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Chinese language learning in the twenty-first century:
towards a digital ecosystem?

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Abstract

Over the last twenty years, a large number of digital tools to support Chinese language learning have appeared. To date, research on these tools has focused mainly on their use in classroom contexts. This growing body of applied linguistics and educational research has yet to be more fully complemented by broader-ranging research in the social sciences on the formation and development of digital communities of learning. Moreover, there is need to consider these tools against research into the operational structures of digital start-ups and digital ecosystems within business and technology studies. The primary aim of this thesis is to provide just such a multi-faceted account of digital Chinese language learning tools: one that incorporates perspectives and findings from different disciplines and areas of research, to explore how technology has transformed the way we learn Chinese in the early twenty-first century.

The theoretical framework adopted in this thesis draws on Pierre Bourdieu's field theory, Clayton M. Christensen's theory of disruptive innovation, and Henry Jenkins' theory of convergence culture. By adopting a transdisciplinary perspective, I seek to gain better theoretical understanding of the commercial, social and political contexts in which the people producing these tools operate, and develop practical understanding to support designers, teachers, and learners in making better tools or using existing tools more fruitfully.

My research was guided by the practical question: *'How might we map the emerging landscape of digital Chinese language learning in a manner that will yield the most useful common understanding of it for learners, teachers, and designers?'* Two conceptual questions were posed to refine the scope of inquiry: *'What is the emerging value proposition of digital Chinese language learning tools, individually and as a system?'* and *'When considering digital Chinese language learning tools, to what extent can we speak of a digital ecosystem being formed?'*

This research required a mixed-methods approach. I combined a morphological analysis of 190 tools and their affordances with digital ethnography, drawing on participant observation and interviews to understand the lived experience of designers, learners and teachers. I complemented this approach with systems-mapping and business case studies to track patterns of co-evolution between a set of core tools and the people or organizations that produced them.

I used my analytical findings to generate a typology consisting of four macro-categories of tools: instructional content, drills & games, formatted content and engagement platforms. I present this typology against the changing norms and practice of Chinese language learning in the twenty-first century.

My findings have allowed me to identify distinctive business models used by different types of tool designers, and trace patterns of technological integration and social capital development among people using, making and circulating digital Chinese language learning tools. Although I was able to detect transmedia learning practices, indicating the possibility of Chinese language learning tools evolving into a digital commons, the commercial, social and political contexts in which the people producing these tools operate are such that any emerging ecosystem remains, at best, fragmented.

In sum, this thesis argues that digital tools for Chinese language learning must be considered within multiple contexts if we are to more fully understand their value for institution-based students and online learners. This contextualized understanding opens the practical possibility of improving the way digital Chinese language learning tools are funded, designed and used.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature:

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Table of contents

Copyright notice.....	ii
Abstract	iii
Declaration.....	v
Acknowledgements.....	vi
Table of contents.....	x
Table of figures	xiv
Table of tables.....	xv
Part One: Digital Chinese language learning tools: conceptualizing an elusive object. 1	
Chapter One: Digital Chinese language learning tools: what are they exactly?.....	1
1.1 Digital technology, China and Chinese language learning, 2000s-2010s .	1
1.2 Framing the object of study	6
1.3 Two conceptual questions.....	19
1.3.1 What is the emerging value proposition of digital Chinese language learning tools, as individual tools and as a system?.....	19
1.3.2 When considering digital Chinese language learning tools, to what extent can we speak of a digital ecosystem being formed?	25
1.4 Structure of the thesis.....	27
Chapter Two: Placing the object in perspective: constructing a transdisciplinary approach to capture a multi-dimensional reality.....	29
2.1 Review of existing research and theory	29
2.1.1 A transdisciplinary approach	29
2.1.2 Digital studies: contextualizing the object.....	31
2.1.3 Business and economics: understanding the structures and drivers defining the shape and evolution of the object	33
2.1.4 Applied linguistics: seeking a normative perspective on the object	37

2.1.5 Chinese Studies: understanding the object as specific and historically situated	42
2.2 Theoretical framework.....	44
2.2.1 Bourdieu's theory of practice.....	45
2.2.2 Christensen's theory of disruptive innovation	52
2.2.3 Jenkins' theory of convergence culture	59
Chapter Three: A mixed-methods approach to paint a new digital landscape	65
3.1 Building a mixed-methods approach	65
3.2 Mapping an uncharted landscape: Moretti's distant reading	67
3.3 The people behind the tools: digital ethnography.....	73
3.4 Tracking patterns of interdependence: comparative case studies	80
3.5 Summary	87
Part Two: Learning Chinese in the digital age – new tools, new practices	88
Chapter Four: Learning Chinese in an age of technological disruption	89
4.1 Learning Chinese in the twenty-first century: sinophones and China-experts in times of disruption.....	89
4.2 Chinese language learning in the twenty-first century: new goals, new practices	93
4.2.1 New technolinguistic systems.....	93
4.2.2 Technology and education: four disruptive possibilities	98
4.3 Speaking Chinese in the twenty-first century	102
4.3.1 Chinese as a global language	102
4.3.2 Chinese language as cultural capital: result and process.	105
4.3.3 Inhabiting new digital spaces.....	108
Chapter Five: Navigating a new learning landscape.....	112
5.1 Articulating a typology	112
5.1.1 Pre-digital tools.....	112

5.1.2	A functional typology of digital Chinese language learning tools	114
5.2	Guiding the learner	123
5.2.1	Tools, resources, practices	123
5.2.2	Three design challenges for individual tools	126
5.3	Towards a learning ecosystem?	131
5.3.1	A chaotic environment: what makes a tool valuable in context?.....	131
5.3.2	Questions of style: from UX to narratives	137
5.3.3	Language learning advice: setting norms in the digital space	140
5.3.4	Peer-learning: building a community of practice.....	144
5.4	The politics of learning Chinese	148
5.4.1	Overcoming the ‘Great Walls of Discourse’	148
5.4.2	Making Chinese easy to learn: ergonomics vs reflectivity.....	152
Part Three: Building a new Chinese language learning ecosystem		155
Chapter Six: Disrupting Chinese language education?.....		156
6.1	Setting the scene: between market and public good	156
6.2	Digital tools as commercial entities	160
6.2.1	Entrepreneurial ventures in a low-cost environment	160
6.2.2	How does a tool establish itself and gain prominence?	165
6.2.3	From value creation to value capture: a spectrum of revenue models	168
6.3	B2B – B2C: working with institutions	173
6.3.1	Institutions as clients, competitors, collaborators or marketing relays?	173
6.3.2	Institutional risk-aversion: the ‘black hole’ of institutional tools.....	179
Chapter Seven: Digital Chinese language education and the shifting field of power		183
7.1	A new learning paradigm.....	183

7.1.1	Understanding the market: how many people are learning Chinese?	183
7.1.2	Who uses digital learning tools? Towards a DIY transmedia experience	191
7.1.3	Online vs offline: an impossible cost-benefit analysis	194
7.2	Making Chinese language learning free?.....	202
7.2.1	Towards a unified digital ecosystem?.....	202
7.2.2	Commodifying community: from free tools to perverted profit economics	205
7.2.3	Digital Chinese language learning tools as a global commons?.....	210
Chapter Eight: A digital ‘ecosystem’ of Chinese language learning in the making?		214
.....		
8.1	‘A close but welcoming community’	214
8.1.1	From tools to people: patterns of integration	214
8.1.2	The geography of digital Chinese language learning tools.....	217
8.1.3	The limits of integration: fair players vs copycats.....	223
8.2	Career continuity across shifting fields.....	227
8.2.1	Designer archetypes	227
8.2.2	The challenges of career continuity	230
8.3	Entrepreneurial tool design: hero’s journey or quixotic pursuit?	232
Conclusion		237
Appendix One: A list of reviewed tools		240
Appendix Two: Interview questions		254
Appendix Three: Stakeholders mapping.....		255
Appendix Four: How many people are learning Chinese?		259
Bibliography		278
Books, papers and reports		278
Websites, online media and other online sources		299

Table of figures

Figure 1: A functional interface typology.....	120
Figure 2: Tools and resources	122
Figure 3: Digital tools facilitating language learning	125
Figure 4: Skritter logo: winning brief	139
Figure 5: Chinese learners - 2017 figures	186

Table of tables

Table 1: Learners interviewed	78
Table 2: Teachers interviewed	78
Table 3: Number of enrolled Chinese students, by category	187
Table 4: Location of tools (by country)	219
Table 5: Location of tools (by city)	220

Part One: Digital Chinese language learning tools: conceptualizing an elusive object.

Chapter One: Digital Chinese language learning tools: what are they exactly?

It was disappointment that prompted me to undertake this PhD research in 2015. I had hoped that by the mid-2010s, an integrated set of efficient digital tools for Chinese language learning would have become available on the World Wide Web, operating as a global commons or a global public good. However, this has not happened, even though the range and number of tools have continued to expand. To understand the digital tools that constitute the object of study for this thesis, we need to consider the broader environment in which they appeared.

1.1 Digital technology, China and Chinese language learning, 2000s-2010s

In the early 2010s, after the Global Financial Crisis and as a new generation of millennials entered the workforce, it seemed like the paradigm for organizing collective activity was about to shift. The main impetus behind this was the new set of possibilities opened by the rapid expansion of the Internet and mobile technology, leading to new forms of social interaction, economic organization, cultural expression, and media consumption. Social changes from connected digital technology predate the early 2010s, but that period seemed to herald the mainstreaming of those tendencies.

A key aspect of the change underway was a shift from centralized to distributed models of organization. In the economic realm, this was variously referred to as collaborative consumption, the peer economy or the sharing economy. New technology could match demand for and offer products on a large scale, and allow people offering and seeking products or services to interact directly, without the mediation of a centralized agency, through platform interfaces – websites or apps – acting as digital marketplaces. Key examples of this business model that have been globally successful are AirBNB and Uber. A variation of this model was the delegation of certain types of productive activities to digital crowds, with large numbers of people collaborating towards a joint goal via ‘crowdsourcing’. The most successful and famous example of this model is arguably the free digital encyclopaedia Wikipedia. A similar shift away from centralized models occurred in the cultural and media industries, which have been transformed by the rise of social media and

user-generated content in text (blogs), audio (podcasts) and video format (e.g. YouTube), in a phenomenon often labelled Web 2.0 (O'Reilly 2005).

For individuals, this shift gave rise to new forms of employment in a paradigm often referred to as 'the future of work' or 'gig economy', characterized by a combination of freelance work, portfolio careers, and small-scale entrepreneurship from co-working spaces (Waters-Lynch 2018). This change was also accompanied by a new social vision, particularly evident in the rise of new forms of organization that combine income-generation and social purpose – social enterprise, B-corps, and for-purpose companies – as well as new discourses on social innovation and social impact measures (Mulgan et al. 2007). There was also rising interest in the commons as a twenty-first century concept, marked for instance by the award of the Nobel Prize in economics to Elinor Ostrom in 2009, in recognition of her work on the governance of commons.

The shift to distributed models of organization took place amid changes within global capitalism, marked by the development of international supply chains, outsourcing practices and the rising importance of global cities, in a process often described as 'globalization'. It was also accompanied by a geopolitical change that departed from the previous world order of economic, cultural and military domination of Europe and North America, to a new order in which Asia's two major countries, China and India, are increasingly influential. In Australia, the currency of the term 'Asian Century' to describe this new geopolitical environment was boosted by an Australian government White Paper released in 2012, titled *Australia in the Asian Century*, highlighting the importance of building 'Asia literacy' and learning Asian languages (Australian government 2012).

China holds a particularly important place in this scenario. The last thirty years have seen a steady rise in China's integration into the globalized world – from the opening of the very first McDonald's on 8 October 1990 to the spectacular staging of the Beijing Olympics in August 2008 – this date being often used to mark the official entrance of China as a key player on the global stage. China's new status today as the world's second largest economy has seen a large influx of temporary visitors to China, increases in mid- to long-term foreign

residents in China and the numbers of Chinese people travelling, living or studying abroad. This has fuelled people's appetite for learning the Chinese language the world over.¹

The global rise of China was also accompanied by internal changes in the country, brought about by new technologies. In the early 2010s, and in spite of the Chinese government's censorship efforts, particularly the blocking of leading global websites such as Facebook, Google, Twitter, or YouTube, a Chinese civil society had developed on the Internet, with more open debate through blogging platforms and microblogging social media network Weibo, while new communication technology has prompted new forms of social connections among digitally connected Chinese millennials (Wang, T. 2013). Over the same period, the growth of a global Chinese diaspora created a new appetite for Chinese language learning, particularly among the children of this diaspora (He & Xiao 2008). Meanwhile, the PRC also promoted the Chinese language through state-funded Confucius Institutes as part of the government's global soft power effort (Gil 2009, 2017).

Having migrated to Australia from France at the end of 2008, I quickly noted the importance of China for Australia, and made use of tools available at the time to learn Chinese autonomously. In 2011, I founded an organization called Marco Polo Project, an online platform exploring new collaborative translation models to foster Chinese culture and language peer learning. This gave me first-hand experience in the type of work required to

¹ Throughout the thesis, I use 'Chinese' or 'Chinese language' as shorthand when referring to the form of the language otherwise described by scholars as 'modern standard Chinese', and sometimes also described as Mandarin or 普通话 (*Putonghua*) in the People's Republic of China (PRC). This language is itself the result of standardization efforts, applied to its phonetics (with the Beijing phonological system as a norm), its syntax and vocabulary (with northern dialects as a norm) and its written form (in particular, with 'simplified' characters used in the PRC, and a standard transcription system in Roman script known as *Hanyu pinyin*). Guidelines regarding *Putonghua* – including the form of language to be taught in state-sanctioned institutions and used in digital formats – have been more recently issued in the Language Law of the People's Republic of China (Kirkpatrick & Xu 2001). A range of dialects exist on the Chinese mainland, some mutually unintelligible in their spoken forms, and there is a broad range of phonetic differences or accents across regions, as well as a distinct set of characters (known as 'traditional') used in Taiwan and Hong Kong. Most of the tools I consider focus on *Putonghua*, though some include or support the learning of variations (such as simplified vs traditional characters, and sometimes different accents or even dialects). Comparative study of the extent to which the language presented by different tools aligns with *Putonghua* as defined in the Language Law exceeds the scope of this thesis, as does research on tools that more specifically enable learning Chinese dialects (especially Cantonese).

develop a digital Chinese language learning tool, and allowed me to become involved in several online projects and communities that were developing education-related software and content.²

Through these activities, I became part of a ‘social innovation ecosystem’ in Melbourne. In particular, from 2012, through working with Hub Melbourne, Australia’s largest co-working space for social impact at the time, where I shared desks with people from Australia’s largest crowdfunding platform Pozible, Melbourne’s largest innovation consulting firm Inventium, and the Australian branch of the School of Social Entrepreneurs. Using digital communication channels – email and social media – I was also able to develop international contacts and collaborations around digital Chinese language learning. From 2011 to 2014, I exchanged and collaborated with the designers or founders of digital learning tools Hacking Chinese, FluentU, Skritter, Fourtones, Duable, Clavis Sinica in the various roles of beta tester, informal advisor, blog contributor, or project collaborator, at the same time as I used their tools for my own learning.³

As digital tools to support the learning of the Chinese language were growing in number, things, however, took a different turn in the digital economy at both macro and micro levels. After an initial period of general enthusiasm, Uber and AirBNB started to

² The question of language deserves a note at this point. One condition to join those communities was the command of English, as interactions were conducted in English, which has been described as ‘the language of the Internet’. The groups and communities I joined were comprised of L1 and L2 English speakers. I am myself an L1 speaker of French, and L2 speaker of English, and Olle Linge, author of Hacking Chinese and one of the key figures in digital Chinese language learning, is an L1 speaker of Swedish. In addition to language, ‘culture’ also deserves a mention, as a number of people I interacted with were of Chinese background (Australian- or American-born Chinese, sometimes with families of Malaysian or Singaporean origin).

The great majority of tools I observed have English as their default interface language. Anecdotal evidence from my fieldwork indicates that tools with an English language interface are widely used by learners who are L2 speakers of English. It is, however, uncertain to what extent the ready adoption of English language tools by L2 speakers of English poses a barrier to global adoption, or negatively impacts learning outcomes for learners with only rudimentary English using the tool. The research presented in this thesis primarily takes into consideration learners who have English as an L1 or a high command of English as an L2, but the precise demographic composition of this learner group is not altogether certain. I detail this further in Chapter Three, and explore some of the implications in Chapter Seven.

³ I collaborated in the same manner with Italki and Mandarin Shooter Quest in 2016, and in 2019, was contacted by Duolingo to advertise a weekly translation event that I run in Melbourne through their platform.

become perceived as exploitative towards workers and disruptive for local communities. Public perception of Facebook and Twitter changed, as growing concerns arose regarding encroachments on privacy and the risk of users inhabiting filter bubbles. MOOCs never quite lived up to their promises and crowdsourcing failed to expand effectively beyond Wikipedia. Meanwhile, the rise of a digitally active civil society in the PRC was limited by crackdowns on bloggers and tightened censorship.⁴

As for digital Chinese learning, a few quality tools that had been developed from the early 2000s are still available today. The Pleco dictionary offers a striking example of a digital tool that brought radical change in the way that language learners could access Chinese characters. Other tools such as Skritter and Italki are also widely used and have proven economically sustainable. Through those tools, new learning practices were now possible. Many of the people I interacted with from 2011 to 2014 are still involved in developing or maintaining tools for digital Chinese language learning and derive some or all their revenue from those activities, indicating a measure of success. However, so far, no ‘killer-app’ has emerged. Rather, different tools focusing on different aspects of the learning process co-exist.

While there has been research on the contribution that various tools can make to classroom learning and self-study, there has been no systematic academic study examining the rapid development of the new digital Chinese learning field as a whole, considering it in the context of technologically facilitated disruption, and globalization. The research I undertook aimed to: (i) identify the types of digital tools currently in existence, in order to (ii) better understand what drives design decisions resulting in the development and success of different types of tools, to then (iii) question whether these tools are leading to the formation of a recognizable (and sustainable) field of operations – what might be called a digital ecosystem for Chinese language learning.

⁴ I will return to Chinese Internet censorship throughout the thesis. It should be mentioned here that the most important impact, for the present object of study, is not so much the censorship of certain tools, but the existence of separate ‘PRC-centric’ social media platforms (Weibo and particularly WeChat). A second-order consequence is the relatively low presence of L1 Chinese speakers – and therefore, Chinese language content – on dominant social media platforms of the global Internet, particularly Facebook and Twitter. I will return to this point more particularly in Chapter Four and Chapter Seven.

The research primarily focuses on digital Chinese language learning tools that were available in the period 2005-2017. I adopted 2017 as an end date both for pragmatic reasons – as it marked the end of the field research for this PhD – and to include the Chinese version of the leading language learning app Duolingo, released in November 2017. In the thesis, I consider both the types of technology used and the people running and designing these websites, platforms and apps. I also consider the existing institutional landscape of Chinese language training as an important context against which these digital tools have been developed, and are currently being used.

1.2 Framing the object of study

The key research question I formulated for this thesis is an open-ended one, encompassing both empirical and theoretical dimensions: *‘How might we map the emerging landscape of digital Chinese language learning in a manner that will yield the most useful common understanding of it for learners, teachers, and designers?’*

In the pre-digital era, a prospective Chinese language learner would have the choice between attending a brick-and-mortar learning institution, private tutoring accessed through personal networks or classifieds, and a limited number of ‘Teach Yourself’ print books or dictionaries, flashcards, CD-Roms or audio methods. New technology has multiplied the range of available options. A search query on the Google search engine for ‘learn Chinese online’ in February 2019, for instance, yielded 1.32 billion results. A search on the iOS Appstore using the phrase ‘learn Chinese’ conducted on the same date did not return a defined number of results, but showed hundreds of apps available for download. Making sense of those results is, however, a serious challenge. Digital technology has increased the *number* of tools available by changing the economic conditions of distribution and production, but more importantly, it has also given rise to *new types of tools* that make new types of practices possible. For now, however, there is no unified vocabulary nor a clear model to classify what those various tools and practices are.

I noticed this gap most clearly in 2013, when I provided advice to Olle Linge from *Hacking Chinese*, one of the most prominent blogs on autonomous Chinese learning, on the development of the resources section of his website. The intention was to establish an authoritative list of the most relevant digital resources for Chinese language learning to support learners and – incidentally – teachers. The problem of classifying those resources became immediately apparent, as no clear, consistent and consensual typology was available.

Different ways to classify digital Chinese learning tools circulate on blogs and social media, as well as in papers from experts in second language acquisition, education technology or related fields. The criteria used to distinguish different types of tools are often heterogeneous in nature, and range from a tool's intended context of use (autonomous vs classroom learning) to the nature of the input (audio, video, text), the type of competency that the tool is designed to develop (listening, speaking, reading, writing), the business model (free, pay per view, subscription), the linguistic competence of the intended user (beginner, intermediate, advanced) or the intended use of the language by the target user (business, travel).

Two main ad hoc classifications were used on blogs and forums at the time and remain in use today. The first classifies tools in relation to a learner's language ability, typically distinguishing 'beginner', 'intermediate' and 'advanced' learners. The second separates tools according to four competencies: speaking, listening, reading or writing, in line with the segmentation used by many standardized language tests. Both are rudimentary types of classification that present serious limitations. Sorting learners by level is often too vague to be genuinely useful. As for the second mode of classification, it misses the fact that the four competencies are interdependent. While some tools can better support one or other of these, most tools cater to all four competencies – with the rare exception of a few tools specifically designed for one narrow aspect of learning, for instance tools to aid tone discrimination as a crucial element of Chinese listening competency, or tools to help users memorize stroke order as part of learning to write Chinese characters.

As these two rudimentary types of classification were the most widely known and used, Olle Linge eventually adopted them to sort the tools on Hacking Chinese Resources. As these categories are unclear, however, many of the resources appear under multiple tabs, reducing the usefulness of the typological framework. In addition, and in reaction to this overlap, Olle Linge adopted a third ad hoc framework that distinguishes six types of resources: 'information-and-advice', 'resource-highlights', 'tools-and-apps', 'social learning', 'resource-collections' and 'courses-and-textbooks'.⁵

A key insight I gained from my discussions with Olle Linge and my own observations was the distinction between two concepts: 'tool' and 'resource'. These terms not only refer to

⁵ 'Hacking Chinese Resources'. Hacking Chinese. <http://resources.hackingchinese.com> (accessed September 24, 2019).

different sets of virtual artefacts, but more fundamentally indicate different ways of conceptualizing them. A learning tool is *designed for learning*, and we expect this to be somehow reflected in its form. By contrast, the term ‘resource’ encompasses learning tools as well as a range of other artefacts that a learner or teacher can put to use for language learning activities. Those include Chinese language texts written for first language speakers, Chinese video clips, Google Translate, or the social media network WeChat. Ultimately, anything that might support a Chinese language learning activity could be construed as a resource, from images of the Great Wall to dumpling recipes or tumbling baby panda GIFs. The concept of a tool emphasizes the role of human agency in creating a purpose-driven artefact conducive to learning. By contrast, the word ‘resource’ emphasizes the ‘resourcefulness’ (pun intended) of individuals, that is, their capacity to make use of what is readily available in their environment to achieve a certain learning goal.

Reflecting on this distinction, I identified three key modes of relating to these various digital artefacts. *Learners* use tools and resources to improve their Chinese language skills; and *teachers* use them to help others improve their skills (and may also use them to maintain their own language skills); while *designers* develop digital artefacts intended to support learning – that is, tools as defined above – and experiment using other tools and resources in order to produce the best possible version of their own tool.⁶ The same individual might have different roles over time (e.g. a learner might work as a teacher at an institution after graduation, or work as a tutor after developing linguistic competence), or at the same time (e.g. a designer might also be learning the language or teaching it). In turn, this distinction between three different and related roles prompted me to realize that these digital artefacts supporting the learning of the Chinese language defined – or might define – a new social

⁶ It should be noted that I define the roles of ‘teacher’ and ‘learner’ independently of institutions. Some learners are enrolled in a course, others study autonomously. As for teachers, the rise of what I earlier described as the ‘gig economy’ affects their professional identity, their working conditions and their practice. A ‘teacher’ may be employed at a school or university, casually or on a permanent basis. They may also – alternatively or in addition – work as an independent tutor, offline or online. I reflect on the complexity of this situation, and the role played by digital technology in redefining the practice and identity of teachers and learners, through the body of the thesis, more particularly in Chapter Four.

realm where learners, teachers and designers come together: something resembling a field, or stabilized system of social positioning, as articulated in the works of Pierre Bourdieu.⁷

The distinction between the concepts of ‘tool’ and ‘resource’ has serious implications when it comes to defining domain boundaries. It is possible, at least in theory, to create something like a finite list of learning tools; but since any virtual artefact with a vague connection to Chinese language learning may become a resource in the hands of a creative enough learner or teacher, then using ‘resource’ as a primary concept means that the entirety of the Internet – or at least a significant portion of it – could be considered as somehow part of a Chinese language learning ecology. In addition, whoever made that resource might also need to be considered as part of the emerging social realm I have tentatively called a ‘field’, in which to locate the various people who make and use digital artefacts for Chinese language learning.

It would be tempting, for pragmatic reasons, to focus exclusively on learning tools, and exclude resources altogether from the scope of this research. However, the clear continuity between tools and resources makes this highly problematic, at least as a first approach. This continuity became evident in the fieldwork I conducted during the research. In answer to an open question about the digital tools that they used, all the Chinese language teachers I spoke to indicated that they used some form of technology. Most often mentioned were videos used in class (YouTube), customizable software for quiz generation (Quizlet and Kahoot) and gamified apps for homework (Skritter and Hello Chinese).⁸ As for learners, all the ones I spoke to mentioned WeChat and Pleco. When I asked designers about tools that they considered to be competing with or complementary to their own, the most often quoted were Pleco and Skritter. Their answers show a clear continuity between tools narrowly designed to learn Chinese (the Pleco dictionary or Skritter flashcards), tools generically used for learning (Quizlet and Kahoot as generic flashcard systems which can be used for Chinese vocabulary revision), or tools designed for Chinese speakers (such as Chinese videos on

⁷ Bourdieu’s field theory constitutes a core element of my theoretical framework, and is explored more in detail in Chapter Two.

⁸ The terminology itself was explicitly questioned by two of the teachers I interviewed, who asked ‘*I don’t quite understand what is a digital tool*’ (TE4) and ‘*Digital tools, do you mean applications or?*’ (TE1). More details about the interview protocol are provided in Chapter Three.

YouTube or YouKu or WeChat) that have been adopted for a pedagogical use other than their original ‘socializing’ intent.

This continuity between tools and resources led me to think of digital Chinese learning in light of the concept of bricolage put forward by the anthropologist Claude Levi-Strauss. ‘The “bricoleur”’, writes Levi-Strauss, ‘is adept at performing a large number of diverse tasks but, unlike the engineer, does not subordinate each of them to the availability of raw materials and tools conceived and procured for the purpose of the project. Instead, his universe of instruments is closed and the rules of his game are always to make do with “whatever is at hand”’ (Levi-Strauss 1966, p.17). I propose here that teachers and learners act as ‘bricoleurs’ when they make use of available digital resources and tools to support a certain learning practice or a combination of learning practices that no pre-existing tool or resource satisfies on its own.⁹

Many teachers of Chinese, for instance, will combine different tools and resources to construct a pedagogical sequence for a particular student, a class or a term of study.¹⁰ This is a common and well-known practice. As Steven Thorne writes:

Second and foreign language researchers and educators have long recognized the potential of digital technologies to provide access to input, practice and rehearsal (audio recordings, video, tutorials, drills, mini games), to amplify possibilities for meaningful and creative expression (text and media processing), to extend existing and create new opportunities for interpersonal communication (synchronous and asynchronous messaging, online intercultural exchange), to collaborate in (often) linguistically rich multiparty interaction in the “wild” (i.e. naturally occurring and non-institutionally located online environments and communities), and to construct relevant presentations of self in digital media environments (Thorne 2016, p. 241).

Learners also operate as bricoleurs when they combine tools and resources as part of an autonomous learning practice conducted digitally, for instance when they use the Pleco dictionary to look for the meaning of a new word encountered in a Chinese text accessed

⁹ Design has been explicitly compared to bricolage, in particular by Louridas (1999).

¹⁰ What I describe here as a bricolage practice occurs when teachers combine different resources and tools available online to construct a course, or even as suggestions for additional practice to their students. It differs from the wholesale adoption of a complete and integrated digital ‘package’, for instance as developed by the teaching and learning unit of a university, or provided alongside a textbook.

online, then add this word to their vocabulary list on the Skritter flashcard app, or even when they alternate between practising Skritter flashcards and listening to podcasts. This is continuous with earlier modes of autonomous learning that combined a Teach Yourself book, handwritten lists of characters in a notebook, and watching Chinese language films with subtitles, but new technology has greatly increased the range of options available. Understanding whether ‘bricolage’ also qualifies the practice of designers requires further conceptual articulation.

For now, we can see that what makes this bricolage possible is the sense that different tools and/or resources can be used together as a set to support a learning practice. The teachers, learners and designers whom I interviewed or consulted over the course of my research shared this perception. They see digital learning tools as belonging within a larger collection of available tools and resources supporting the learning of the Chinese language, akin to what Levi-Strauss calls the ‘treasure’ of the bricoleur. Formal differences between different tools and resources – especially their interface and the content they present – are understood as *relatable* to each other as part of a conceptual system or a typology of tools.¹¹ This relatability is central to the perception of tools as serving distinct and complementary functions in an ecology of learning. It is obvious that, for now, there is no clear, consistent and explicit conceptual system shared across designers, teachers and learners. Rather, a broad range of such systems co-exist, with only some measure of overlap. Core to my key research question is an attempt to make those conceptual systems explicit, and by doing so, to reveal and hopefully increase their level of alignment.

The concept of affordances, originally introduced by psychologist James Jerome Gibson, offers a first point of approach to identify a basis for developing such a typology of tools. The concept is used to describe an environment as it is functionally perceived by an animal – that is, in terms of what it offers, provides or furnishes. The affordances of an environment relate to its physical properties, but only to the extent that these properties are measured relative to a certain agent, for instance its posture or behaviour (Gibson 1979). The concept has since been adopted in a broad range of contexts, including in applied linguistics,

¹¹ This relatability includes both tools and resources. By this, I mean that different digital artefacts are and can be grouped on the basis of certain formal characteristics conducive to certain learning practices – for instance, videos for listening practice or social media tools for chatting – and are therefore relatable to other tools and resources as part of an ecology of learning. I will return to this in Chapter Five.

as part of what has been called an ecological approach to language learning.¹² In this perspective, ‘affordances are relationships of possibility, that is, they make action, interaction and joint projects possible’ (Van Lier 2010, p.4). We might say, then, that affordances are the most appropriate criteria to distinguish among different types of tools, and therefore a key component of any tool typology.

It is important to underline here that the affordance of a digital artefact is more than a formal attribute: it is, more precisely, a formal attribute as it relates to a function that a user (learner, teacher or designer) is able to perceive, and considers as possible and/or desirable to pursue. That the same object will have different affordances depending on a user’s capacity to perceive them is well-known among language educators. For instance, as Li Jin (2017, p.3) points out, a film in a target language will provide advanced learners with rich input for listening practice, while it only offers isolated words and cultural understanding through images for beginners. More generally, the affordances of any digital artefact will depend on a user’s capacity to conceptualize it as supporting a certain practice conducive to language learning. They will more broadly depend on the user possessing a certain normative framework that articulates those different practices as complementary and effective (to different degrees) towards learning. A typology of language learning tools, therefore, is closely tied to a typology of possible language learning practices.

When it comes to developing a typology of tools, a key difficulty lies in the fact that the tools are in a state of constant and fast evolution. The same applies to digital technology at large, where new digital artefacts that can support learning practices constantly appear, from new videos and social media networks all the way to automatic translators and hardware devices enabling access to virtual reality environments. As new tools appear and old tools become obsolete, or as existing tools are upgraded, or as digital technology more generally evolves, new practices become possible and desirable, new discourses circulate, and new conceptual models evolve. Thus, there is an inherent tension between *what currently is* – a certain set of existing tools and resources enabling a certain set of practices and patterns of relationships between them – and *what is emerging* – tools and other digital technology in development or recently released but only adopted by a small group, and enabling new types of practices, or supporting practices better than other tools. Not all of the people using or making those tools are aware of all those changes at the same time, leading to the

¹² I explore this approach in more detail as part of my literature review in Chapter Two.

simultaneous existence of multiple typologies. This is a relatively simple issue, more generally related to well-understood patterns of technological adoption.

A more fundamental difficulty stems from the particular ontology of digital artefacts. Classifying and articulating a typology of tools would require a clear capacity to identify and distinguish among the different tools in existence today as discrete entities. Specifically, four things would need to be considered when analyzing each tool:

- the tool's identity (how would one classify this tool: is it 'the same tool' when used on different devices or does a tool used on a desktop become 'a different tool' when it is used on a mobile phone)
- the tool's component parts (when should we talk about 'different parts of the same tool' vs 'different tools')
- the tool's temporality (are we seeing 'a new version of the same tool' or 'a new tool')
- the tool's quality (how to distinguish 'the same type of tool' from 'a different type of tool').

In none of these aspects is any of these distinctions clear-cut.¹³

Digital language learning tools are computer programs or software – long strings of code ultimately reducible to a series of 0's and 1's – accessed through a hardware device, for instance a phone, tablet, or computer, equipped with an operating system.¹⁴ This operating system can translate the underlying code into, for instance, a visual interface with various functionalities, a set of Chinese characters forming the first chapter of the *Analects*, or the

¹³ It would be, of course, possible to discuss at length whether the US and UK versions of a book with a different cover and a price listed in dollars or pounds, or a second print of a book with a new preface and a few corrections, or the two tomes of a large book, should count as 'the same book'. It is very clear that this question is considerably simpler to address than it is in the case of digital artefacts.

¹⁴ I limited myself to software-based tools for this research. This is in line with the general evolution of digital technology, which presents polyvalent hardware devices – as opposed to, for instance, digital translators existing as a separate device. However, in 2018, I came across a crowdfunding campaign for a new hardware tool, 'Lily, the first AI speaker that can help you learn Chinese'. This tool was developed too late to be part of my research data. It is uncertain, at this point, whether a new trend can be expected where separate hardware devices for Chinese language learning will become prevalent. The likely trend towards increasing connection of devices as part of what is often referred to as the Internet of Things would invite consideration of the possible role played by different connected devices with different affordances as part of an ecology of learning. Considering those questions exceeds the scope of this thesis.

picture of a panda. This also means digital artefacts have fuzzy boundaries. They cannot be individualized in the same manner as physical objects which have clear material boundaries, for instance printed texts circulating in book form, but rather exist in a state of interdependence with other digital technology, from hardware devices to operating systems and data networks. In addition, as information and communication systems experts Jannis Kallinikos, Aleksi Aaltonen and Attila Marton write in a paper titled ‘The Ambivalent Ontology of Digital Arterfacts’, digital artifacts are ‘perpetually in the making’ (2013, p. 357) and ‘lack the stability and plenitude of traditional [material] objects’ (ibid. p. 366).

In short, the plasticity of tools makes their identity inherently uncertain and changeable. In most cases, a tool can be accessed through different types of hardware: for instance, the Skritter flashcard system can be accessed through a desktop computer, a laptop, a tablet or a smartphone. It would seem that digital Chinese language learning tools are hardware-indifferent: that is, Skritter should count as the same tool, whichever hardware is used to access it. To what extent, however, should Skritter-on-a-smartphone be considered as ‘the same tool’ as Skritter-on-a-desktop, when one key feature – mobile access – is present in one case and absent in the other?¹⁵ To give another example, should we consider the Pleco dictionary in its original version for PDAs as the same tool as Pleco when used on a smartphone, considering that smartphones have a camera, and one feature of Pleco-on-a-smartphone is optical character recognition (OCR), whereby the software is able to provide the meaning of a character captured through the camera? More generally, many tools are accessible in two different versions: a simple free version, and a ‘premium’ version with added functionalities. Are those to be considered as ‘the same tool’ or ‘a different tool’?

This point has greater relevance for the present research than simple definitional hesitation. It implies that the continued existence of a digital learning tool is directly tied to its ongoing capacity to operate as part of an evolving ecosystem of digital technology, consisting of hardware, operating systems, and a network of other pieces of software. As such, to survive over time, tools need an ongoing investment of resources and energy from a designer to ensure that they remain compatible with that underlying digital infrastructure as it

¹⁵ This question is all the more relevant as Skritter can be accessed on a phone in two ways: through the phone’s web browser, or as an app directly downloadable to the phone, where features such as display quality and overall accessibility are optimized for phone use. Different strings of code must be written to make Skritter accessible as an app and a web-browser: in terms of their underlying code, ‘Skritter-app’ and ‘browser-Skritter’ are therefore not the same tool.

evolves.¹⁶ Digital tools are thus both static and dynamic objects, and any mapping effort needs to capture this dynamic element to provide useful common understanding.

This point directly relates to another: not only do new tools appear constantly, but existing tools evolve over time. They do so both in line with the evolution of digital technology – whereby designers use the new affordances of new digital devices to develop new functionalities for an existing tool – and as part of an independent, ongoing process of improvement, so that successive versions of the tool present affordances that are better and better adapted to the needs and preferences of learners (or any other pedagogical, commercial or other goal that designers optimize a new version of their tool for).

An associated difficulty is that it is often unclear what should count as one tool with complementary features, as opposed to different tools brought together under the same brand. To give a concrete example, Pleco started as a digital Chinese-English dictionary, but has since added other functionalities, including a set of flashcards to support vocabulary acquisition. Are ‘Pleco-dictionary’ and ‘Pleco-flashcards’ to be considered the same tool, or two different tools bundled together? And does the fact that Pleco and Skritter both offer flashcard functionalities mean that Pleco and Skritter are ‘the same type of tool’? Two characteristics of digital artefacts that Kallinikos, Aaltonen & Marton (2013) refer to as ‘granularity’ and ‘modularity’ are relevant here. Digital tools are *granular* in regards to ‘the minute size and resilience of the elementary units or items of which the digital object is composed,’ and *modular* in regards to ‘the organization of the items and operations [of digital artifacts] that make up a system in distinct and relatively self-sufficient blocks’ (Kallinikos, Aaltonen & Marton 2013, p. 360).

To take the example of Pleco, for instance, it is unclear what is the most appropriate level of abstraction to describe its component elements. Is it enough to define it as a ‘digital dictionary’, or should one describe it as the combination of a ‘touchscreen input’ with a

¹⁶ It is worth noting that the level of dependence on the broader technological ecosystem varies at least in part in relation to choices made by designers when it comes to development. As a general rule, tools that are coded from scratch tend to be more robust than tools developed on top of existing platforms – for instance, tools using the Wordpress blogging interface with added plugins. In the latter case, the ongoing existence of the tool is directly tied to the ongoing existence of that underlying software, and updates to this underlying software can lead to dramatic loss of functionalities for a tool. More generally, tools that exist as e.g. videos on YouTube or series of blog-posts hosted on a certain blogging interface, are directly dependent on this underlying software infrastructure.

‘bilingual database’, or should smaller units of analysis be adopted? This is a matter of ontology, but also of norms and habit: while education systems and academic traditions are relatively well established when it comes to analyzing, for instance, the constitutive elements of a text, or a film, or physical machines such as a car, when it comes to digital artefacts, things are far less settled.¹⁷

To address this, as a first point of definition, I would like to propose that there are three key levels at which digital tools can be usefully described. They are recognized for their core functional units – for instance, as the Skritter-*flashcards* or the Pleco-*dictionary*. They are also instantiated artefacts, insofar as they may consist either of just one core functional unit, or multiple such units bundled together – for instance, the Pleco app as dictionary, flashcards function, OCR, etc. Finally, each tool also exists as a brand. That brand includes a recognizable logo, name and style, and is carried across multiple sites of digital presence, whether in the form of social media handles, a landing page on the Appstore, or a blog. In further chapters, when the need for distinction arises, I refer to those three levels of capture as ‘tool-as-core-functional-unit’, ‘tool-as-instantiated-artefact’ and ‘tool-as-brand’.

Earlier, I described teachers and learners of Chinese, as well as designers of digital tools, as bricoleurs. When considering the work of a designer producing a new tool, the three levels of description I articulated above need to be considered. In doing so, it is also important to note that tool designers do not create entire technological systems from scratch: rather, they identify what affordances of digital technology can be used for the purpose of Chinese language learning, and find ways of bundling and presenting them in a manner that will be most conducive to that goal. To do so, their tool must include some sort of ‘user’s manual’, so that it is indeed used towards its intended goal.¹⁸ To that extent, the work of designers is very close to the work of teachers recommending a certain practice to their

¹⁷ The following anecdote may be illustrative of the prevailing confusion. In 2017, I was invited to provide input on a draft paper on digital Chinese learning written by an Australian academic that I had met at the LCNAU conference. Central to the paper was a table summarizing key existing technologies to learn Chinese. One of the columns bore the label ‘types’, and listed the following possible categories: ‘software’, ‘app’, ‘online platform’, ‘online learning app’, ‘mobile app’, ‘learning platform’ and ‘learning tool’. This list contained no definitions and the categories were treated as if they referred unproblematically to discrete objects. The ontological questions that I have raised here were outside the author’s purview.

¹⁸ This can be presented in the form of an explicit set of instructions through text or video, or in a more intuitive manner by using graphic and interface layout cues, and relying on a learner’s capacity to use digital technology.

students and directing them to a resource supporting that activity. It is also continuous with what learners do when sharing learning tips on a forum, when posting a list of recommended tools or resources on their personal blogs – or even, one might argue, when they write a review of a tool or share updates about their practice on social media. This continuity reinforces the possibility, mentioned earlier, that a new social realm – somewhat resembling a field – might be emerging where learners, teachers and designers come together. It also signals the possibility of struggles for primacy among learners, teachers and designers.

This description of digital learning tools resonates with the way that French philosopher Jacques Ellul discusses technology in his seminal book on the topic (Ellul 1954). The realm of technology, argues Ellul, goes beyond machines and artefacts, and includes entire systems of organized activity that shape technologically advanced societies. In the same way, digital Chinese language learning tools exist as a set of artefacts, but also depend on underlying digital technology, as well as a certain state of language education as it is conducted through different institutions. They depend more broadly on the economic system that organizes the labour to produce them, and on a certain state of discourse regarding language education – and the Chinese language itself.

The complex ontology of digital learning tools, as well as ensuing uncertainties when it comes to describing and comparing tools or separating tools and resources, have crucial implications for my research. Digital Chinese language learning tools need to be treated not as given but as a dynamic construct. To the extent that these tools are the products of intentional design, they can be considered as an important feature of Chinese language learning in the digital age, notwithstanding the difficulties outlined earlier (e.g. of how one defines such a tool).

When attempting to map an emerging landscape of digital learning tools, the practical aspect of my inquiry will thus be to identify a large range of currently active digital artefacts – more specifically, learning tools designed to support Chinese learning, but also digital artefacts designed for other purposes that are consistently used as resources to support Chinese learning practices. It considers the most useful ways of categorizing those tools and resources in order to provide an overarching perspective. This will allow me to consider how these tools and resources are or might be of value to learners and teachers and what developments are underway among their designers.

The reflective aspect of my research is related to the practical mapping described in the previous paragraph. I want to ascertain whether the tools and resources that constitute my object of study have the capacity to be better integrated as complementary parts of a structured system of online language learning. The emergence and ongoing development of such a system would enable customizable learning experiences for bricoleur-like learners pursuing different goals. More generally, this thesis reflects on Chinese language learning as a practice evolving under the influence, and affordances, of new digital technology.

In mapping this landscape, I chose to pay more particular attention to the perspectives of tool designers. This choice was motivated by the desire to fill a knowledge gap, in line with an observation by Phil Benson in the introduction of his 2011 book, *Beyond the Language Classroom* (Benson 2011). Benson notes that teachers' emphasis on their direct practice, together with the greater difficulty of studying what happens beyond the classroom, has resulted in a knowledge asymmetry, whereby effectiveness of classroom learning is relatively well understood, but there is a relative lack of understanding when it comes to learning beyond the classroom (Benson 2011, pp.7-16).¹⁹ This choice to centre the research on the perspectives of designers – and consider the perspectives of teachers and learners as complementary, rather than central – is intended as a way to understand digital tools, as it were, 'on their own terms', and offer a fresh perspective on the object. One consequence is that this thesis does not specifically address the interests of readers whose primary expertise is in Second Language Acquisition: in particular, this thesis does not directly assess the pedagogical value of different tools and their associated practice. For reasons of space, and given the transdisciplinary nature of my research, it was necessary to impose this limitation on the present project. A study of these tools for classroom or independent language-learning practice would require another thesis in its own right, within the field of applied linguistics.

¹⁹ To give one example from personal experience, in November 2015, I presented a paper based on early results of this research at the third conference of the Languages & Cultures Network of Australian Universities (LCNAU) at Macquarie University. The use of new technologies was one of the most common topics for presentations during this three-day conference. However, almost all of those papers either reflected on case studies relating the application of certain tools to an existing curriculum, or offered general reflections on the impact of new technologies on language classrooms and language teachers. Only two presentations that I was aware of at this conference – including my own – took a different angle, and frontally questioned the way that digital tools might affect the experience of learners irrespective of their enrolment in offline classes. This is one of the key reasons I chose to prioritize the perspective of designers in this research.

To answer my key research question, I will need to pose two conceptual questions, which expand on the key topics articulated in this section. The first pertains to the perceived value of digital Chinese language learning and is framed around the value proposition of digital tools for Chinese language learning. The second is more speculative as it asks whether there is sufficient evidence of integration and systematization of the digital tools and resources under study, such that we might refer to an emerging ‘ecosystem’ of online Chinese language learning.

1.3 Two conceptual questions

1.3.1 What is the emerging value proposition of digital Chinese language learning tools, as individual tools and as a system?

When chatting with people about my research, I have often been asked: ‘What is the best app to learn Chinese?’ or ‘What should I use to learn Chinese?’ These questions assume that there is a hierarchy of apps – or tools – and that an ‘expert’ (as I am perceived to be) would know how to grade tools on their usefulness. The existence of various lists of the ‘5/7/10 best apps to learn Chinese’ on blogs and forums, as well as incidental conversations while I conducted this research, echo this implicit model of a simple hierarchy.²⁰ My reply to those requests for advice has consistently been that there is no such thing as a ‘best app’. Different tools serve different goals, and what might work for one learner at a particular time might not suit another learner at another time. This does not, however, mean that no judgement whatsoever can be made regarding the relative quality of digital learning tools. Rather, such judgements require preliminary clarification as to the normative models guiding them.

A new experience of Chinese language learning is evolving under the impetus of digital technology. This experience involves new learning practices and new learning communities which did not and could not exist in the pre-Internet age. A range of digital artefacts mediate those practices and bring together those communities. However, we currently do not have a unified vocabulary or consistent model to understand, describe and

²⁰ Two examples are Grigg, Hugh. ‘My favourite Chinese Learning Tools’. Eastasianstudent.net. October 6, 2013. <https://eastasiastudent.net/china/mandarin/chinese-learning-tools/> (accessed September 25, 2019); and Sapore di Cina. ‘The best 13 Apps to Learn Chinese on Your Smartphone or Tablet’. Saporedicina.com. April 9, 2020. <https://www.saporedicina.com/english/best-apps-to-learn-chinese-on-your-smartphone-or-tablet/> (accessed July 6, 2020).

classify those artefacts. The consequence is confusion among the people designing, using and promoting those artefacts when it comes to articulating and assessing their value. This, in turn, affects the usefulness of learning tools and the effectiveness of digitally supported Chinese learning practices.

To address this knowledge gap, I will employ the concept of value proposition, which stems from the field of business studies, and refers to ‘the benefits customers can expect from your products and services’ (Osterwalder, Pigneur & Clark 2010). I will expand this definition such that ‘customers’ are perceived, independently of a commercial goal, as ‘users’, in line with the way that the concept is now widely used in start-ups and innovation circles to assess the viability of a new venture. I propose that three key factors come into play to determine the benefits that a tool will provide to a user: cost, design and production quality.

I use production quality by analogy with its use in the context of film, to describe whether a tool is well-crafted. Production quality is mainly visible by its absence, if a tool turns itself off for no apparent reason, frequently freezes, crashes or loses data, or if it offers sound and/or images of low quality, then it will be judged as being of poor quality. More generally, a tool can be said to lack in production quality if it presents a clashing colour scheme, clumsy graphic design, poorly edited text, or a user interface that is difficult to navigate. The minimal threshold of quality that a user will accept for the tool to be deemed suitable will depend partly on reasons of taste and personal preference, and various users will judge various elements differently. As such, assessing the relative production quality of different tools is not straightforward.²¹

When it comes to assessing design, things become even more contentious. By design – in line with the way that I characterize the work of designers in the previous section – I mean not the look-and-feel of a tool, but a more fundamental consideration of its form as it

²¹ When it comes to the quality of user interface, large digital companies offering ‘free’ access to their tool – YouTube, Google, Facebook – set a high bar. When it comes to audio and video, the rise of user-generated content, from podcasts to YouTube videos or social media streams, is changing the norms of what counts as ‘acceptable production quality’. More generally, production quality is continuous with questions pertaining to ‘style’. I will return to this in Chapter Five.

relates to a certain learning practice (or multiple learning practices) that this form enables.²² A well-designed object is thus one whose form is well-adapted to its intended function. A well-designed Chinese language learning tool is one whose form is particularly effective at supporting the kind of Chinese language learning it provides. For this reason, it is impossible to assess whether a tool is well-designed without taking into consideration normative elements as to what constitutes effective language learning. A large and growing body of research evaluates the effectiveness of different tools in classroom environments. When it comes to tools used outside of such environments, however, not only do researchers face a relative paucity of research available, but they face at least two connected theoretical challenges.

The first challenge has to do with the fact that appreciating the effectiveness of a tool directly depends on the underlying criteria chosen to define what should count as ‘learning Chinese’. This could range from a strict definition whereby, for instance, ‘learning Chinese’ corresponds to an increase in communicative competence as measured through standardized testing, all the way to much looser definitions whereby, for instance, watching a subtitled Chinese language cartoon, resulting in a learner’s higher perceived capacity to recognize certain words in context, and/or their increased sense of connection with the language and increased desire to continue learning, would qualify as ‘learning Chinese’. The second challenge has to do with the articulation of an overarching goal – learn Chinese – into smaller sub-goals: for instance, learning to distinguish the sounds and tones of Chinese, acquiring a core vocabulary, mastering character stroke order, or producing appropriate utterances in different communicative circumstances, all of which can metonymically be referred to as ‘learning Chinese’.²³

Even a superficial observation makes it clear that different tools currently in existence have different goals, particularly in relation to the third element listed above. To give a simple example, some tools focus on listening skills while others train character recognition.

²² This definition of design is inspired by the way that Brian Arthur describes design as core to technological development: ‘The basic task is to find a form, a set of architected assemblies, to fulfil a set of purposes. This means matching a purpose with some concept of a structure that will meet it, and putting together a combination of assemblies that will bring this structure to reality’ (Arthur 2009, p.28).

²³ In the case of autonomous and lifelong learners, ‘learning Chinese’ might even involve the additional tasks of setting goals, measuring progress, developing discipline and maintaining motivation. I will return to this in Chapter Five.

In that regard, directly comparing Skritter flashcards with ChinesePod podcasts to ask which tool is better does not make sense. By contrast, it seems more intuitively right to ask which of these three – Hello Chinese, Chinese Skills or Duolingo Chinese, which all offer a roughly similar type of gamified course for beginners – is the best tool.

What makes judgement on the value of a tool more complex is that digital technology is impacting what ‘learning Chinese’ means, as a goal and as a process. Digital technology has, in some ways, dramatically altered the skills required for a learner to use Chinese at a certain level of fluency – the clearest example being the omnipresent pinyin input keyboard that now enables functional written fluency with limited or no handwriting skills. Technology has also created new types of expectations regarding the learning process itself, such as greater emphasis on personalized learning and learning on-the-go. This is compounded by the fact that new generations of Chinese language learners are attracted to the many economic opportunities that China presents or engage with the Chinese language for personal fulfilment or identity construction and consolidation, particularly among the children of a growing Chinese diaspora and people engaging with this diaspora as neighbours, friends, business partners or spouses. Those learners are therefore more likely to value rapport-building through translanguaging or enhanced enjoyment of Chinese popular culture over diplomas and certificates – and therefore likely to value the tools they perceive as helpful in achieving those goals.

This is particularly true in the absence of a globally recognized Chinese language certification with value comparable to that of the main standardized tests for English – particularly IELTS, PTE and TOEFL – which are formal requirements for access to desirable university courses and work visas in English-speaking countries, or teaching opportunities, and therefore serve both as a benchmark and a goal in English language education. The *Hanyu Shuiping Kaoshi* or HSK test, monitored by Hanban, is widely discussed on digital forums and serves as a benchmark for a number of digital tools. For instance, Skritter offers revision lists aligned to the HSK vocabulary lists, and the Chairman’s Bao uses the standard HSK vocabulary list as a criterion to sort texts into levels of difficulty. However, the practical benefit of an HSK diploma is significantly more limited than that of IELTS, PTE or TOEFL, and therefore less likely to serve as a strong criterion to determine the value of a tool.²⁴

²⁴ As for nationally delivered Chinese language diplomas, a digital tool that directly supports, for instance, better high-school test results or success at exams leading to a diploma, is likely to be valued by the people who

The final element I identified to determine the benefit of a tool is cost – more specifically, the capacity offered by a tool to provide a certain benefit at a lower cost than alternatives. By this, I mean the financial cost of accessing a certain tool, for instance in the form of a monthly subscription or a one-off payment for download. I also propose to extend the concept of cost to include other factors, such as time saved, reduced effort, or the risk that time and/or effort invested in a certain learning practice do not yield the intended results in terms of developing language skills. The cost of a tool will not only be assessed directly in comparison with other similar tools (e.g. a user will compare the cost of two flashcard apps), but also in relation to complementary tools (e.g. a user will compare the cost of a flashcard app and a set of podcasts) and in relation to non-digital alternatives, whether Chinese classes or private tutoring. Low cost is an important driver of value, though different users will be sensitive to different types of cost to varying degrees: time-saving, effort and money required will matter differently, depending on the circumstances of individual users.

The concept of value proposition requires us to consider a tool in relation to its possible competitors. When comparing tools of the same kind – for instance, two flashcard apps – a user may compare their production quality, design and/or cost. They may also compare the value of a tool in relation to different types of ad hoc assemblages resulting from ‘pedagogical bricolage’. For instance, they may compare a flashcard app with a home-made character revision system developed on Powerpoint, or with a tutoring session focusing on character memorization. In this example, and more generally when it comes to comparing the value of a specialized digital tool with a non-language-specific resource or non-digital alternative, cost is likely to play an important part. But again, different users will be willing to bear different types of cost – the time taken to make and update flashcards on Powerpoint vs Skritter, or the burden of developing personal revision routines as part of an autonomous learning effort vs the financial cost of tutoring sessions or classroom study.

When adopting a tool, typically, users will have already sought recommendations from figures of authority (teachers and online influencers) and/or peers, circulating online and offline. Tracking the value proposition of digital tools thus involves considering the role played by those recommendations. This is particularly important as the recommendations may not only influence the perceived value of different tools relative to each other, but also

have already chosen to enrol, but it is not as clear to what extent, for instance, a course resulting in an accredited Chinese diploma will be valued in comparison to a learning tool. I will return to this point in Chapter Four.

assist learners and teachers in identifying new digitally-mediated practices that may be effective in supporting language learning, and contribute to normalizing the adoption of recommended tools.²⁵ The broader discourses in which these recommendations circulate – from digital learning advice to critical reviews of tools – are also useful to designers in helping them identify what characteristics of a tool are likely to be perceived as more valuable by what type of user, identify gaps in the landscape, and thus increase the success of their design effort, whether that effort is guided by pedagogical or commercial goals, or both.

This takes us back to the importance of addressing the value proposition of digital Chinese learning tools in relation to both the ways in which they have been used and the purpose for which they were designed. As mentioned earlier, a practical outcome of this research is to produce a set of criteria for the appraisal of existing and new tools. The aim is to identify not just ‘the best tools’ or ‘tools that work’ but help assess what tools may be most effective in which situations for which users.

As a final point, it is important to note that learners and teachers can and do combine tools: therefore, they will consider their value both individually and as a set. Particularly relevant will be the capacity of a certain tool to integrate with other technology. At the most basic level, users will only adopt tools that ‘work’ on their device – that is, if an app only exists in iOS version and they have an Android phone, they will not use that app. More generally, they are likely to consider how a new tool works with any learning technology they already use. For learners, this may be tools offering plugins that integrate with other tools they already use (for instance, The Chairman’s Bao offers a plugin that allows automatic export of vocabulary to Skritter). For teachers, this may be tools that integrate with their institution’s learning management system or align closely with the classroom textbook.²⁶ This invites reflection on whether and how certain conditions favour the

²⁵ This line of inquiry invites a reflective question: who is best placed to assess the value of a tool that proposes to support the learning of the Chinese language? Is it academic scholars analyzing the tools or measuring their impact in various settings? Is it teachers in schools or universities adopting those tools in their classes or recommending them to their students? Is it the designers of the tools themselves? Is it other users, whether autonomous learners or enrolled students? Is it Internet ‘influencers’ such as Ben the Irish Polyglot? And to what extent should those various perspectives be somehow reconciled? Those questions are explored throughout the thesis.

²⁶ One unfortunate logical consequence is the likelihood that users in technologically constrained environments, such as accredited university courses with a ‘locked’ LMS, will find themselves using otherwise costly and

development of highly specialized tools, generic tools, or versatile tools. It also calls for an exploration of the tools' value proposition in relation to their integration into an existing learning system, leading me to my second conceptual question.

1.3.2 When considering digital Chinese language learning tools, to what extent can we speak of a digital ecosystem being formed?

In the digital age, methods and tools for language learning have expanded dramatically, to the point that it no longer resembles the idea of Chinese language learning *as a field* in the pre-digital age. However, does the 'reality' co-produced by the designers of these digital tools, learners and teachers using the tools, and the organizational structures in which these tools are produced, maintained and distributed, resemble an ecosystem in the making?

The concept of 'ecosystem' became popular with the rise of ecological thinking from the 1970s onwards. It has since been adopted in a range of fields, including the social sciences and business management. The word was made popular in business studies to describe a range of commercial organizations by James Moore in his 1996 book *The Death of Competition* (Moore 1996). Moore characterizes new business environments, particularly in the IT industry, as ecosystems, referring to the complex patterns of mutual dependence and co-evolution among organizations whose processes of value creation are increasingly interdependent. The concept is now commonly used not only in business studies and technology-related publications but also in the discourse around second language acquisition.²⁷

The word is typically used in two distinct yet related ways. In expressions such as 'the Melbourne start-up ecosystem', it refers to the loosely defined assemblage of individuals, organizations, events, spaces, institutions and funding sources that make up a certain industry sector in a particular location.²⁸ Expressions like 'the Apple ecosystem' describe a loosely

poorly produced tools, simply because they happen to be best aligned with the technological systems of their institution. I will come back to this in more detail in Part Three of the thesis, particularly Chapter Six and Chapter Seven.

²⁷ Proponents of an 'ecological' approach to second language acquisition include Claire Kramsch (2008) and Leo Van Lier (2010). I return to this point in more detail in Chapter Two.

²⁸ 'Ecosystem' is used particularly in sectors that have large numbers of small innovative organizations with a high failure rate, and where large amounts of work are of a short-term, project-based nature, particularly in new

defined assemblage of websites, apps, operating systems and interfaces that present users with a unified and convenient experience, and evolve dynamically together.²⁹ These two uses of the word ‘ecosystem’ are related: the co-evolution of different digital services and products both incentivizes and is facilitated by the co-evolution of the businesses producing them.

My inquiry into the possible emergence of a digital Chinese language learning ecosystem straddles these two meanings of the word. I explore whether there are signs of integration between digital tools, hinting at the emergence of a digital learning ecosystem – manifested, for instance, in the form of plugins that would allow a learner to share a single list of known characters across multiple tools, or easily upload a character from a dictionary to a set of flashcards, or receive automatic suggestions on podcasts that would match their interest and language level. I also investigate whether we can see patterns of interdependence between individuals and organizations engaged in the development of digital tools to learn Chinese, such as can be seen in start-up ecosystems. In particular, I explore to what extent organizations developing those tools are economically interdependent and to what extent the career trajectories of individual designers show a pattern where they go from one digital Chinese learning project to another. Beyond this, I explore whether there seems to be any emerging success at coordinating collective action around a common vision to develop a

digital technologies. Individuals with specialized skills in such a sector rely on the ongoing emergence of new projects to offset the high level of failure and short-lived nature of projects – while such projects are made possible by the presence of qualified and available individuals. To give one example, a May 2019 article from SBS indicates that Melbourne is a ‘start-up hub to watch’, on the basis of analysis provided by the ‘2019 Global Start-up Ecosystem Report’, where Melbourne (alongside cities like Montreal, Seoul or Jakarta) is identified as a ‘challenger ecosystem’ (‘Melbourne, a start-up hub to watch’. sbs.com.au. October 05, 2019.

<https://www.sbs.com.au/news/melbourne-a-start-up-hub-to-watch-report> (accessed May 21, 2020)).

²⁹ To give one example, a December 2019 article in *Business Insider* about the quality of integration among Apple services – and hence the perceived need to use a suite of Apple products together to enjoy the best experience – is titled ‘I don’t want to switch from Android to iPhone because Apple’s ecosystem is too good’. (Villas-Boas, Antonio. ‘I don’t want to switch from Android to iPhone because Apple’s ecosystem is too good’. Tech Insider, businessinsider.com. December 24, 2019. <https://www.businessinsider.com.au/apple-iphone-macbook-ecosystem-so-good-i-dont-want-iphone-2019-12?r=US&IR=T> (accessed May 21, 2020)). In that sense, the entire Internet could be said to form an ‘ecosystem’, since all digital tools require other programs to work together: websites require a browser, apps need to be downloaded through the Apple or Google Appstores, all digital tools need operating systems to function, and the Internet itself as a network depends on underlying telecommunication systems and protocols.

better toolbox among the key ‘stakeholders’ of digital Chinese language learning – or whether all that can be found is unsurmountable fragmentation.

Would the concept of an ecosystem encourage us to see the topography of digital Chinese language learning tools as co-evolving in a dynamic environment? This second conceptual question calls for an understanding of how different individuals making and using those tools interact to define and negotiate their value, meaning and usage. From a theoretical perspective, it offers a way of reflecting more broadly on the impact of economic and technological factors on the structure of Chinese language learning, conceived of as a once well-defined field undergoing significant change. From a practical perspective, identifying patterns of interdependence between the uses of different tools is essential to mapping their value proposition, from the varied perspectives of learners, teachers and designers. This second question is therefore a crucial complement to the first question outlined earlier.

1.4 Structure of the thesis

The thesis is structured into three parts. Part One – including the present chapter – focuses on identifying the object of study and defining an approach to properly understand it, with particular attention to the various ontological, conceptual, theoretical and methodological challenges that the object raises. Chapter One offers a high-level conceptual analysis of digital Chinese language learning tools and resources, including questions of ontology, and articulates key research questions. To address those questions, Chapter Two explores the construction of a transdisciplinary approach, called for by the complexity of the object and the novel nature of this inquiry. It starts with a review of existing literature that positions the present research in relation to four fields of knowledge: digital studies, business and economics, applied linguistics and Chinese studies. It then articulates an original theoretical framework, drawing on Bourdieu’s field theory, complemented by Christensen’s theory of disruptive innovation and Jenkins’ theory of convergence culture. Chapter Three details the methodology that I developed to address the questions raised in this introduction, as informed by my theoretical framework. I use a mixed-methods approach to analyze a selection of 190 digital tools, drawing on strategies from Franco Moretti’s distant reading, combined with digital ethnography and comparative business case studies applied to a smaller subset of representative tools.

Part Two tracks the emergence of a potential digital ‘ecosystem’ as it affects the practices of learners and – to some extent – of teachers. In Chapter Four, I take a wide-angle

view and explore how digital technology combined with globalization have affected the social and technolinguistic conditions in which the Chinese language is learned and used. In Chapter Five, I propose a typology of digital tools and resources sorted into eight macro-categories – language accessibility tools, learning advice, multimedia courses, drills & games, formatted material, engagement platforms, Chinese social media and digital Chinese content. I then detail the various elements of design and style that determine the value proposition of the tools, as well as the constitution of a ‘digital tissue’ where discourses on those tools circulate, affecting their perceived value and usage. The chapter concludes by positioning the discussion against the background of tensions around the politics of learning Chinese, including questions of identity consolidation, remaining cultural differences in appraising the goal of education, and PRC measures of Internet control.

Part Three explores the socio-economic conditions in which digital tools are produced and maintained, with particular emphasis on the perspective of tool designers. Chapter Six looks at digital tools as commercial entities, exploring their disruptive potential. The chapter includes a discussion on the complexity of digital business models, as those impact the success and survival of digital Chinese language learning tools, and therefore affect design decisions and discourses about the tools. I focus more particularly on the relationship between digital tools that are primarily designed for learners around the world and learning institutions that are in part constrained by nationally defined norms, curriculums, regulations and funding mechanisms. Chapter Seven surveys the size and structures of the market for digital Chinese learning tools. I explore the tensions between education as a state-funded and state-centric public good, and education understood as a *global* public good achieved through freely available digital learning tools. Against this background, I discuss the possible emergence of a new Chinese learning paradigm as a DIY transmedia experience. Finally, in Chapter Eight, I look at the possibility of characterizing digital Chinese language learning as a ‘field’ in the making. I track strategies for the constitution of social capital among a small community of tool designers, as well as designers’ career trajectories and personal narratives. This thesis ends with the people who have played a large part in designing and developing digital Chinese language learning tools, to draw attention to the crucial role of human agents in creating and maintaining any digital ecosystem.

Chapter Two: Placing the object in perspective: constructing a transdisciplinary approach to capture a multi-dimensional reality

2.1 Review of existing research and theory

2.1.1 A transdisciplinary approach

How should one investigate an object that is difficult to define? More particularly, how to establish what bodies of disciplinary knowledge are most appropriate to address my intentionally broad research question, *‘How might we map the emerging landscape of digital Chinese language learning in a manner that will yield the most useful common understanding of it for learners, teachers, and designers?’* The digital tools for Chinese language learning that I am studying belong under Chinese language pedagogy, virtual communities and online start-ups, but do not fit neatly into any established field of activity. Moreover, the existence of these digital tools has made Chinese language learning far more fluid and accessible to a far greater number of learners. Partial descriptions of new digital language learning tools and associated practices, in and out of the classroom, have appeared in academic publications, in disciplines such as digital and media studies, applied linguistics, education, information technology, and business and economics. However, those tools have yet to be considered as reflecting a whole new approach to Chinese language learning.

A transdisciplinary approach, loosely defined as one that transcends disciplinary boundaries, is necessary to capture the complexity of how digital tools for Chinese language learning are both supporting existing forms of pedagogy and altering language learning in dramatic ways. Four elements characterize transdisciplinary research: the systemic integration of knowledge, a synthetic theoretical framework, an approach that questions the legitimacy of existing traditions, and research geared towards practical application (Thompson Klein 2017, pp.11-12). All four are present in this project.

My research has a clear practical dimension. As stated in Chapter One, my research aims to create a typology that would be of benefit to the designers of the tools and the people using those for teaching and learning, in order that institutions and individuals can discuss the functions, strengths and limitations of existing tools and explore the possibility of new tools and new practices. In this regard, we must note the disconnect between the discourses and perceptions of teachers, learners and designers – and more generally the lack of aligned incentives and common discourse about the object. In order to produce my typology, I had to first develop a synthetic theoretical framework, drawing on the works of Bourdieu,

Christensen and Jenkins, which is detailed in the second section of this chapter. I needed to also ask whether the landscape of digital Chinese language learning tools may be described as an emerging ecosystem. This question begs another: is the ill-defined object formed by digital Chinese language learning tools in existence today best understood as the emergence of a new system of Chinese language learning, or as part of an existing system defined by institution-based language instruction? As discussed in Chapter One, there are difficulties in saying whether it is one or the other. The reasons for this are set out in the subsequent chapters.

Transdisciplinary research, by its very nature, requires a different approach to literature review than disciplinary or interdisciplinary research. This is because there is nothing that constitutes ‘the state of the field’ in relation to the object of inquiry. In describing my research as transdisciplinary, I mean that the research process draws on different fields of knowledge to understand the different interconnected dimensions of the object. Whereas interdisciplinary research combines different (existing) disciplinary approaches to form an argument, transdisciplinary research highlights the multifocal effect of different approaches. In this project, I argue that understanding digital Chinese language learning tools requires different analytical approaches that are not entirely commensurable, as I will outline below in relation to the work of Pierre Bourdieu and Clayton Christensen.

According to Alfonso Montuori, transdisciplinarity requires the use of pertinent knowledge from different disciplines as opposed to defining the inquiry in terms of existing disciplines. This is how Montuori describes such an approach in an interview with Russ Volckman, taking the study of an organization as an example:

An approach that’s inquiry-based starts with the phenomenon in question, in this case looking at the organization, and there are many, many different things going on. That includes individuals, relationships, organizational culture, organizational structure, openness to risk-taking, the business climate, and all these issues that are typically addressed in different disciplines. For me, the important thing isn’t the discipline, but the issue that I’m addressing. Then you bring in pertinent knowledge from whatever disciplines are relevant (Volckman 2009, p.280).

I adopted an inquiry-based approach to my literature review inspired by this approach, guided by research needs as they emerged from engagement with the object, rather than driven by the tradition and parameters of one or several given academic disciplines. The four

fields of knowledge that I have identified as most relevant to my key research question are digital ethnography, business studies, applied linguistics and Chinese studies³⁰. In the rest of this section, I will look at those four fields in turn, in an attempt to better situate the present research in relation to a broad and diverse body of literature.

2.1.2. Digital studies: contextualizing the object

Digital learning tools for Chinese language learning appear as part of a broader shift marked by the rise of the Internet and the associated global integration of populations, discourses and economies that occurred at the end of the 20th century. Understanding this at the macro-level was required in order to appropriately frame and contextualize the emergence of the object that I aim to describe. For this, I turned to works from the social sciences offering a general perspective on this shift, framing it as the emergence of a network society (Castells 1997; 1998) or an internet galaxy (Castells 2001), occurring in an age of liquid modernity (Bauman 2000), or an information age (Lallana & Uy 2003), characterized by the death of distance (Cairncross 1997), where new connected communities organize themselves as smart mobs (Rheingold 2002) and coordinate large-scale productive activities in collaborative ‘wikinomic’ models (Tapscott & Williams 2006), or where migration and electronic media result in the emergence of diasporic public spheres (Appadurai 1996), and where global cities serve as key nodes in the flows of information, people and capital (Sassen 2005).

This broad contextual understanding was complemented by the more recent works of Peter Sloterdijk offering a long-term historical perspective on globalized capitalism (Sloterdijk 2013) and Ethan Zuckerman investigating the emergence of a global public sphere bringing together global cosmopolitans (Zuckerman 2013). In addition, I paid particular attention to works from the last decade which, informed by observation of the digital environment and its evolution, offer a more critical perspective on technology. Five particularly relevant authors here were Jose Van Dijk interrogating the influence of commercial decisions on technologically mediated sociality (Van Dijk 2013), Eli Pariser on

³⁰ I use the loose term ‘field of knowledge’ here rather than ‘discipline’, as each of these fields is itself composed of different academic disciplines, each focusing on a narrower object or aspect of an object, captured through different methodologies, on the basis of different assumptions, and articulated in different publications and conferences. The labels I have adopted to refer to those four fields do not reflect debates currently at play within those fields regarding their respective boundaries or internal structures.

the increasing personalization of the Internet leading to a Filter Bubble (Pariser 2011), Evgeny Morozov offering a critical analysis of solutionism as characteristic of digital culture (Morozov 2013), Don and Alex Tapscott describing the emergence of a new digital ecosystem around blockchain technology (Tapscott & Tapscott 2016), and Shoshana Zuboff describing new Internet business models as heralding an age of surveillance capitalism (Zuboff 2019).

To more specifically understand an emerging set of digital tools supporting Chinese language learning as a digitally mediated practice, I found particular relevance in the writings of media studies professor Henry Jenkins exploring new flows of content across media platforms and the changing behaviour of audiences engaging with this content, defining a new participatory culture (Jenkins 2006a, 2014), redefining engagement with national and global narratives as a form of pop cosmopolitanism (Jenkins 2006b), and defining a new type of media structure where reach requires spreadability (Jenkins, Ford & Green 2013). Jenkins' works form a key part of my theoretical framework and are described in more detail in the next section. The works of Jenkins resonated with my transdisciplinary approach because of their practical character, as evidenced by a White Paper for the McArthur Foundation describing the types of literacy needed to address the challenges of participatory culture, informed by the perspective above, and with Henry Jenkins as lead researcher (Jenkins et al. 2005).

To understand the new behaviours and relationships of designers, teachers and learners engaged in digitally mediated Chinese language learning, I looked more closely at in-depth ethnographic case studies, which informed my methodological approach. I considered particularly the work of Bonnie Nardi on World of Warcraft (Nardi 2010) and Tom Boellstorff on Second Life (Boellstorff 2008), as well as the studies of digital communities as a locus for learning conducted by Thorne, Fischer and Lu (2012). Recurring references in this body of research, echoed in other research I will describe later in this section, put forward a body of literature on situated learning emerging at the intersection of digital studies, psychology and education, including the works of James Gee on affinity spaces where learners affiliate with each other on the basis of shared practices, activities and interests (Gee 2004), the writings of Jean Lave and Etienne Wenger on communities of practice (Lave & Wenger, 1991), and the work of psychologist Jerome James Gibson on affordances, referring to the way that an environment is functionally perceived by an agent (Gibson 1979). Complementing those, the writings of Jane McGonigal offered crucial

insights on the design of digital environments as impacted by the understanding of human motivation derived from the study of games, a practice now commonly known under the buzzword ‘gamification’ (McGonigal 2011).

Finally, to more properly understand the development of digital learning tools as an interconnected set of technological artefacts, I turned to works exploring the nature of technology as a system. Foundational here was a seminal 1954 book by French sociologist and philosopher Jacques Ellul which put forward the concept of technology as forming an interdependent system and independent principle of social organization (Ellul 1954). As a distant response to Ellul’s more critical approach of technology were the works of science anthropologist Bruno Latour investigating the interdependent relationship between humans and technology (Latour 2007; 2010). As a counterpoint to those perspectives from the social sciences, I turned to engineering specialist Brian Arthur for a description of technology as an evolving system whose growth is based on both the capture of new natural phenomena towards a purpose, and the recombination of past technologies (Arthur 2009). This systemic understanding of technology was complemented by theoretical writings problematizing the identity of digital objects (Faulkner & Runde 2009) and the ontology of digital artefacts (Kallinikos, Aaltonen & Marton 2013). Finally, to better understand current trends and the likely future evolution of digital technology, as well as its potential impact on human structures, I turned to the work of physicist and existential risk expert Max Tegmark on Artificial Intelligence and its growing influence on society as defining a potential new ‘Life 3.0’ paradigm (Tegmark 2017).

2.1.3 Business and economics: understanding the structures and drivers defining the shape and evolution of the object

Together, the works I listed as pertinent to digital studies offered substantial material to understand the context where digital learning tools emerge and are used. However, they failed to address two important questions: what drives the design of digital tools? What coordinated efforts have been made to organize these tools, so that they can operate as a system? To answer these two questions required engaging with bodies of literature that address online business models, structures of organized human activity, incentives driving this activity, and the effects of rapid technological change.

My first point of approach was to consider digital Chinese language learning tools as a form of innovation. The works of Clayton Christensen were critical here and they form a

core component of the theoretical framework articulated in the next section. Of particular importance was the concept of disruptive innovation, referring to the way that a new product or service enabled by technological progress can lead to the creation of new value chains, thereby restructuring an entire industry sector, as first articulated in Christensen's *Innovator Dilemma* (Christensen 1997), and later applied to other areas including high school education (Christensen, Horn & Johnson 2008) and universities (Christensen & Eyring 2011).

To understand not only the development of individual tools, but also their emergence as a system and therefore their patterns of mutual interconnection and interaction with existing organizations supporting Chinese language learning, I turned to a body of literature articulating changing relationships between organizations in the context of globalization using 'ecosystem' as a metaphor. The term 'business ecosystem' was first brought forward to describe this by James Moore in a 1993 article for the *Harvard Business Review*: 'Predators and Prey: A New Ecology of Competition' (Moore 1993). This metaphor informed later reflections by Moore exploring business ecosystems as heralding the 'death of competition' (Moore 1996). An important associated concept, stemming from the same metaphor, is that of the 'keystone', or leading firm in an ecosystem that determines its overall balance, articulated by Marco Iansiti and Roy Levien (Iansiti & Levien 2004). Often used when discussing business ecosystems in the digital industry, but offering a different metaphor, is the concept of a 'platform', referring to an Internet company offering a digital environment that others can build upon, such as Facebook or YouTube, and therefore plays a key function in defining business opportunities for other companies (Tiwana 2014).

The concept of business ecosystems is associated with a redefinition of the relationship between firms as hovering between collaboration and competition. This is echoed in the title of a 2013 volume edited by Ron Adner, Joanne E. Oxley and Brian S. Silverman on *Collaboration and Competition in Business Ecosystems*, offering a range of papers exploring how the need to engage with a broad range of stakeholders means that companies must define their offers not only in relation to their customers, but also to their partners, as part of an 'ecosystem strategy' (Adner, Oxley & Silverman 2013). Three papers in this volume shaped my reflection, particularly in relation to my second leading question and the third part of this thesis. Those are a chapter by Rahul Kapoor exploring collaboration between firms in an ecosystem as complementors (Kapoor 2014), a chapter by Stefano Brusoni and Andrea Prencipe on the relationship between innovation in ecosystems and the joint framing of a problem (Brusoni & Prencipe 2013), and a chapter by Christensen and

Rosenbloom exploring the importance of joint understanding between participants in an ecosystem for innovation to have value (Christensen & Rosenbloom 2013).

Writings on business ecosystems defining a new paradigm of interdependence led me back to early research on the nature of the firm by economist Ronald Coase, seeing the structuring of economic activity in firms as a mechanism primarily intended to reduce transaction costs (Coase 1937), as well as more recent research emphasizing the role of firms in the development of knowledge, by facilitating the development of social capital and intellectual capital (Nahapiet & Ghoshal 1998), and the role of social capital in contexts of open innovation (Rass et al. 2013). In light of the changing context where digital tools are evolving – particularly the many different small organizations building them – I looked at research exploring the related topics of the future of work, digital nomadism, the gig economy and portfolio career. For this, an important contribution was the recent PhD of Julian Waters-Lynch on the ethnography of co-working spaces as entrepreneurial communities, whom I had direct interaction with as a participant subject (Waters-Lynch 2018). This literature was particularly relevant to understand the social conditions under which designers – but also teachers and learners – operate. Those works built on earlier writings on social networks, particularly James S. Coleman on Social Capital (Coleman 1988) and Mark Granovetter on the economic role of weak ties (Granovetter 1973), or more recent work by Nicholas A. Christakis and James H. Fowler articulating the difference between groups and social networks (Christakis & Fowler 2009). An underlying thread through this body of literature was the importance of interpersonal relations, and different ways of creating, accumulating and establishing value. This directly tied into the work of sociologist Pierre Bourdieu on the theory of practice, fields, capital and habitus (Bourdieu 1984, 1998, 1999; Bourdieu & Wacquant 1992; Grenfell 2008). Bourdieu's writings formed a pivotal part of my theoretical framework, and are discussed more at length in the second section of this chapter

One recurring element in writings on disruptive innovation and business ecosystems is how different services and products offer value to different users and organizations. This informed my first attempts to understand how digital learning tools were relevant to teachers, learners and designers, and how to map these different forms of relevance. An important source of inspiration here was the work of Alex Osterwalder on business models and value propositions (Osterwalder 2004; Osterwalder, Pigneur & Clark 2010). A business model, according to this model, describes the rationale of how an organization creates, delivers and

captures value. In addition to an identification of customer segments and value proposition – being the products and services offered by the organization as they relate to problems that the customer aims to solve, or otherwise aim to satisfy customers’ desires – it also involves an articulation of key partnerships, cost structure, key activities, resources, revenue streams, customer relationships and channels of delivery (Osterwalder, Pigneur & Clark 2010, pp. 15-17).

A series of books, both academic and intended for the broader public, looking at the economic drivers of globalized digital technology informed my understanding of the object in that regard. Digital innovation has led to the emergence of new types of business models that offer services for free or at a very low cost to users (Anderson, C. 2009), variously referred to as Wikinomics (Tapscott & Williams 2006), open source (Berdou & Dini 2005), peer production (Benkler 2002), networked information economy (Benkler 2006), the participatory web (Blank & Reisdorf 2012), Web 2.0 (O’Reilly 2005), an economy of crowdsourcing (Howe 2008), or a collaborative economy (Bauwens, Mendoza & Iacomella 2012), enabling a new industrial revolution centred on ‘makers’ (Anderson, C. 2014) or driven by ‘peer progressives’ (Johnson 2012). More recently, the work of Rachel Botsman on trust and its impact on businesses was also highly relevant (Botsman 2018). I also looked at the associated emergence of discourses on social innovation, social entrepreneurship and social impact, exploring new ways to solve social problems through entrepreneurial activities, particularly entrepreneurial activities making use of digital technology, detailed in a report by the Skoll Centre for Social entrepreneurship (Mulgan et al. 2007). All those were particularly relevant to understand the conditions under which tools are produced and received, and informed both Part Two and Part Three of this thesis.

The perspectives articulated by the authors listed above more generally relate back to the questions asked by economist Elinor Ostrom in *Governing the Commons* (1990) on how communities are able to efficiently manage common resources outside of a market or state-led paradigm, without exhausting those resources. Literature from the legal field articulated in the early days of the Internet, and aligned with the works of Ostrom, explores the question of the Internet as a commons, and associated challenges of collective action in the digital realm. Of particular relevance here were the writings of Lawrence Lessig on the possibility of establishing a constitution for cyberspace and describing the Internet as a space where ‘code is law’ (Lessig 1999), and later works investigating the increasing commercialization of culture on the Internet (Lessig 2004). Aligned with this perspective, James Boyle considers

digital development from the joint perspective of intellectual property law and digital cultural production. Boyle speaks of a ‘second enclosure’ movement to describe the extension of certain property rights to digital commons (Boyle 2003). An important related body of literature is that of Jeremy Rifkin, which explores digital development as opening an ‘age of access’ where property is defined less by the right to exclude others than the right to be included (Rifkin 2000). This characterizes a new economic paradigm described as ‘the third industrial revolution’ (Rifkin 2011), and defines the digital space and other emerging distributed economic ventures as a ‘collaborative commons’, made up of millions of self-managed organizations, from charities to cultural groups or consumer cooperatives, made possible by technology allowing scale at zero marginal cost (Rifkin 2014). From a different perspective, the works of global policy scholar Inge Kaul emphasize the need for global public goods arising from globalization, and the challenges of developing adequate structures to incentivize their provision (Kaul 1999; Kaul, Grunberg & Stern 2003).

2.1.4 Applied linguistics: seeking a normative perspective on the object

The tools I observed and the practices they support are unified by a common purpose: learning the Chinese language. Adequately mapping the landscape therefore called for engagement with applied linguistics as a field of study particularly concerned with language learning.

My research intersects with two relatively well defined subdomains of applied linguistics, namely Computer-Assisted Language Learning (CALL) and Teaching Chinese as a Foreign Language (TCFL), which became fields of study in 1982, in line with the then rise in appetite for Chinese language learning (Ruan, Zhang & Leung 2016). There is a fast-growing literature located at the nexus of these two domains: a recent bibliography from a chapter on ‘Technology in CFL education’ by Yongan Wu, published in the 2016 volume *Chinese Language Education in the United States*, lists over 100 references (Wu 2016).³¹ An overview of the titles and abstracts, however, indicates that this body of research primarily considers new ways for teachers to integrate digital tools in institutional practice – in classrooms or as part of after-class work. In line with the much broader scope of my transdisciplinary research, I therefore chose not to explore this body of literature in detail, but rather to investigate key debates and questions from applied linguistics that would help me

³¹ Comparable numbers of references exist for other commonly taught languages – French, Spanish, German, etc – and a greater number for English as a second language.

better understand my object of study. This choice aligns with a warning from Thorne and Smith in a 2011 paper that CALL experts are at risk of not seeing the big picture by focusing too closely on the technology (Thorne & Smith 2011). It also aligns with my decision to privilege the perspective of designers, as explained in Chapter One.³²

There is a growing body of work that explores how digital technology supports new forms of autonomous learning, and what consequences this might have for the conceptual understanding of learning and teaching. In the introduction to a 2011 volume edited by Phil Benson and Hayo Reinders on ‘language learning and teaching beyond the classroom’, the authors call for a reframing of the established division between teaching and learning, whereby language learning is not primarily defined as a consequence of classroom education, but rather, as various pedagogies at play in and beyond the classroom (Benson & Reinders 2011). These pedagogies can combine digital immersion and instructed learning (Benson 2011), task-based approaches (Ellis 2003), or diverse forms of online collaborative learning (Harasim 2012), with interest in the ways that learners ‘self-regulate’ their learning (Lai & Gu 2011), or the development of ‘Mobile Learning Communities’ – communities of practice gathering teachers and learners around shared mobile learning tools and resources (Wang, L. & Ma 2017, Wang, L. 2019). In line with this, Moloney and Xu, in the foreword of a 2016 volume, indicate that teaching is ‘moving towards management of an array of readily accessible un-mediated input resources’ (Moloney & Xu 2016, p.vii). The works of Rod Ellis also explore a redefinition of language teaching as investigating ‘instructional artifacts’ (e.g. a task) and ‘instructional procedures’ (e.g. small group work), and proposes that digital spaces designed for language learning should be considered as language classrooms (Ellis 2012, p.1). A 2016 volume on *Language-Learner Computer Interactions* edited by Catherine Caws and Marie Josee Hamel, adopting a transdisciplinary approach, is guided by the following outlook, which echoes the perspectives articulated above: ‘if good design can lead to better learning, we ought to ask ourselves this simple question: How can we design effective, sustainable learning ecosystems mediated by technology?’ The question is focused not on individual tools but on how different tools might work together as a system (Caws & Hamel 2016a, p.2). Papers from this volume consider ergonomics, or the systematic study of what a learner does when interacting in order to improve that interaction (Caws & Hamel

³² It also aligns with the observation by Phil Benson, quoted in Chapter One, that language learning in the classroom is understood far better than language learning beyond the classroom (Benson 2011).

2016b), as well as digital affordances in relation to CALL environments, particularly Web 2.0 (Blin 2016a). They propose framing second language learning as a complex and adaptive system (Schulze & Scholz 2016) and consider the broader context and details of interaction by combining a micro and macro approach to the research (Levy & Caws 2016). An earlier and more general perspective on the question of autonomous learning, informing later research, is offered by Henri Holec's seminal 1979 report on the topic (Holec 1979).

To complement the general perspectives on autonomous learning offered by the researchers listed above, I considered works focusing on more specific applications of technology, particularly digital tools not primarily intended for learning. Mark Warschauer offered an early review of the benefits and possible uses of diverse generic digital tools (chats, email, hyperlinks) for instructed tasks (Warschauer 1997). Of particular interest were papers by Thorne and Reinhardt on language learning and other forms of intercultural interactions conducted through new media platforms, such as Massive Multiplayer Online Games or fan fiction, opening the possibility of intercultural communication in the wild (Thorne & Reinhardt 2008; Thorne 2010), and Li Jin looking at the use of WeChat for autonomous Chinese learning (Li, J. 2017). I also considered a recent paper by Han Luo and Chunsheng Yang exploring 'telecollaborative practices', that is, language peer-learning practices conducted through digital technology (Luo & Yang 2018). More broadly relevant, for contextual understanding, was consideration of MOOCs, or Massive Open Online Courses, a term first coined in 2008 and referring to learning courses, typically developed by universities, and offered online for free or for a very small fee to a very large number of users, representing a new development in autonomous learning (Conole 2013).

A different line of investigation from applied linguistics was offered by a body of research questioning the relationship between second language acquisition (SLA) frameworks and language pedagogy.³³ This includes an extensive review of SLA frameworks by Lourdes Ortega (Ortega 2009), as well as papers considering the connection between SLA frameworks and complexity theory (Larsen-Freeman 1997), exploring SLA in relation to communicative language teaching (Savignon 1991), more directly SLA and computer

³³ I here use the term SLA in a loose manner to refer to a field interested in the acquisition of a language or languages other than the language(s) acquired in early childhood. Important conversations are conducted in the field to do with the appreciation of translanguaging and reconsidering constructs such as native speaker or interference. I refer to those in this literature review and throughout the thesis.

assisted language learning (Chapelle 2009), and SLA as it relates to the Chinese language (Ke 2018). Particularly relevant to my research was the contrast I encountered between two SLA paradigms, a cognitive paradigm and an ecological paradigm. The first is best represented by the works of Noam Chomsky, and sees learners as ‘essentially engaged in a continuous, autonomous, cognitive, morpho-syntactic struggle to traverse, in linear fashion, along the plane of their interlanguage in pursuit of the target (i.e., native speaker) competence’ (Firth & Wagner 2007, p.804). By contrast, the ecological approach ‘aims to look at the learning process, the actions and activities of teachers and learners, the multilayered nature of interaction and language use, in all their complexity and as a network of interdependencies among all the elements in the setting, not only at the social level, but also at the spatial and symbolic level’ (Van Lier 2010, p.3). This perspective pays particular attention to the ‘symbolic competence’ displayed by multilingual speakers, defined by Claire Kramsch, another proponent of the ecological approach, as ‘the ability not only to approximate or appropriate for oneself someone else’s language, but to shape the very context in which the language is learned and used’ – a competence that the author explicitly compares to Bourdieu’s *sens pratique* or ‘matter-of-factness’ (Kramsch 2008, p.400). This theoretical approach is more broadly explored in a recent chapter by Francoise Blin that features in the 2016 Routledge Handbook of Language Learning and Technology (Blin 2016b). My research accords with this ecological paradigm.

An associated point of reflection came from socio-linguistics, through an influential paper by Firth & Wagner questioning the goal of emulating native speakers, and instead exploring the use of interlanguage as a way to negotiate social interactions across languages (Firth & Wagner 1997). Similar lines of investigation, considering the nexus of identity and linguistic productions for speakers operating across languages, particularly in multicultural urban settings and among bilingual populations, have been variously described as translanguaging (Li W. & Zhu 2013, Li, W. 2017), metrolingual multitasking (Pennycook & Otsuji 2014), or symbolic competence in multilingual settings (Kramsch & Whiteside 2008). This research more generally ties into discussions about linguistic performance in conditions of superdiversity (Blommaert 2013), as well as a questioning of terminology – particularly applied to the English language – conceptualizing the target language as a second language, an international language, or a foreign language (Kirkpatrick 2006; Xu 2018; Ruan, Zhang & Leung 2016).

The concept of identity and its relation to language learning – integrating the language learner and their social world – was of particular importance here. Bonny Norton's 2000 essay 'Identity and Language Learning' was an early publication in this area. Since then, identity has become much discussed in the academic literature on language learning, featuring in encyclopaedias, handbooks, and even a dedicated journal (Norton 2013). Different digital environments support different constructions of the self (Thorne 2016; Thorne, Sauro & Smith 2015), and identity construction is at play when learners participate in digital environments as social learning spaces (Lam 2000; 2006), with particular importance in the case of international students (Chen & Bennett 2012), or in cases where the interrelation between social structures of learning and language use and the experience of language learners can lead to a feeling of imposture (Kramsch 2012). Teacher identity also plays a role, and becomes significant when there are sharp differences between teachers from the Chinese mainland and teachers who do not have Chinese as a first language (Moloney & Xu 2016). The concept of identity is more generally important to understand the perspective of learners of Chinese background, often referred to as 'heritage' learners (He & Xiao 2008; Mu 2014a, 2014b), and for the role it plays in relation to learner motivation (Dörnyei & Ushioda 2009).

This research on linguistically-derived identity ties into the more general contextual understanding offered by works from digital studies that pay specific attention to the consequences of new social, economic and technological structures on language use, that I described earlier in this section. From the perspective of pedagogy, it is also important to consider that users of digital tools are mainly people who grew up with digital technology, often called 'digital natives' (Prensky 2001, Pasfield-Neofitou 2013). Reflections on how to better engage with digital natives through technology, particularly using visual elements (Brumberger 2016), or by engaging learners through multiple semiotic practices (Kramsch 2008, 2014), form an important part of the background for my research. This is because those questions tie in with research on how learners' beliefs influence the choice of language practice and learning outcomes (Benson & Lor 1999).

As a more general background to my research, questioning the pedagogical purpose and value of language learning tools, and whether it exceeds linguistic competence (understood as the capacity to use language to communicate) to encompass broader areas of communicative competence (including the capacity to develop communicative strategies using different symbolic systems and media), I turned to literature on 'literacies', as 'socially

organized practices [that] make use of a symbol system and a technology for producing and disseminating it' (Scribner & Cole 1981, p. 236). Of interest in that respect was a paper by Dorothy Chun, Richard Kern and Bryan Smith reflecting on changes in teaching and learning practices in light of technology's role both as a pedagogical tool *and* as a medium that affects language use (Chun, Kern & Smith 2016). I looked in particular at the concept of multi-literacies, a term first proposed by a multi-disciplinary group of academics called the New London Group in 1996, to 'give sense to the ways in which literacy practice is colliding with new technological modes of representation and shifting heterogeneous demographics' (Cole & Pullen 2009 p.1), as well as digital literacies as the capacity to engage meaningfully with the different people and texts circulating on the Internet (Thorne 2013). This ties back to the works of Jenkins, particularly the 2005 report commissioned by the McMillan Foundation quoted above, which articulates the types of literacies that would underpin a 'media education for the 21st century' (Jenkins et al. 2005). Broadly speaking, my approach to this project has also been guided by constructivist models that have directly or indirectly informed most learner-centric approaches, as articulated by Lev Vygotsky (Vygotsky 1965) and John Dewey (Dewey 1933).

2.1.5 Chinese Studies: understanding the object as specific and historically situated

The literature that I have so far referred to in this section, whether from digital studies, business and economics, or applied linguistics, set aside one critical aspect of the object: namely the specific investigation of digital learning tools intended to support the learning of the Chinese language. This called for engagement with Chinese studies, broadly defined as a field of knowledge aiming to develop a reflective awareness of the various deforming lenses through which China is and has been understood within and outside its borders (Barmé 2005; Jullien 2006), as well as what counts as 'Chinese' (Xu 2009).

China holds a special place in the global digital landscape for two distinct reasons. The first is a formal feature of the language: the character-based Chinese language offers a practical challenge to an information technology system based on the Latin keyboard – a problem articulated by Thomas Mullaney in his work on *The Chinese typewriter* (Mullaney 2017). The second reason has to do with the shape of the Chinese Internet as separated from the global Internet by a filter, often referred to as the Great Firewall of China. This filter limits access to certain websites and content, but also thereby defines a different digital

environment where local platforms – YouKu, WeChat, Baidu, Weibo – replace the global giants Facebook, Google, or YouTube (Goldkorn 2015).

This status of China as hard to access is reflected in the works of different researchers. Edward McDonald explores the difficulty for Chinese language learners to define a distinctive ‘sinophone’ identity, which he traces to resistance in China itself. McDonald describes an ideological construction embedded deep within Chinese language teaching that puts forward China’s exceptionalism, and frames the Chinese language as ‘impossible’ for foreigners to access (McDonald 2011a, 2011b). Haun Saussy used the expression ‘Great Walls of Discourse’ to characterise this phenomenon, whereby the Chinese language (and its alleged inaccessibility) is used as an ideological tool to protect China’s cultural exceptionalism (Saussy 2001). The construction of China as difficult to access is an important element in defining the distinctive value of China expertise. This gave rise to a controversy in the French speaking world between Francois Jullien, who insisted on the radical difference between the Chinese and European intellectual traditions, and Jean-Francois Billeter, proposing instead that the supposed inaccessibility of China for Europeans was nothing but the effect of hazy translation (Billeter 2006; Keck 2009). At stake in this controversy was not just a question of philological methodology to access Chinese texts, but the exceptional status of Chinese ‘experts’ – and particularly their complicity in supporting ideological constructs from the Chinese state uncritically.

Indeed, under Chinese Communist Party rule since 1949, Chinese language and language learning have been politicized. The establishment of 普通话 (*Putonghua*) or Mandarin as the language of China is a political decision (Kirkpatrick & Xu 2001). In the PRC school system, acquiring a proper mastery of this language, particularly learning to properly trace characters, is more than instrumental, as it is linked to moral education and character building (Kipnis 2011). Externally, the rise of the PRC has been accompanied by efforts to promote the Chinese language internationally, particularly through the Confucius Institute program (Gil 2009, 2017), often understood as an expression of what Joseph Nye describes as soft power (Nye 2004) or as a state-sponsored and university-piloted form of cultural diplomacy (Pan 2013). In turn, this has turned the question of who ‘owns’ the Chinese language into one that is widely debated, with frustrations regularly expressed among diaspora communities regarding the type of Chinese taught in institutions and the absence of funding for Cantonese and other Chinese dialects (Li, W. & Zhu 2014).

Questions raised in the field of Chinese studies prompted me to look at questions discussed by applied linguists – particularly on the rise of translanguaging practices – from a political angle, contextualizing the practice against the changing definition of nation states and national languages under the influence of globalization (Kramsch 2014). In the present-day, when technology serves as an infrastructure for increasingly regular communications among people in the Chinese-speaking world globally, the situation of language learning has been characterized as a form of superdiversity (Blommaert & Rampton 2011).

Translanguaging, in this regard, can be seen as a challenge to the dominant monolingual conception of language, in favour of an approach that exposes the ideological and historically constructed nature of languages (Li, J. 2017), or supports the creation of multilingual and transnational networks among speakers of different Chinese dialects studying overseas (Li, W. & Zhu 2013). A useful comparison can be found in research on the use of English in China to express local cultural realities (Xu & Sharifian 2017), as well as the rise of a distinct variety of English, variously known as Chinese English, China English or ‘new’ Chinglish (Xu & Deterding 2017), or the rise in the number of expats and returned overseas students leading to an increasing number of events held in English in the PRC, and even increasing occurrences of digital and offline communications between Chinese speakers taking place in English (Ma & Xu 2017). These situations recall and exceed earlier theories of linguistic nationalism as resting in an imagined community (Anderson, B. 1983) or as a form of postcolonial hybridity (Bhabha 1994). To understand how new systems of representation can emerge as part of broader supra-national systems, a crucial question for the field of digital humanities, I turned to the work of Franco Moretti, in particular his development of a methodology for studying novel genres (Moretti 2013). A fuller account of this will be presented in Chapter Three.

2.2 Theoretical framework

To satisfy the transdisciplinary demands of my research, which involves critical thinking about the uses of digital technology for language-learning in a context of disruption, I turned to Pierre Bourdieu’s theory of practice, which forms the core of my theoretical framework. Bourdieu’s theory alone, however, formulated as it was in the pre-digital mid-late twentieth century, is inadequate for capturing crucial economic, cultural and formal aspects of my research object. I therefore added two complementary theoretical perspectives to my framework: Clayton Christensen’s theory of disruptive innovation, and Henry Jenkins’ theory

of convergence culture. This section of Chapter Two explains how these three perspectives have shaped my analytical approach and how they relate to one another.

2.2.1 Bourdieu's theory of practice

Through studies of institutional hierarchies, careers and personal trajectories in a broad range of professional and social areas, Bourdieu developed a unique theory to understand what drives the practice of different agents within their social environment. Bourdieu's theory involves four closely inter-related concepts: field, capital, habitus and hysteresis.

Fields are stabilized systems of social positioning within the overall social structure. A field is a sort of microcosm, which Bourdieu compares to the field where a game of football or rugby is played: it involves a number of rules that agents within the field follow in order to maximize their relative positions (Bourdieu 1990). Importantly, Bourdieu conceives of social fields as autonomous – in the sense that each field has its own set of rules – but only relatively so. The rules of a field and the positions of individuals within this field may be impacted by other fields: for instance, the field of journalism is impacted by the fields of politics and finance. Bourdieu calls this situation heteronomy (Bourdieu, 1999). Finally, fields are in relation to one another as part of what Bourdieu calls 'the field of power', or 'the system of positions occupied by the holders of the different forms of capital which circulate in the relatively autonomous fields which make up an advanced society' (Wacquant 1993, p.20).

The second core concept, capital, refers not only to an agent's monetary assets or property, but encompasses two less tangible types of assets described as cultural and social capital.³⁴ Cultural capital corresponds to non-financial assets recognized as valuable within a given field: this includes acquired traits – skills, behaviours, accent, knowledge – as well as institutional tokens such as diplomas and certificates, or objects reflecting taste, from clothes to books or paintings.³⁵ Social capital is the network of relationships that an agent can access

³⁴ A third concept, symbolic capital, appears in Bourdieu's writings. Symbolic capital is not an additional type of capital, but rather the form taken by other forms of capital when they are recognized as legitimate, and therefore confer a sense of prestige on the person who hold them.

³⁵ Bourdieu distinguishes three types of cultural capital. Cultural capital stabilized in the form of diplomas or certificates he calls 'institutional cultural capital'; cultural capital as manifested by the different objects or properties owned by an individual, for instance a collection of records or clothing, he calls 'objectified cultural

for information, access or support. The concepts of capital and field are closely intertwined: ‘capital is a social relation, i.e., an energy which only exists and only produces its effects in the field in which it is produced and reproduced’ (Bourdieu 1984, p. 113). The capital value of an asset – economic, social, cultural – is therefore never universal or impermanent, but determined within a field at a given point in time.

The rules of the games played within a field are integrated by agents as a set of personal dispositions known as ‘habitus’. Habitus is a form of field-specific social conditioning, or ‘the social embodied’ (Bourdieu & Wacquant 1992, p.128). There is a mutual relationship between habitus and field. ‘On one side it is a relation of *conditioning*: the field structures the habitus... On the other side, it is a relation of knowledge or *cognitive construction*. Habitus contributes to constituting the field as a meaningful world’ (Bourdieu & Wacquant 1992, p.127). Habitus encompasses an agent’s capacity to discern what has value within a field and adapt strategies accordingly. It determines what an agent considers to be possible, likely and desirable. Social practice, then, can be understood as resulting from the result of a strategy guided by an agent’s habitus, the evolving structures of the social fields, and the various types of capital that an agent has at their disposition.

The social world is not static but under constant evolution, through the joint pressures of generational change, technological change, political change, and change in the thinking and behaviour of the social agents themselves. The structures and boundaries of fields therefore evolve over time and may be contested at any moment. As this happens, the relative value of different forms of capital and the usefulness of different types of habitus evolve as well. Those changes in field structures are described by Bourdieu as the result of a social struggle (Bourdieu 1984). When field structures are relatively stable, agents can develop consistent strategies to accumulate economic, cultural and social capital and access desirable positions in the field. However, when field structures are unstable or a new field emerges, more complex strategies are required that entail active involvement in the struggle to define the value of cultural and social capital within changing or new fields, as well as the respective weight of different types of capital across the field of power (Wacquant 1993, p.24). In that respect, ‘the definition of the legitimate means and stakes of struggle is in fact one of the stakes of the struggle, and the relative efficacy of the means of controlling the game (the

capital’; finally, the knowledge of an agent and characteristics of their behaviour – for instance, their accent – he calls ‘embodied cultural capital’. The latter, importantly for this research, includes linguistic mastery.

different sorts of capital) is itself at stake, and therefore subject to variations in the course of the game' (Bourdieu 1984, p. 246). When field structures change abruptly, there is likely to be a mismatch between field and habitus, a situation that Bourdieu described as hysteresis. This mismatch can lead to sanctions for agents adopting practices no longer suitable or relevant to the changing field, but it also opens new opportunities, allowing certain agents to occupy desirable positions in a new or changing field which they contribute to structuring.

This set of related concepts – field, capital, habitus and hysteresis – enabled me to conceive of the learner of Chinese as an agent who develops a habitus allowing them to understand and enter previously inaccessible fields. This is because a level of mastery over the Chinese language is essential to start 'playing the game' – in China itself, as well as in fields that require engagement with China: whether diplomacy, commerce, law, or education. Learning Chinese can also be conceptualized as a practice leading to the acquisition of cultural capital.³⁶ Chinese language teachers serve as guides, models and sometimes gatekeepers for learners in the development of habitus and acquisition of cultural capital.

The education field is of particular interest in my research because this is where language learning tools have their greatest application. To become a teacher of Chinese, the language learning agent must achieve and demonstrate a threshold level of competence in the language. Chinese language teaching itself operates as a field structured around various institutions, where different types of assets yield different levels of cultural capital – for instance, language and teaching diplomas, teaching experience, native competence in the language, or time spent living in China – which agents can make use of to access different positions, from those of tenured professors, high school teachers and language tutors to a wide range of roles in the public and private sector requiring Chinese language skills, accredited or otherwise. Teachers are key players in the education field and indirectly affect outcomes in fields linked to the education field.

³⁶ This may be institutional capital in the form of diplomas and certificates that provide access to grants or scholarships – although, as noted in Chapter One, the Chinese language lacks the globally recognized accreditation system that exists for English in the form of standardized tests (IELTS, PTE or TOEFL particularly) that command considerable value in the access they provide to desirable work-visas, university courses, or job opportunities. These tests thus properly function as cultural capital. By comparison, the Chinese government sponsored HSK test is of more modest value. Nonetheless, knowledge of the Chinese language may open work opportunities locally or internationally, or otherwise serve as part of social positioning strategies, particularly in relation to members of the Chinese diaspora.

Understanding digitally mediated Chinese learning practices in relation to the institutionally structured field of Chinese language learning and teaching, however, raises a number of questions. The object of this research – a set of digital Chinese language learning tools and other digital artefacts, what I call resources, supporting Chinese language learning – is the product of a new type of practice that involves designing, producing and maintaining digital artefacts. This practice is conducted by a new class of agents whom I have generically labelled as ‘designers’. It is not entirely clear whether there is anything like a ‘field’ where these agents come together and mutually determine their social position as designers, nor even what other field or fields these agents may belong to.

The practice of digital Chinese language learning tool designers can be understood in relation to at least three distinct fields. To the extent that their work influences and is influenced by existing tools for learning Chinese as these are used in institutions that teach Chinese, they relate, in one way or another, to the field of institutional Chinese teaching and learning.³⁷ To the extent that these designers develop new digital tools, their practice can also be understood in relation to a broader field of digital innovation and technology start-ups. Finally, to the extent that they develop new tools to facilitate people’s engagement with China, they relate to a field perhaps best referred to as ‘the China space’ that brings together, online and offline, people and institutions already active in or preparing to engage with China. These three fields value different types of cultural and social capital, and call for different types of habitus.

There are also differences among designers of Chinese language learning tools. The more entrepreneurial and business-focused among them may belong to all three fields, while others who are institutionally-based or who have specific professional interests may conduct their practice primarily or exclusively within one of the three fields. As for Chinese learners, many are likely to be active within ‘the China space’, as a field-of-sorts that is relevant to their future careers; and most Chinese teachers, through their role as mediators of Chinese culture and language in classrooms, are themselves likely participants in ‘the China space’. As for the field of digital innovation and technology start-ups, although it has no direct

³⁷ Teachers and learners themselves are located within the education field, where they are assigned different and complementary roles. There is also a hierarchy between teachers – for instance, distinguishing professors, lecturers, high school teachers or teachers working at community schools – as well as between learners, depending on their age, level of mastery as demonstrated by enrollment in an advanced or intermediate course, and the prestige of the institution where they are enrolled.

relation to Chinese language learning, the growing importance of technology throughout all fields of social activity gives it a high level of prominence, such that growing numbers of teachers or learners wish to establish a position for themselves in the education-related technology field.

It is important to note here that Bourdieu's field theory was developed at a time when fields reflected clear national boundaries – that is, each nation-state was its own field of power. In the digital age, things have become much more complex. This is particularly relevant for designers, whose tools tend to be developed for a global market of learners and teachers, who tend to spend a lot of time in the global environment of the Internet, and who tend to be globally mobile. Furthermore, in a globalized world, Chinese language learners and teachers are or may be mobile agents, whose social strategies make sense in relation to their own national field, but they often also participate as cosmopolitan expats in a wide range of borderless online fields. Different strategies are therefore in circulation, whereby different agents aim to optimize their position in their own national field, for instance by obtaining a role in a school or university or establishing themselves as a 'China expert' servicing businesses or government in their own country. They could also be developing an online reputation as 'influencers' if they command a globally distributed audience.

The fields of language education, digital innovation and 'the China space' are impacted within each country by the field of power, that influences curriculum choice and design, the choice of education models and the use of technology in publicly funded teaching institutions. Policy decisions will affect the availability of public investment for Chinese language learning and education technology, or indirectly encourage private investment, affecting the overall amount of economic capital available in the Chinese language learning field – thereby affecting the importance of this field in relation to other educational fields. The practices of learners, teachers and designers of Chinese digital tools are similarly affected.³⁸

³⁸ On this matter, Brian Arthur insists that successful design depends on its adequate integration within a larger social context. 'Design and development is a very human process of organization and action,' writes Arthur, and the final success of a certain design project 'depends to a high degree on the larger network of interests surrounding it: its engineering champions, funding bureaucracies, sponsors and other participants who stand to gain or lose power, security, or prestige from the finished work' (Arthur 2009, p.29).

Digitally mediated Chinese language learning is itself an activity that has also been directly shaped by the PRC government. The PRC's Office of Chinese Language Council International (Hanban) engages in active promotion of the Chinese language through investments in a global network of Confucius Institutes (or Confucius Classrooms), promotes the spreading of textbooks through local community schools, determines the criteria to assess language competence through standardized tests such as the HSK, and offers scholarships for language learning at Chinese institutions. In these ways, it conditions popular and institutional perceptions of what constitutes Chinese language mastery in the fields where such mastery matters.³⁹ To that extent, geopolitics will impact the situation of Chinese language education in any given country – for instance, by affecting the availability of scholarships and bilateral exchange programs, the perceived desirability of Chinese language learning or belonging to 'the China space', and the degree of collaboration between national and Chinese institutions.

Finally, digital language learning is conducted through connected digital devices in relation to the Internet as part of a globalized field where the influence of large Internet companies exceeds that of any nation-state. We should note here that the Chinese government imposes restrictions on Internet access thus making the Chinese Internet into a field largely separate from the global Internet via the 'Great Firewall', thereby adding yet another layer of complexity to the field structures that must be considered to more fully understand Chinese language learning in the digital age.⁴⁰

In short, Chinese learners, teachers and tool designers are constantly developing strategies to acquire or preserve valuable habitus and accumulate cultural and social capital, on the basis of their current positions. However, in a situation of high uncertainty and fast change, they will most likely aim to develop more transposable forms of habitus – that is, habitus that is useful in diverse fields – and accumulate cultural and social capital with currency in a broad range of fields (what could be called 'convertible cultural and social

³⁹ Taiwan also exerts an influence (albeit a far more modest influence) on Chinese language education through scholarships, research and support for the development of language-learning tools in Taiwan-based institutions.

⁴⁰ The particular tools that constitute my research object have so far not been censored in China, but the existence of the Chinese Internet as a separate space imposes further constraints, particularly when it comes to identifying integration or developing strategies to make use of other large technology platforms. I explore this in Chapter Five.

capital'), which in turn requires adopting more complex and diverse strategies. To give concrete examples, agents engaging with Chinese learning tools as learners, teachers or designers may be looking for alternative entry paths to the institutional education field, seek to gain recognition as digital entrepreneurs, or earn credentials for their work in people-to-people diplomacy; and they may seek such recognition primarily in their own country, in the PRC, or on a global basis.

The ever-accelerating capital and cultural flows of the digital twenty-first century gives dramatic clarity to Bourdieu's observation that 'the homology between the specialized fields and the overall social field means that many strategies function as *double plays* which [...] operate in several fields at once' (Bourdieu 2005, p.271). The emergence and rapid development of digital tools for learning Chinese allows us to grasp that learners, teachers and tool designers are agents who occupy more than one field at a time, and their practice is determined to different degrees by the various fields that they operate in: designers, learners and teachers are thus all affected by hysteresis. All of this makes it increasingly difficult to evaluate different Chinese learning practices according to one given standard or another. In this situation, practical reasons and achievable objectives for learning Chinese have continued to multiply, aided in large part by digital language learning tools.

These conditions make the normative judgement of pedagogical experts somewhat limited in terms of assessing Chinese language learning aided by digital tools. Thus, I have chosen instead to focus on how these digital tools have been produced, circulated, supported, and used, and to consider the conditions under which they have done so. To reiterate a key point, my research indicates that these tools are the result of actions taken by agents belonging to and navigating across Chinese-language-speaking and China-related fields in a context of fast and significant change.⁴¹ Importantly, field structures not only impact the capital value assigned by teachers, learners and designers to different learning practices and the digital tools supporting these practices, but the classification of these tools as well. On this point, it is useful to bear in mind that classification also involves a struggle over what constitutes the 'best' or most 'reliable' system of classification. As Bourdieu puts it, 'one cannot establish a science of classifications without establishing a science of the struggle over classifications and without taking into account the positions occupied in this struggle for the power of knowledge' (Bourdieu 1991, p.241). What I am tentatively calling the 'typological

⁴¹ And therefore, to reiterate an associated point, I chose to privilege the perspective of designers.

chaos' of digital Chinese learning tools and resources may therefore be a manifestation of the struggle underway about Chinese language learning as a changing field of activity. Think, for instance, of how Google Translate has made it possible for non-Chinese speakers to communicate instantly 'in Chinese'. The extent to which the digital language learning tools that I am studying have similarly affected the many fields in which Chinese language skills are required can thus be analogously imagined.

Although Bourdieu's theory of practice was immensely helpful in enabling me to conceptualize my project, it has limited explanatory value. Bourdieu's concept of 'field' was developed in a time and environment when social change was significantly slower than it is now. Within a fast globalizing world and the vortex of current technological change, field structures are entering a state of exponentially faster renewal. What people today perceive as cultural and social capital is far more complex and fluid as an object of discussion than it was at the time Bourdieu developed his theory. Similarly, the respective values of different educational pathways are open to more and more debate. In addition, Bourdieu's theory does not provide concepts to properly understand the economic environment where digital tools are developed and produced, nor qualitatively describe the types of cultural experiences offered by those tools, and how they differ from previous experiences. Essentially, it offers a framework to understand the value assigned to digital tools as contingent on how they matter to different users, and as involving fields in which Chinese language learning matters. Bourdieu also reminds us that the work of classifying things or assessing the value of things involves 'a struggle for the power of knowledge' among agents in positions of authority (Bourdieu 1991, p.241). In other words, a given digital tool may be enormously useful for someone who uses it to conduct business in Chinese. Such a person 'uses' Chinese but commands no authority in the field of Chinese language learning. Conversely, a classroom teacher, who does command relative authority in the field, may be indifferent to the same tool, and their indifference would result in students being unaware of the tool's existence.

2.2.2 Christensen's theory of disruptive innovation

To better understand the value of digital language learning tools, individually and as a system, it is important to understand their formal characteristics as they relate to the economic conditions in which those tools are developed and adopted. For this purpose, I chose to complement my use of Bourdieu's theory of practice with Clayton Christensen's theory of disruptive innovation.

Clayton Christensen is a professor of economics at Harvard Business School, best known for his theory of disruptive innovation, first articulated in his 1997 book *The Innovator's Dilemma*. Christensen's theory, originally developed by observing the IT and car manufacturing sectors, is politically at the opposite pole of Bourdieu's socially-engaged and anti-neoliberal inquiry. Unlike Bourdieu, Christensen is not interested in providing a critique of capitalism as a system. Rather, he explores the way that technological change, in particular the falling cost of certain technological components, leads to structural transformations in an entire industry and of the market in which the industry operates.⁴²

Disruptive innovation, as defined by Christensen, is not about using technology to create better quality products or services that can better satisfy existing customers. Instead, as he explains, disruption involves 'bringing to the market a product or service that actually is not as good as what companies historically had been selling. Because it is not as good, the existing customers (...) cannot use it. But by making the product affordable and simple to use, the disruptive innovation benefits people who had been unable to consume the product – people we call “non-consumers”' (Christensen, Horn & Johnson 2008, p.47).⁴³ Disruption occurs in a second step, when further evolutions in technology and service design eventually allow the company to increase the quality of the service or product in aspects relevant to existing customers, so that it can start competing with the dominant providers on the market, and eventually allows the companies making those new products and services to take over from existing competitors.

Christensen distinguishes disruptive innovation from what he calls sustaining innovation, where companies increase the performance of services and products targeted at their existing customers. The distinction between sustaining and disruptive innovation has nothing to do with the type of technology used or the speed of progress: sustaining innovation can occur through incremental changes or radical breakthrough. Instead, disruptive

⁴² As mentioned in the literature review, Christensen has extended his observations to several areas, including schools (Christensen, Horn & Johnson 2008) and universities (Christensen & Eyring 2011).

⁴³ Christensen gives the example of motorbike company Honda when they entered the American market in 1959. Attempts to compete with Harley Davidson, who dominated the market with large motorbikes for long-distance road riding, did not succeed. However, Honda's smaller and cheaper motorbikes proved popular with people interested in off-road usage who would not consider purchasing a Harley Davidson. Further technological development, made possible in part by revenue derived from sales to customers looking for off-road usage, eventually allowed Honda to start playing as a concurrent to Harley Davidson for road riding.

innovation occurs when new technology leads to a transformation of what Christensen calls value networks.⁴⁴ ‘Companies are embedded in value networks because their products generally are embedded, or nested hierarchically, as components within other products and eventually within end systems of use’ (Christensen 1997, p. 40). It is normal for parallel value networks to exist, each corresponding to different customers with different problems or concerns. ‘In fact, the unique rank-ordering of the importance of various product performance attributes defines, in part, the boundaries of a value network’ (Christensen 1997, p.41). For instance, someone using a mainframe computer will focus on the capacity of the computer’s disk drive performance, but the user of a portable device will be more concerned with issues of ruggedness and weight. Value networks differ in terms of the customers’ willingness to pay for progression in one aspect of performance – that is, how much they value this particular aspect of performance (Christensen 1997, pp.42-43). Value networks, in other words, determine what attributes of a tool will be valued – and therefore impact the design of the tools, their form, and ultimately the organization of tools in a consistent formal typology. To that extent, the concept of a value network is continuous with that of value proposition, as articulated by Osterwalder, and discussed in Chapter One.⁴⁵

⁴⁴ To give a further example, in a 2015 article for the Harvard Business Review called ‘What is Disruptive Innovation’, Christensen, Raynor and McDonald explore the distinction between sustaining and disruptive innovation using digital examples. The authors contend that Uber should not be described as a disruptive but sustaining innovation. Disruptive innovators begin their market entry in low-end markets where they propose a ‘good enough’ product for a set of price-conscious users. By contrast, Uber – though its underlying technology and organization model marks a radical departure from previous taxi services – started in the relatively high-end market of central San Francisco, where the services it offered were targeted at mid- to high-end customers, with performance measures exceeding taxis in key areas of importance to customers, such as fast booking, easy payment, comfort or speed of arrival. By contrast, Netflix is proposed as an example of disruptive innovation because, when it started its service as an Internet supported mail-order video rental company in 1997, it could not satisfy existing customers of Blockbuster who rented new releases on impulse – although its broad catalogue and competitive prices could satisfy ‘movie buffs’ ready to wait a few days to receive a video. Development of digital technology, allowing Netflix to shift its model to video streaming, made it a potential competitor for Blockbuster, which it eventually displaced (Christensen, Raynor & McDonald 2015).

⁴⁵ Though Christensen does not refer to a business ecosystem per se, his argument can easily translate into the idea of a business ecosystem as the term has been used in academic business discourse, and as I further articulated it both in Chapter One and in the first section of this chapter. Christensen’s theory of disruptive innovation, particularly as it relates to the integration of a service or product as part of a value network, is highly relevant to how companies operate in the digital realm. The products or services of these companies are closely

In this connection, Christensen notes that because the structures of an organization tend to optimize for a dominant product, they can inadvertently impair the development of new products. Thus, disruptive innovation typically occurs through small entrants to the market, rather than within large established organizations, often called incumbents (Christensen 1997, p.38). One example is Kodak, the largest incumbent manufacturer of films and cameras, which failed to develop digital products, and eventually declared bankruptcy as a result. According to Christensen, the internal logic of large companies structurally hinders disruptive innovation: they are geared to favour the highest paying (usually the most demanding) customers within established value networks, and therefore discourage internal attempts to develop innovations with disruptive potential. In contrast, small organizations will see a benefit in developing entirely new customer segments for new products.

One key question raised in relation to Christensen's theoretical model is whether digital Chinese language learning tools should be understood as a sustaining or disruptive form of innovation. Addressing this question requires acknowledging that different markets for Chinese language learning already co-exist, corresponding to learners with different types of needs and expectations, or different 'jobs to get done'. Curricular high school and university education appeal and cater to different audiences from alternative, independent classroom learning institutions, whether adult classes offered by community schools for children of the diaspora, Confucius Institutes, one-on-one tutoring for executives or immersion courses in China. Besides, a number of Teach Yourself books and audio methods are commercially available that target yet another set of learners from Chinese language programs at universities.

The emergence of digital Chinese language learning tools affects the use of those existing products and services to varying degrees. To some extent, digital Chinese language learning tools appear to have already diminished the value of (hitherto widely used) Teach Yourself Chinese books in print. If digital learning continues to grow, it may either adversely

dependent on each other – for instance, a new digital app depends on and must integrate with existing digital devices and operating systems. The constitution of a business ecosystem as an integrated network of interdependent companies can result in participants collectively developing a competitive advantage, all the way to global domination of an industry, as for instance Hollywood film companies in cinema internationally or Silicon Valley companies in the global market for digital technology.

affect or transform this industry as a whole.⁴⁶ Accredited university courses certainly represent what Christensen describes as ‘the high end of the market’ in relation to Chinese language education and, therefore, are less exposed to disruption than non-accredited offline courses, such as community learning centres, adult learning centres or even Confucius Institute classes. However, the situation of digital language learning tools in relation to offline courses – whether institutionally-accredited or otherwise – may also be one of complementarity, whereby digital tools offer the basis for more attractive classroom activities, supplementing existing options for homework, or integrate with offline courses in other ways yet to be seen. The relationship between digital tools and offline institutions may therefore variously be conceived of as one of competition, customer-client, or one of co-evolving partners. I explore this particularly in Chapter Six and Chapter Seven.

Some signs do indicate that the concept of disruptive innovation may be properly applied to the evolution of digital Chinese learning tools. Digital tools on their own may not yet offer education services of sufficient quality to compete with institutional learning, but they offer a cheaper and more flexible option, thereby attracting people who are neither enrolled nor likely to enrol in institutionally-based Chinese language courses. Here is one clear example: within a year of its launch in late 2017, the Chinese curriculum on the popular language learning app Duolingo had attracted 2.8 million language learners around the world.⁴⁷ By comparison, in the same timeframe, a bold initiative by President Obama to have 1 million people learn Chinese in US classrooms by 2020 – up from 200,000 in 2015 – had only resulted in the announcement of ‘implementation partners’, and seems to have made

⁴⁶ One area of consideration to further understand this would be to observe the relation between the tools I observed for this research and large incumbents in autonomous language learning, such as Berlitz or Rosetta Stone. Although the latter still exists, and did develop digital tools continuous with earlier CD-Rom offers, they did not feature in any measure of prominence in my fieldwork, indicating that the tools I am observing may be disruptive in relation to those incumbents. This would at least appear to be the case when it comes to the Chinese language. I will return to this in Part Three.

⁴⁷ When one starts a new language curriculum on Duolingo, the screen shows how many people have downloaded the corresponding modules: this is how I got the figure of 2.8 million in late 2017. Figures are also available through the Duolingo website. As per November 2019, the number of people who had downloaded the Chinese curriculum was 3.5 million.

little or no progress since.⁴⁸ Certainly, there is a difference between the learning outcomes of downloading Duolingo on a mobile phone and attending an institutionally-accredited Chinese curriculum. The cost and time investment required is very different for these two situations of learning. That said, the ease of access to digital learning tools and their portability (accessible via smart phones and tablets) has afforded Internet users opportunities to learn Chinese that they would not otherwise have had.

Christensen's concept of disruptive innovation, as I have used it here, complements Bourdieu's account of the effects of hysteresis. Hysteresis considers the social impact of changes in field structure, while disruptive innovation considers that phenomenon through an economic lens. In both cases, change elicits different reactions depending on an agent's position. Younger agents with larger amounts of more convertible social and cultural capital tend to perceive such situations as offering opportunities to gain desirable social positions, while older agents, or agents whose 'portfolio' of cultural and social capital is less easily convertible across fields, tend to resist or fear that change. This was reflected at language teacher conferences that I have attended: when the issue of digital learning tools is raised, language teachers have often reacted in one of two ways: they either dismiss the tools as simply 'not as good' as classroom learning, or express an anxiety that the tools might radically change what they've become adept at teaching within the institutional context.

In relation to Bourdieu's theory of practice, Christensen's theory of disruptive innovation provides a way to describe the concrete mechanism whereby changes in field structures occur because of digital technology. Agents with a certain type of cultural capital and habitus – particularly an understanding of new technologies combined with what we may call an 'entrepreneurial mindset' – form small organizations that specialize in the production of new services and products. They do so in the hope of accumulating economic capital and cultural capital, as owners of profitable businesses and experts in new learning models – and more broadly, to influence the redefinition of field structures in a way that maximally benefits them as founders. It needs to be emphasized, however, that the works of Christensen and Bourdieu, in spite of their complementarity, differ greatly when it comes to their underlying ideological perspectives. Bourdieu's approach is largely driven by a critical

⁴⁸ Allen-Ebrahimian, Melanie. 'Can 1 million American students learn Mandarin?'. Foreignpolicy.com. September 25, 2015. <http://foreignpolicy.com/2015/09/25/china-us-obamas-one-million-students-chinese-language-mandarin/> (accessed September 26, 2019).

endeavour to reveal social strategies of domination in order to increase agents' capacity to resist those strategies, while Christensen's work is rather intended to support business leaders – already holding dominant positions – maintain their position as field structures change, by better anticipating, or even leading, the process of change.

In bringing together Bourdieu's field theory and Christensen's theory of disruptive innovation, I am also highlighting a certain tension between institutional interests on the one hand, and commercial interests on the other.⁴⁹ The design and production of digital learning tools is guided by both pedagogical and commercial reasons. These tools circulate among users located in institution-based Chinese language learning as an international field (with many different local fields that form part of the education systems in different countries) that only partly operates on the basis of market forces. Tools developed as independent commercial entities thus compete with publicly-funded institutions of learning, and sometimes with publicly-funded digital tools developed by institutions or commissioned through state agencies for institutions. The various social strategies conducted by teachers and designers (and to some degree by learners), to the extent that they have an impact on field structures, will also affect the availability of public funding for different types of tools or ventures – or more broadly impact policy conditions and market structures for digital tools. The capacity to articulate the relationships between local and global is particularly important to understand those questions. Although Bourdieu's theory was developed at a time and in a context where the field of power was tied to the nation state, it has since been applied by researchers to understand fields on a global scale. In fact, in a paper titled 'What is a global field? Theorizing fields beyond the nation state' Larissa Buccholz proposes that the concept of field may be particularly apt to 'grasp social spheres with "institutionalized anomie"', which seem to be profuse at the transnational or global level (Buccholz 2016, p.40).⁵⁰ Thus,

⁴⁹ It is uncertain which of these best aligns with what may be called the interest of public education, or the goal to have as many people learn as much Chinese as possible. To give one concrete example, at a workshop that I attended during the 2013 LCNAU conference in Melbourne, language lessons on Skype – the Italki model – were described by a Professor of Chinese at an Australian university not as a great opportunity to develop affordable language literacy at scale, but as a concerning challenge for the university's Chinese program's income-generation through student enrollments. The remark was met not with outrage but concerned agreement. I return to this point in Chapter Seven.

⁵⁰ The quote "institutionalized anomie" is from Bourdieu, Pierre. 1993. 'Manet and the institutionalization of anomie', in P. Bourdieu (ed.), *The Field of Cultural Production*, pp.238–253, Oxford: Polity Press.

Bourdieu's theory may be particularly apt to understand digital technology as an emerging global field, and its tension with nationally structured fields of education.⁵¹

Christensen's theoretical framework is highly useful to understand the economic context shaping the design and adoption of digital learning tools, while Bourdieu's theory – particularly his concept of a field as an autonomous *social* sphere in relation to its rules and practices when considered against those of other fields – will guard against a naïve or ideologically loaded subscription to neoliberal understandings of education. More broadly, the combination of these two different theories offers a clearer understanding of the factors that drive the design of digital learning tools as well as an appreciation of their value. Specifically, these tools serve as part of various strategies for capital accumulation across a range of evolving fields on the basis of a social logic, but also as objects of transactional exchanges across changing markets on the basis of an economic logic.

2.2.3 Jenkins' theory of convergence culture

I now turn to concepts that are useful for analyzing the formal characteristics of different learning tools. While Bourdieu's and Christensen's arguments enable us to approach digitally mediated Chinese language learning as occurring within broader institutional structures and as emerging out of rapid social and cultural change, they do not provide a way of understanding the networked aspect of Chinese language learning in the digital age. To gain perspective on the combinatory nature of digitally-based language learning, I now turn to Henry Jenkins' theory of convergence culture.

In *Convergence Culture* (2006), MIT cultural analyst Henry Jenkins explores the relationship between emerging forms of cultural practice and changes in media and communication technology. His analysis focuses more particularly on a phenomenon that he calls 'media convergence', best described in the words of the author:

By convergence, I mean the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behaviour of media audiences who will go almost anywhere in search of entertainment experiences they want. [...] This circulation of media content – across different media systems, competing media economies, and national borders – depends heavily on consumers' active participation. I will argue here against the idea that convergence should be

⁵¹ I explore those questions in Chapter Seven.

understood primarily as a technological process bringing together multiple media functions within the same devices. Instead, convergence represents a cultural shift as consumers are encouraged to seek out new information and make connections among dispersed media content (Jenkins 2006a, pp.2-3).

Jenkins insists that convergence is a matter of interpretation and experience, and not purely a matter of technological integration. ‘Convergence does not occur through media appliances, however sophisticated they may become. Convergence occurs within the brains of individual consumers and through their social interactions with others’ (Jenkins 2006a, p.3). However, one consequence is a changing pattern of collaboration across different agents of the media industry, who develop coordinated strategies in relation to the changing behaviours and expectations of media consumers, including the development of new technological features to guide those behaviours.⁵²

Convergence culture enables new forms of narrative constructions – facilitated both by interconnected sets of cultural artefacts and by commercial products made by the media industry – which Jenkins calls transmedia storytelling. The term transmedia was originally coined by Marsha Kinder in 1991 to describe entertainment franchises centred on iconic characters, for instance Super Mario or the Teenage Mutant Ninja Turtles, that include a range of products such as games, cartoons, figurines, books, or movies (Kinder 1991). Jenkins’ concept of transmedia storytelling goes one step further, beyond the simple circulation of a character from e.g. book to film and video game, to the deliberate development of narrative experiences that span across different media, where each platform makes a unique contribution to the experience. One iconic example is *The Matrix*, which consists not only of three movies, but an associated range of interconnected texts – animated films, comics and games – each of which offers additional and unique elements about the matrix universe (Jenkins 2006a).

A third characteristic of the digitally mediated cultural experiences described in Jenkins’ theory is that they are participatory: rather than a clear distinction between media

⁵² This point relates to the way that Jose Van Dijk describes ‘defaults’ in her book *The Culture of Connectivity*. ‘Defaults are not just technical but also ideological maneuverings. (...) Algorithms, protocols, and defaults profoundly shape the cultural experiences of people active on social media platforms.’ These coded structures ‘are profoundly altering the nature of our connections, creations, and interaction. Buttons that impose ‘sharing’ and ‘following’ as social values have effects in cultural practices’ (Van Dijk 2013, p.32).

consumers and producers, those media environments gather ‘participants’ who interact with one another according to changing sets of rules. Although corporations do exert much greater influence than individual consumers in shaping media contents and stories, and although some individuals are more able to participate effectively in this new culture (for reasons that, to use Bourdieu’s concepts, have to do with greater levels of economic, cultural and/or social capital), the notion of joint participants in a cultural experience, instead of customers and producers of media, entails a much greater level of equality between producers and consumers of culture (Jenkins 2006a). The word ‘prosumer’ is often used to describe this convergence.

In a 2005 White Paper titled ‘Confronting the Challenges of Participatory Culture: Media Education for the 21st Century’, for which he was the lead author, Jenkins articulates four dimensions of a participatory culture. It has ‘relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one’s creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices.’ In addition, ‘a participatory culture is also one in which members believe their contributions matter, and feel some degree of social connection with one another (at the least they care what other people think about what they have created)’ (Jenkins et al. 2005, p.3). Critical examples of such participatory cultures include the fast-growing number of Internet platforms that circulate user-generated content.

Jenkins’ descriptions of transmedia experiences and participatory cultures can be usefully applied to digital Chinese language learning. The distinctive digital learning tools I am analyzing offer different yet complementary learning experiences, and they reflect the workings of media convergence. There is a good deal of interaction among users of these digital language learning tools, directly through the tools themselves or through blogs, forums and social media, and some of the tools have features that intentionally encourage migratory behaviour from participants, from hyperlinks and recommendations to features allowing, for instance, the export of highlighted vocabulary items from a text to a flashcard app. In other words, the possibility to use different tools as part of a transmedia learning experience is connected to those tools forming an ecosystem, and vice-versa.

Jenkins’ work also invites reflection on the relationship – and continuity – between learners, teachers and designers. Rather than a central institution defining what language learning is, rather than tools being perceived as the work of engineer-educators developing them from a distant ivory tower, Jenkins’ theory invites us to conceive of learners, teachers

and designers as involved together in developing and maintaining a dynamic digital environment where Chinese language learning occurs. Jenkins' theory is particularly useful to understand the agency of learners in navigating a complex and shapeless environment of digital tools, engaging in what I earlier called a form of pedagogical bricolage, but which might also be referred to as a 'transmedia learning' experience.

From a pedagogical perspective, to speak of learners, teachers and designers is somewhat misleading as these roles are fluid in a predominantly online participatory culture. Advanced learners may take over the function of a teacher, and anybody contributing content – that is, a very large number of learners and teachers – would also count as designers. A useful description of the digital Chinese learning landscape would therefore also require mapping the various virtual communities that a person can join by using different digital tools, and the different roles they can play in those communities. In this context, to go one step further, the value of a tool may have less to do with the normative appraisal of pedagogical experts on the language skills that a learner is likely to reach by using the tool, and more to do with the intrinsic appeal of the experience and community that can be accessed through that tool. In that perspective, formal characteristics of a tool that are conducive to such experiences – such as the capacity to create personal accounts, share content, post comments, or interact with other users – would be particularly valued by users.⁵³

From a commercial perspective, there is also continuity between learners, teachers and designers. Christensen's theory of disruptive innovation clearly distinguishes between producers and consumers, but in a participatory culture, this distinction blurs into the more fluid category of prosumers. Our context, at least, offers a number of examples where contributions to the experience of other learners is provided without direct commercial counterpart – for instance, Chinese forums where learners support other learners through comments, user-generated vocabulary lists on Skritter, or participation in speaking pairs on HelloTalk. In fact, many tools were developed by learners, while they learned, to support their learning. Making those tools public may be a way to gain economic capital, or help

⁵³ This point invites reflection on peer-learning: the practice is typically conceived of as 'interacting with peers in order to learn', but it might also be described as 'taking learning as an opportunity to build new relationships with peers or interact with them'. I will return to the question of peer-learning, and more generally the structures allowing learners, teachers and designers to take part in something akin to a form of convergence culture, in Chapter Five and Chapter Seven.

those learner-designers gain a position of influence in a digitally mediated community supporting the learning of the Chinese language, which can later translate into cultural or social capital. I will explore this point in Chapter Six and Chapter Eight.

To return briefly to Christensen's point about disruptive innovation being connected to value networks, the value of tools depends at least in part on their level of technological integration with other tools. It also depends on the capacity of users to integrate the tools with the rest of their digital life, whether this is programmed as part of the tool design, or simply allowed by it – for instance, through a plugin to share learning progress on Facebook, or even a Facebook login option. What Jenkins draws our attention to is that within media convergence, the value of digital tools rests not only on how well they perform in relation to their individual intended use, but also on the way that they perform as part of a system of digital learning. Moreover, to return to the pedagogical and commercial reasons behind the production of these tools, we must also consider the complexity of their formal characteristics: they can serve as many pedagogical goals as their users (whether learners, teachers or designers) can find for them.

The concepts of convergence culture and participatory culture articulated by Jenkins also extend and problematize Bourdieu's concepts of field, capital, habitus and hysteresis. To what extent can the community that comes together in a joint participatory transmedia experience be described as forming a field? Or would 'field' be the wrong term, given that online communities tend to be far more amorphous than offline ones? Would it be adequate to speak of reputation building on a peer-learning platform as a form of social capital accumulation or, again, are those communities too elusive to warrant use of the concept of social capital in that context?

The three arguments drawn from Bourdieu, Christensen and Jenkins that inform my theoretical framework offer distinct ways of understanding the emerging landscape of digital Chinese learning: as a field, as a market, as a transmedia experience, and as a potential ecosystem under investigation. In turn, this allows me to think of the tools I intend to describe in three distinct modes: as assets yielding differential cultural capital within different China-related fields, as products and services with different perceived values in different markets, and as vehicles for different transmedia experiences. The next step to explore this landscape is to articulate a methodological approach to capture data and develop knowledge about the object.

Chapter Three: A mixed-methods approach to paint a new digital landscape

3.1 Building a mixed-methods approach

Developing a methodology for this research presented two major difficulties. Since the object – an emerging ‘landscape’ of digital Chinese language learning tools – is so broad and ill-defined, I needed a data collection method that would yield a set of data contained enough that I could analyze it within the limited boundaries of a PhD project, yet broad enough to offer an adequate representation of the object. Since I adopted a transdisciplinary approach, I also needed to construct a methodology that would allow me to understand the object in line with Bourdieu’s field theory, Christensen’s theory of disruptive innovation, and Jenkins’ theory of convergence culture – that is, as a set of interconnected learning tools conceived as cultural artefacts possibly supporting participatory transmedia experiences, as products and services possibly facilitating economic disruption, and as symbolic objects supporting a range of new social practices whose value depends on shifting field structures.

As described in Chapter One, I was able to identify digital Chinese language learning tools – designed for the purpose of learning – as a salient unit of observation. However, the ontology of digital artefacts is such that the identity of those tools is hazy. I could not decide a priori to focus exclusively on the ‘tool-as-core-functionality’, the ‘tool-as-instantiated-artefact’, or the ‘tool-as-brand’, as I defined those terms in Chapter One, but rather needed to consider all of these aspects. I also needed to account for the fact that tools typically evolve over time. In addition, the intention to provide an overarching map of the digital Chinese language-learning landscape, meant that my data should include ‘resources’ as well as ‘tools’. This is because the development of language learning tools is affected by how learners and teachers access and make use of what is available on the Internet. For these reasons, I could not simply select a bounded set of tools and proceed with content analysis of formal elements such as their interface design, introduction text and/or choice of imagery, or analyze and compare the business models of the organizations producing them. I would need a method that allowed me to scan the landscape, categorize important elements of online language learning, understand patterns of complementarity among the tools, and identify the most salient ones, before I could conduct more specific analysis.

A related challenge was that the cultural and organizational contexts in which the tools were, and are, used and valued are themselves ill-defined and emerging. Understanding how learners, teachers and designers engage with new pedagogical, cultural, social and

economic practices – online and otherwise – enabled by digital tools, was essential in order to address my key research question. This is because these practices and the diverse contexts in which they are conducted define the value of learning tools, individually and as a set. The situation that I faced, however, differed from that of a social scientist proposing to study a set of artefacts used by a relatively well-defined group of people who regard themselves as members of a relatively well-defined culture – whether the people are living in a certain neighbourhood, belong to a certain organization, or are jointly participating in an identifiable practice. The nature of my investigation made it impossible for me to predefine a demographic target (for instance, young adults aged 18-30 living in Australia who have spent at least a year living in China, or students enrolled in a Chinese Studies major at Monash University), investigate their use of digital learning tools, and inductively derive an understanding of the tools from this study. Instead, my research demanded that I consider the interplay between a large and difficult-to-define set of tools and a large and undefined set of users, conducting different practices enabled by those tools, the meaning and value of which was contingent on different, changing and as-yet-undefined contexts.⁵⁴

For these reasons, any quantitative approach was unfeasible and hence excluded. Rather, I developed an original methodology relying on diverse sources of qualitative data that I analyzed iteratively. My approach generally aligned with the principles of grounded theory, or ‘a systematic, inductive, and comparative approach for conducting inquiry for the purpose of constructing theory’ (Bryant & Charmaz 2007, p.1). In order to capture the ill-defined object I was aiming to understand and to properly triangulate the data, my methodology combined three otherwise unrelated ‘methods’: a formal analysis of the tools inspired by Franco Moretti’s distant reading (Moretti 2013); ethnographic research of digital Chinese language learning that involved an auto-ethnographic element; and comparative case studies focused on a core set of interconnected digital learning tools selected on the basis of a network map. In using these non-cognate ‘methods’, I am arguing that, together, they offered an apt and efficient way to capture the dynamic development of these digital tools.

⁵⁴ In this research, my focus is on tools designed for and used by independent learners – defined as learners who are allowed to surf on the Internet freely, or teenage and adult learners. I define tools and groups that I excluded from my focus in more detail at the end of the next section.

3.2 Mapping an uncharted landscape: Moretti's distant reading

The first methodological challenge I faced could be summed up by this question: how might one understand a reality that exceeds anybody's capacity for close observation? A key source of inspiration came from Franco Moretti's practice of distant reading. In 'Conjectures on World Literature', Moretti addresses a central issue that has seldom been asked by scholars of comparative literature: how might one understand literature as a planetary system, comprised of texts written in hundreds of languages and embedded in hundreds of distinct regional and national contexts? Reading more, argues Moretti, is hardly the solution when 'there are thirty thousand nineteenth-century British novels out there, forty, fifty, sixty thousand – no one really knows, no one has read them, no one ever will. And then there are French novels, Chinese, Argentinian, American...' (Moretti 2013, p.160).

This situation presented similarities with the one I was facing. I was looking to chart a domain with unclear boundaries: one where, for instance, there was an undetermined (and indeterminable) number of vocabulary building and character revision apps accessible through the Appstore, whose designers were based around the planet, in and outside China, and then there were podcasts, learning videos, graded readers, and games, and blogs, and online tutoring offers, not to mention discussion forums, and social media channels offering a new Chinese word every day, adding up to numbers exceeding any researcher's capacity to process.

Like world literature, understanding digital Chinese language learning tools is 'a problem that asks for a new critical method' (Moretti 2013, p.160). Following Moretti, I then sought to develop a method where distance is a condition of knowledge as 'it allows you to focus on units that are much smaller or much larger than the text: devices, themes, tropes – or genres and systems' (Moretti 2013, p.162), and to use this distance as a way to conduct a comparative morphology, or 'the systematic study of how forms vary in space and time' (Moretti 2013, p.164). This, in turn, allowed me to explore how this formal variation has enabled different types of learning practices which are differently valued by users in different fields.

Considering this landscape from a distance, what should I look for? That is, how should I identify the tools most worth focusing on, and to what elements of a tool should I pay more attention? Moretti's 'The Slaughterhouse of Literature' provided me with a workable approach. In this essay, Moretti argues that literary history should be approached

with the following situation in mind: the vast majority of books have disappeared from history. Thus, even ‘if we set today’s canon of nineteenth-century British novels at two hundred titles (which is a very high figure), they would still be only about *0.5 per cent* of all published novels’ (Moretti 2013, p.207). This observation was relevant to my object of study. I was, indeed, aware that while an indefinite number of tools existed (many of them being aborted attempts or early versions of tools with limited circulation), only a small number of tools seemed to have persisted over time, circulating more broadly and featuring more prominently in conversations about digital Chinese language learning. Those tools may be understood as forming the equivalent of a ‘canon’.

What factors result in a work becoming part of a canon or falling off into the Great Unread (or, in the case of learning tools, the Great Unused)? Drawing on economic analysis, Moretti acknowledges the role of market mechanisms whereby audiences discover what they like, and create a cascade of information regarding the quality – or lack thereof – of a certain film or book, leading to its success on the market, ongoing commercial availability, and later access to canonical status. When it comes to understanding why a certain literary text (or, in my case, a digital tool) achieves success, Moretti proposes that the distinctive feature is formal in nature. He uses the example of the detective novel as a new rising genre in the late nineteenth century. He identifies clues allowing the protagonist to resolve a mystery as a key formal feature – what he calls a device – leading to the popularity of Arthur Conan Doyle’s novels as archetypally representative of the detective genre, and their eventual rise to canonical status (Moretti 2013, pp.212-216).⁵⁵ Genres appear and evolve, argues Moretti, as a result of formal exploration conducted by novelists, whereby new devices, or formal features serving a function in the narrative, are produced through a creative process of trial and error. Some of these innovative devices strike a chord with the public, thereby leading to the success of a novel, and retrospectively, a genre can be recognized as a repeatable pattern which that representative novel comes to epitomize (Moretti 2013, p.217).

This resembled the situation I was aiming to capture. Digital tools are created by designers who make use of the new formal possibilities afforded by digital technology towards the goal of supporting Chinese learning, in a form of creative bricolage resembling

⁵⁵ It is important to note that what Moretti calls ‘devices’ involves not only formal elements, but formal elements connected to a narrative function. In the case of the detective novel genre, for instance, the distinctive element is not only the presence of clues, but their function in guiding the protagonist in their quest for truth.

the process of ‘trial and error’ described by Moretti (2013, p.215). What the model would suggest, in addition, is that a tool whose formal characteristics are particularly well suited to a certain learning practice, or offers a new and useful solution to a specific learning problem, becomes popular among users. That tool then becomes recognized as representative of a certain ‘type’ (understood in analogy with literary genres), and each ‘type of tool’ is then definable on the basis of certain functionally significant formal characteristics, akin to what Moretti calls ‘devices’ (2013, p.217). What Moretti’s model suggested, therefore, is that the typology of tools I was looking to identify should be conceived of as derived from concrete instances, in the same way that a system of literary genres is derived from the works of individual writers. I should also expect to find something like a canon of tools, with representatives of different ‘types’ or ‘genres’ that could be distinguished on the basis of functionally significant formal elements.

To follow Moretti’s argument, published novels, the primary source of his data, form discrete and contained units. It may not be possible to read the tens of thousands of novels published in Victorian England, but it is possible to develop a list of those novels and access, if not the complete text, at least their titles in digital form, to serve as the basis for computational analysis. When it comes to online tools for Chinese language learning, however, computerized analysis of this kind would not be possible, for reasons to do with their complex ontology and ensuing ‘fuzzy boundaries’, which I described in Chapter One. I was also not able to use simple quantitative methods – such as the number of downloads or number of users – to identify a proposed ‘canon’. I could, however, take an indirect approach in three steps, keeping in mind the limitations imposed by the uncertain ontology of digital tools.

The first step was to develop what I called an ‘extended canon’. To do this, I used the list of tools and apps presented on the Hacking Chinese website’s ‘resources’ page, because my own contribution to this page had made me familiar with the list. Moreover, the listed tools were fairly well-known and widely used. To this pre-existing list, I added tools which I had gathered through an open search on Google and the Apple Appstores, using ‘learn Chinese’ as a keyword, looking for tools with at least a year of existence and which had attracted at least five user reviews. I also included tools mentioned in lists of ‘best tools to learn Chinese’ which I searched on Google, and tools mentioned by my interviewees when I conducted field research for this project.

On this basis, I gathered a list of 190 tools, representing a proposed ‘extended canon’. The production of this list was, for the problems of tool classification and categorization outlined earlier, the result of both first-order observation and higher-order reflection on what should constitute a digital Chinese language-learning tool. The items in the list are individuated and ordered on the basis of what I called the ‘tool-as-core-feature’, but identified (that is, referred to) on the basis of what I called the ‘tool-as-brand’.⁵⁶ In some cases, a certain brand may be present twice when it offers multiple tools or ‘products’. To give one example, the main blog of Hacking Chinese (providing language learning advice) is a separate entry from the Hacking Chinese tone training course. In cases when a tool bundles multiple features, for instance Pleco combining a dictionary function with flashcards, it was listed under the category that it is most known for, as assessed on the basis of online discussions about the tool: for instance, Pleco was listed as a dictionary. The full list appears as Appendix One.

The next step was to identify items in this list that played a more central role – type-defining tools forming what may be called a ‘core canon’. The method of identification I used appears in the last section of this methodology. The third and final step consisted in ‘working’ through both lists – the ‘extended canon’ and the ‘core canon’ – and looking for ways to organize the items in this extended canon on the basis of a functionally significant formal element. This final step is discussed in Chapter Five.

The tools on this list constitute a first core set of data, but need to be considered against a background comprising other types of ‘resources’, which also informs the proposal of a tool typology presented in Chapter Five, as well as discussions in further chapters. Tools that appear on the list also stand against an undefined number of tools not listed, because they were too marginal, because I was not aware of them, or because they only exist in an early alpha version and/or have become defunct. To conclude this first section of my methodology, I would like to reflect more generally on types of digital artefacts that are not included in

⁵⁶ What I call the ‘tool as core feature’ can be analyzed as a combination of functionally significant formal elements, forming the equivalent of what Moretti calls a ‘device’, so that each ‘tool-as-core-feature’, or type of tool, can be interpreted as the equivalent of a genre. For instance, Pleco-dictionary combines bilingual database and touchscreen input allowing for search in English, pinyin, or by drawing a character on a touchscreen, which, together, could be said to form the ‘genre’ digital mobile dictionary. I explore those questions in more detail in Chapter Five.

what I propose to call an extended canon of digital learning tools. Seven different reasons may account for such exclusion.

First, my fieldwork was conducted between 2015 and 2017. My data therefore only takes into account tools that were in existence during that period, with the features that were present at the time.⁵⁷ The end date was largely imposed by external constraints. It also happened to align with a moment when Internet, mobile technology, social media and to a smaller extent peer-to-peer economic models had become mainstream.

Second, my ‘extended canon’ consists mainly of tools designed for speakers of English. Interviews and online discussions showed that these tools were widely adopted by first speakers of other languages with a reasonable command of English.⁵⁸ Simple searches by keyword in French and Spanish (‘apprendre le chinois en ligne’ or ‘aprender chino en línea’ meaning ‘learn Chinese online’) showed the existence of ‘extended canon’ tools in those languages, and I was more generally aware of tools produced by Hanban and translated in different Asian and European languages. Those, however, neither seemed to present the same level of variety, nor did they seem to form a cohesive set in the way that tools designed for English users appear to be, nor did they seem in any way ‘integrated’ with tools for English users. In addition, from a superficial search, I did not identify any tool in French or Spanish that presented a significant formal difference with the tools I considered. I therefore chose to leave them out of the research. I was not aware of any tool designed explicitly for speakers of Korean and Japanese, for whom language similarities would possibly result in different learning needs.⁵⁹ Field research showed that, if such tools existed, the designers of

⁵⁷ For contrastive purposes, I also considered two defunct tools, developed in the early 2010s, that I had used or contributed to developing: Fourtones and Duable Chinese.

⁵⁸ This would include most expats of origin other than East Asian in China, and many otherwise educated people (whether from Europe or elsewhere) learning Chinese after completing high school or a university degree. It should be noted as well that, in some cases, the interface language could be changed, making the tool properly multilingual. This is the case for all the tools I focused on in this research that support not only Chinese language learning, but also the learning of other languages (for instance, Italki, Duolingo or FluentU). Understanding the comparative penetration of those tools among different states, and their perceived value for users of different cultures, far exceeds the scope of this research.

⁵⁹ I was, however, very aware of those as learners. In 2013, I spent a term of study at Nanjing University, studying Chinese for foreigners. About a third of the students at intermediary levels and above would have been Korean or Japanese then.

tools for English learners were not aware of them. I therefore also chose to leave them out of the research. What I did consider listing, however, was not only tools which narrowly support Chinese language learning (e.g. Pleco, The Chairman's Bao or Hacking Chinese) but also language learning tools that support the learning of different languages including Chinese (e.g. Duolingo, FluentU or Italki).⁶⁰

Third, I limited myself to tools developed for desktops, laptops, phones and tablets. I set aside virtual reality tools offering immersive 3D environment, as well as tools existing as separate hardware, for instance Chinese-English translators (now largely obsolete), or a more recent 'AI-speaker' to learn Chinese mentioned in Chapter One.

Fourth, I was aware of tools developed specifically for learning institutions, whose usage is typically limited to one school or university, or the schools / universities in one region or country. I did not systematically study those tools, nor did I include them in my extended canon. The existence of those tools as a distinctive type, and the effect of their presence on the use of other tools, is the object of analysis in Part Three.

Fifth, I focused on tools designed primarily for independent Internet users – that is, adults and teenagers. Over the period that I considered, there was a rise in demand for Chinese language learning as part of adult education, as China became perceived as a place of economic opportunity, stimulating the interest of adult learners who had not learned Chinese during their school years. I reflect on this in the body of the thesis. I was aware of institutional tools designed for children – for instance, the state of Victoria in Australia funded a set of apps used in primary schools. I left those outside of the data that I considered for the list, along with other institutional tools. I was also aware of tools made in the PRC to help Chinese children learn the language. One of these tools, called 'Baobei Ting Ting' ('Baby listen') was in fact listed on Hacking Chinese resources. Although this and other similar tools may occasionally be used by learners or teachers to support a learning practice,

⁶⁰ When looking at the set of tools in existence, I did not conduct a contrastive research between tools to learn Chinese and tools to learn other languages (e.g. tools for Spanish, English, French). It is likely that the typology proposed in Chapter Five would offer a good basis for research on those languages, with a main difference being the relative emphasis on character acquisition (for Chinese and Japanese) vs morphology (for Indo-European languages with complex systems of declension and conjugation). Conducting contrastive research of the sort in more detail exceeds the scope of this thesis.

the clearly different intended audience placed them in a different set. I therefore chose to not consider them as part of my extended canon.

Sixth, I was aware of technology for encoding Chinese characters, such as Sogou Chinese, and a broader set of operating software and technological standards to process text written with Chinese characters. I considered those as part of the underlying technological infrastructure, and left them out of my extended canon, but discuss them in Chapter Four and Chapter Five.

Finally, I was aware of content-rich websites focused on Chinese culture, history or current affairs such as ‘The China Story’ website based in the Australian National University’s Centre on China in the World, bridging blogs or expat blogs, and more generally, a set of publications circulating on blogs, media outlets and social media produced and maintained by China correspondents and commentators. I will consider the relationship between these ‘resources’, which are not about Chinese language learning per se, and language-learning tools in Chapter Four.

3.3 The people behind the tools: digital ethnography

Conducting a formal analysis of the various items in a canon of tools would not be sufficient to address my key research question. I needed additional data to understand patterns of evolution and interdependence among tools, or their function and value as determined by their conditions of use and production. To better understand this, I resorted to a second method that I here refer to as digital ethnography. What I am describing as digital ethnography was the process of field and online research, conducted from 2015 to 2017, by which I sought to better understand the conditions in which tools are produced and used.

Since the rise of the Internet, social scientists from a range of disciplines have developed new approaches or adapted previous approaches to understand new social practices conducted online and the communities conducting those practices, giving rise to numerous discussions and labels (Varis 2015, p.55). In the context of this transdisciplinary research, I chose to adopt the generic term ‘digital ethnography’, which I adopted in line with the way it is used by the RMIT Digital Ethnography Research Centre (DERC) to define a research area that ‘focuses on understanding a contemporary world where digital and mobile technologies are increasingly inextricable from the environments and relationships in which

everyday life plays out'.⁶¹ This approach is continuous with pre-digital ethnography in that it 'takes as its object of interest the very lived reality of people, of which it aims to produce detailed and situated accounts – in the words of Geertz (1973), "thick descriptions"' (Varis 2015, p.55).⁶² The purpose of the approach is to understand 'informants' life-worlds and their situated practices and lived local realities' (ibid.).

In order to understand the lived realities of designers, learners and teachers producing and using digital Chinese language learning tools, I conducted fieldwork that combined interviews, auto-ethnographic reflection, participant observation, non-participant observation or 'lurking', as well as gathering and analyzing documents available online. The rest of this section details the procedure that I followed for data gathering and analysis.

A core part of my approach was to conduct a series of semi-structured interviews with key individuals involved in the production of tools (designers). I interviewed fourteen designers, whom I invited to take part in semi-structured interviews that lasted between 30 minutes and one hour. I conducted a second interview with one of those designers. One additional designer was unavailable for an interview, but answered a series of questions by email. Those interviews were greatly facilitated by my familiarity with several of them as a former professional collaborator on China-related Web projects. This privileged access to the tool designers posed a risk of positive bias, as being on friendly terms with the interviewees might make me disposed to agree with them, thereby affecting my data analysis. For this reason, I took particular care in note-taking, to ensure a highly accurate account of their responses to my questions.

I gathered approximately twelve hours of interview data. Eight of those interviews were conducted face to face, seven were conducted by Skype, and one by WeChat. Eight were fully recorded and transcribed. Of the remaining eight, I typed down extensive notes on my laptop for four of them, and produced handwritten notes which I later transcribed for the other three. For face to face interviews, of which there were eight, five were conducted in the

⁶¹ More specifically, as a mode of approach committed to transdisciplinary research that is inquiry-based, engagement with empirical research and/or materials, socially and historically contextualized analyses, comparison across local, national, regional and global frames. The quote is from 'About The Digital Ethnography Research Centre – DERC'. Digital-ethnography.com. <https://digital-ethnography.com/about/>. (accessed January 19, 2020).

⁶² The embedded quote is from Geertz, Clifford (1973), *The Interpretation of Cultures*, Basic Books.

regular workplaces of the interviewees, allowing me further observation of the physical location where the tools are produced. Two were conducted at cafés, and one in the designer's home. I used the coding DE1 to DE15 to identify designers in the body of the thesis.⁶³

My interviews loosely followed a template inspired by the Venture Design Framework developed by the THNK School of Creative Leadership in Amsterdam, where I studied during the first year of my candidature. This template is intended to support the founders of start-up organizations planning for long-term growth. The purpose was to understand designers' motivations, assumptions, business challenges, and values, as well as their relationships with other designers. Data collected in that manner informed both the work of digital ethnography and comparative case studies which I will describe in the next section. Detailed interview questions are presented in Appendix Two. Interviews, though guided by this general template, were largely co-constructed with the interviewee, with follow-up questions building on salient elements. In line with the practice of grounded theory, I directed follow up questions in light of previous interviews, inviting participants to build on statements that resonated with those of other interviewees, and I also used questions to elicit answers that would fill in knowledge gaps revealed through the iterative work of analysis conducted on previous interviews. I applied the same flexibility to interviews with learners and teachers.

In addition to designers, I interviewed learners and teachers, whose lived reality – and experience of using tools – offered crucial complement to that of designers in order to understand the emerging landscape of digital Chinese language learning.⁶⁴ The process followed is detailed below.

⁶³ My personal involvement in digital Chinese language learning through the Marco Polo Project offered me a high level of access, which meant I was able to interview a number of prominent designers, including designers with a critical role in seven of the nine tools identified as forming a 'central cluster' in the third section of this chapter. For reasons of anonymity, I have left out names and details, and did not provide a table with demographic information. Throughout the thesis, I use the non-gendered pronoun 'they' to refer to designers, learners and teachers, as a way to further ensure anonymity and reduce gender-bias.

⁶⁴ As mentioned in Chapter One, my primary focus was to understand the perspective of designers. I therefore conducted fewer interviews with learners and teachers, and conducted those primarily in order to triangulate data from designers and observation, and add depth to my understanding of the object.

I interviewed six learners aged approximately 20 to 45, two of whom were enrolled in a Chinese language course (one in Australia and one in China, the latter of Nigerian background), the other four being former students engaged in lifelong learning (three based in Australia and one in Norway). Two of them were personal contacts that I had met through Chinese language MeetUps. Two of them were ‘friends of friends’ that I was directed to in reply to a call-out on Facebook. On my request, Olle Linge shared a Tweet on the @hackingchinese handle asking for potential interviewees, which resulted in two further contacts from learners. Participant selection did not intend to achieve random sampling, but rather yield the richest material through a deliberate bias in favour of learners using technology. In fact, one of the learners I interviewed had been involved in the Marco Polo Project and served as beta tester for a number of other tools, while two more expressed an interest in building a learning tool in the future, confirming the continuity between the roles of learner and designer. I conducted four of those interviews face-to-face at cafés, and two through Skype with learners located overseas.⁶⁵

I conducted semi-structured interviews following a template of six open-ended questions intended to yield a descriptive understanding of learning practices, as well as normative value judgements on tools. Those questions were:

- What digital tool to learn Chinese are you currently using or have you used recently?
- What is or has been your favourite tool and why?
- What are the things about digital tools that annoy you?
- What is a tool you would like to have access to, but which does not currently exist?
- What is the best or most useful thing about digital tools?
- Is there anything else you would like to discuss?

⁶⁵ Of those six learners, one was of Chinese heritage. In line with my deliberate decision to focus on the experience of designers, and in regards to the great level of complexity involved by this transdisciplinary research, I paid limited attention to the different ways in which digital Chinese language learning tools support and are used by heritage and non-heritage learners. This is a limit of the present research. I return to this point in Chapter Four.

I interviewed five Chinese language teachers. Of these, three were working in high schools (in Australia and the US) and two at Confucius Institutes in Australia.⁶⁶ Two of these teachers were personal contacts I had met through the Marco Polo Project. Two replied to a call-out for interviews circulated through a friend in a WeChat group for Chinese language teachers in Australia. The last one responded to the Tweet shared by Olle Linge mentioned earlier. Four of those had Chinese as their first language, while one had English as their first language. The latter also reflected on their own experience learning Chinese through digital tools, confirming continuity between the roles of teacher and learner. I followed the same interview template I had used with learners. The sample of interviewees was, again, skewed towards the ‘tech-savvy’, with one of those teachers contributing professional development on technology use, and one engaging regularly through social media with tool designers. I conducted two of those interviews face-to-face at cafés, two through Skype/WeChat, and one in the school where my interviewee worked.⁶⁷

Altogether, interviews with teachers and learners yielded about 7 hours of detailed information. I recorded and transcribed ten of these and took extensive handwritten notes on one more which I later transcribed. Demographic details of the interviewees are presented in Tables 1 and 2 below. Information has been coded to ensure participant anonymity.

⁶⁶ Of the two teachers working at Confucius Institute, one had previously taught Chinese for foreigners at a PRC university and conducted some private tutoring, while the other also taught in a primary school. Three of the designers I interviewed also worked at universities. Their interviews were particularly useful in revealing how digital tools were being used in university-based teaching. Further insights on university teaching were offered by my supervisors, particularly Dr. Hui Huang, and gathered informally through participation at two conferences and two study days of the Languages & Cultures Network of Australian Universities (LCNAU). As the main purpose of interviews with teachers was to triangulate data from designers, in the context of a large transdisciplinary research project, I did not seek additional interviews from teachers based in China. This, however, represents a limit of the present research.

⁶⁷ This latter case was at a primary school, and I was invited to observe a grade 6 class in which technology was used. Although my research is focused on learning and a different demographic, this provided additional context on the use of digital technology by classroom teachers.

Code	Location	Enrolled in an institution	Professional tech experience?	Age (approx.)	Mode of interview
LE1	Australia	No	Yes	35	Face to face
LE2	Australia	No	No	25	Face to face
LE3	Australia	Yes	No	20	Face to face
LE4	Norway	No	No	45	Skype
LE5	China	Yes	No	25	Skype
LE6	Australia	No	Yes	30	Face to face

Table 1: Learners interviewed

Code	Location	Affiliation	Age (approx.)	Mode of interview
TE1	Australia	Confucius Institute + private tutoring	30	Face to face
TE2	USA	High school	35	Skype
TE3	Australia	High school	30	Face to face
TE4	Australia	High school	40	WeChat
TE5	Australia	Confucius Institute + Primary School	40	Face to face

Table 2: Teachers interviewed

I gathered additional data through informal interviews conducted opportunistically as I discussed my research, either with people involved in Chinese language learning or with people more generally involved in related fields – tech start-ups, social innovation, language learning, diplomacy and language policy – whom I had met through language exchange groups, at conferences, in co-working spaces, or socially at events and through common

friends. I collected notes covering those interactions over the course of the research, but those interviews were not formally transcribed or exhaustively documented nor, therefore, coded.

I complemented those interviews with non-participant observation or ‘lurking’, where I paid attention to designers’ digital presence by following their social media interactions, reading through personal and company blogs, and reading through their personal Twitter and LinkedIn accounts, as well as public accounts associated to the tool. This observation was conducted with an exploratory intent, to gain greater contextual understanding. I also searched for published interviews with designers, reviews of tools or articles about digital Chinese language learning published on blogs and other online publications – particularly ‘top ten’ lists of recommended tools and testimonies on learning Chinese using digital tools.

I triangulated the data gathered from interviews and observation with data derived from an auto-ethnographic approach, or ‘a method in which the researcher’s personal life experiences form the starting point and the central material of research’ (Uotinen 2010, p.163). This auto-ethnographic approach was anchored in my own experience as a learner, as a designer and, to a lesser degree, as a teacher.⁶⁸

My own autonomous Chinese language learning journey started with print Teach Yourself methods and language exchanges with a language partner that I met through a dedicated website in Paris in 2007. I started using Clavis Sinica in 2009, Pleco and ChinesePod in 2010, then Skritter, Hacking Chinese and the Chinese Grammar Wiki from 2012, and FluentU from its release in 2013. Over the course of my candidature, I continued using those tools, as well as Hello Chinese, Chinese Skills, Duolingo, Italki, Slow Chinese, Bubble Tea Master, The Chairman’s Bao, Mandarin Madness, and the Hacking Chinese Tone Training Course. I paid particular attention to formal elements such as user interface, graphic interface, static pages and induction material (text or video), as well as payment models and pricing, and the overall learning experience. I also considered my own experience as designer

⁶⁸ In addition to my work as a designer of Marco Polo Project, which I described in Chapter One, I have worked as a language teacher on different occasions. I taught English grammar to French undergraduate students at Institut Catholique de Paris and Paris-Sorbonne University from 2002 to 2008, and I taught French at Trinity College Dublin (1999-2000), Alliance Francaise de Melbourne (2009), Alliance Francaise de Tianjin (2011), La Trobe university (episodically from 2009 to 2013), and as a private tutor. I have also been a learner of Chinese, which I learned autonomously from 2007, with three periods of institutional studies at Tianjin Normal University on a HSK scholarship (December 2010), Confucius Institute in Melbourne (July-October 2012) and Nanjing University on a Victorian government Hamer scholarship (August-December 2013).

of a digital platform supporting collaborative translation of new Chinese writing as a learning practice, and my interactions with other designers. I did so through personal reflections captured in handwritten notes, as well as by reviewing blog posts I had written during the development of the Marco Polo Project and past interactions with other designers through emails and social media.

I ‘worked’ that rich data – consisting of interview transcripts, digital documents and personal reflective notes – in an iterative manner, looking for emerging themes and concepts. As the research called for a holistic and connective approach, and more generally involved heterogeneous types of data, I chose to conduct manual coding rather than using software such as Nvivo, in line with a suggestion from Joseph Maxwell and L. Earle Reybold in their chapter on qualitative research in the *International Encyclopaedia of the Social & Behavioral Sciences* (Maxwell & Reybold 2015, p.686). I read interview transcripts multiple times, comparing them to let broad themes emerge. I started by comparing interviews of the same ‘type’ (i.e. designers with designers) to identify emerging themes, colour coding important passages, making marginal notes, and developing both hand-written and digital memos. I then reviewed those memos together with interviews, comparing them across types (i.e. designers with learners), triangulating them with data gathered through participant observation and auto-ethnography. As I mentioned in the second chapter, this process also guided my transdisciplinary literature review – that is, I considered new lines of academic inquiry on the basis of themes emerging from data analysis, then reviewed my data in light of the library research I undertook. I conducted this process iteratively over the course of my fieldwork as I started drafting the thesis, regularly reviewing the text itself and the structure of the argument against further consideration of the data. This eventually led to a rich understanding and description of the context in which digital tools are used, valued and circulated by learners, teachers and designers.

3.4 Tracking patterns of interdependence: comparative case studies

Morphological analysis and digital ethnography were not sufficient to understand the complementarity between tools (as digital artefacts and as organizations) and therefore allow me to properly explore whether those tools might be said to evolve towards something resembling an ecosystem. I would need to understand in more detail the value networks in which tools are embedded, and to what extent the evolution of individual tools is impacted by their interactions with other tools and with other contextual elements, from learning

institutions to technological infrastructure, media discourses or policy. For this, I conducted a series of comparative case studies.

When it came to selecting tools for those case studies, one leading hypothesis was that, among the 190 tools listed in my ‘extended canon’, I would be able to identify a set of relatively central and closely interrelated tools, forming something like a central cluster. To yield the richest and most useful material, I could focus on analyzing the tools in this cluster, contrasting them with a diverse range of other tools.

To confirm the existence of such a ‘central cluster’ of tools, and identify what tools belonged to this set, I looked for signs of deliberate and intentional collaboration between designers, particularly:

- evidence of interaction between designers, for instance on social media, through joint appearance on panels, through guest blogging, or as more advanced forms of professional collaboration (e.g. Olle Linge collaborates with Skritter and appears on their team page); and
- evidence of connection between tools, in the form of a hyperlink from one tool to another (for instance, The Chairman’s Bao has a ‘resources’ page with links to Pleco, Skritter, Hacking Chinese and the Chinese Grammar Wiki), or in the form of plugins allowing data transfer from one tool to another (for instance The Chairman’s Bao has a plugin to export vocabulary to Skritter).

I also knew from personal interactions that several designers were in regular communication with each other. Interactions were further explored during interviews, where one of my questions was: ‘What is your relationship with other language learning platforms and institutions of learning?’

I tracked further evidence of interaction from interviews with learners and teachers, as well as through data collected online. In particular, I considered whether tools appeared together in ‘top 5/7/10’ lists for Chinese language-learning, and I looked for statements from learners and teachers, in interviews or online (e.g. on forums, blogs or social media), explicitly comparing or associating tools (e.g. I like to use x and y, x is better than y).⁶⁹

⁶⁹ I quoted two instances of such lists in Chapter One: ‘My favourite Chinese Learning Tools’ from October 2013 by Hugh Grigg on his blog East Asia Student (Grigg, Hugh. ‘My favourite Chinese Learning Tools’. Eastasianstudent.net. October 6, 2013. <https://eastasiastudent.net/china/mandarin/chinese-learning-tools/>

On this basis, I was able to identify a set of six tools which seemed to be most widely known, complementary, and interconnected. The oldest is the Pleco dictionary, with a first version launched in 2000, then ChinesePod, offering podcasts for Chinese learners, launched in 2005. Italki launched in 2007 as a language exchange platform, then evolved to its current model as a two-sided marketplace for language tutoring from 2009. The Skritter flashcards launched in 2008, and finally the Hacking Chinese language learning advice blog and the Chinese Grammar Wiki appeared in 2011. By the start of the research, each of those tools had been in existence for at least four years – fifteen for Pleco, the oldest of them – indicating their robustness. I chose to focus my analysis more narrowly on this set of six tools, which seemed to form a central cluster in online Chinese language learning.

I distinguished three types among these six tools, based on their respective functions:

- ‘Best in show’ – specialized tools that seemed widely recognized as best in their category: Pleco and Skritter.
- ‘Interconnection leaders’ – tools backed by a medium-sized organization showing signs of ambition to dominate the market in their category, but also create mutually beneficial partnerships with complementary tools and beyond: Italki, ChinesePod.
- ‘Leading authorities’ – tools frequently described on blogs, social media posts, reviews and online lists as best in their category and that were developed by individuals who are themselves highly connected in the system: Hacking Chinese (curated by Olle Linge) and the Chinese Grammar Wiki (curated by John Pasden).

I added three more recent tools to this list, which I called ‘New Kids on the Block’. They are FluentU, launched in 2013, which selects Chinese language videos from the Internet as ‘authentic learning materials’, and provides customizable subtitles to increase their

(accessed September 25, 2019), or the more recent list of ‘The best 13 Apps to Learn Chinese on Your Smartphone or Tablet’ published in September 2018 on the blog Sapore Di Cina (Sapore di Cina. ‘The best 13 Apps to Learn Chinese on Your Smartphone or Tablet’. Saporedicina.com. April 9, 2020. <https://www.saporedicina.com/english/best-apps-to-learn-chinese-on-your-smartphone-or-tablet/> (accessed July 6, 2020)).

accessibility for learners.⁷⁰ The Chairman's Bao, also launched in 2013, provides learners with simplified versions of news articles in Chinese, commissioned in-house, and accompanied by an audio version, a translation, and a flashcard system. Finally, Hello Chinese, launched in 2015, is a learning game for beginners based on interactive vocabulary and grammar quizzes. The favourable reviews that these tools attracted at the time I started my fieldwork, as well as signs of interaction between their designers and those of the tools listed above, indicated their potential evolution towards membership of the 'core cluster'.⁷¹

I conducted case studies on those nine tools. For this, I relied on data collected through my ethnographic research, which I complemented through desktop research, looking at the various points of digital presence for each tool, as well as mentions in the media (I searched for those through Google Search, using the name of the tool as a keyword). I had first-hand experience of all those tools as a learner, and collaborated through Marco Polo Project with Hacking Chinese, Skritter, Italki and FluentU – giving me yet greater understanding of those tools. Through a personal contact in Shanghai, I was invited to speak at the 2016 LanguageCon conference in Shanghai organized by Italki, where I met or reconnected with a large number of the designers I would then interview.

I analyzed the data to identify the organizational context where those tools were developed. My goal was to understand operations, cost structure, sources of income, target users and marketing models, as well as patterns of interdependence with other tools, digital resources, institutions, and other contextual elements. I sought more generally to develop a

⁷⁰ FluentU started with an exclusive focus on Chinese, then expanded to other languages. It also added instructional videos produced in-house to authentic native material.

⁷¹ Looking back at this selection from 2019, The Chairman's Bao proved most successful, and would now find its place among the 'core cluster' as another 'best in show'. It was evident from the beginning that Hello Chinese was at risk of being displaced by Duolingo. Duolingo, launched in 2011, soon rose to a position of prominence among digital language learning tools. From the beginning, Duolingo announced its intention to develop tools for multiple languages, including Chinese. However, Duolingo only launched the Chinese version of its app in 2017 – after I completed my data collection. During this time, two apps with similar features were developed: Hello Chinese and Chinese Skills. By the time of completing this thesis, Duolingo Chinese would find its place among the 'core cluster'. I will return to the question of Duolingo's integration with other tools in Chapter Eight. As for FluentU, although it continues to exist, it has received many negative reviews for the low quality of experience it provides. Its status as part of a 'core cluster' is therefore uncertain.

picture of how each tool developed. One important element that appeared through these case studies was the need to distinguish three elements:

- the ‘brand’, manifested in a tool’s different points of digital presence and marked by a choice of style, narrative and imagery
- the ‘organization’, or business entity tasked with developing and maintaining a tool, with legal, financial and operational dimensions
- the ‘designer’, who existed as a physical person but also presented themselves through different digital artefacts (e.g. social media page(s), personal blog(s), LinkedIn profile), and could be involved in more than one organization, or develop more than one tool.⁷²

My case studies took those three aspects into consideration, documenting and analyzing them separately and in conjunction with each other.

For contrastive reasons, I conducted a similar analysis on six tools outside the core of the system: Mandarin Madness, MyChineseTeacher, Mandarin Shooter Quest, Chinese Island, Clavis Sinica, Slowmersion and Tea Story.⁷³ The choice of these tools was based on two criteria: they presented original approaches to language learning, and I had personal experience of the tool or direct contact with their designer, allowing me to gather first-hand data.⁷⁴ For contrastive reasons, I also considered three tools that I labelled as ‘discontinued tools’: Duable Chinese, Fourtones and Tea Story. Duable Chinese proposed to support intermediate readers. I became aware of Duable Chinese in 2013, when the designer had just received seed funding in Singapore, and the tool was discussed in multiple digital forums. It was, however, never developed. I was a beta tester for Fourtones, a tool for character

⁷² In the digital age, designers exist as embodied individuals and as ‘digital personas’, manifested as photographs, texts, and sometimes podcasts or videos, united by a certain ‘voice’ or ‘style’. A striking example is Benny the Irish Polyglot, whose website ‘Fluent In Three Months’ could be described as performative language learning.

⁷³ In 2019, Slowmersion was available for download on Amazon, but the associated Twitter account has disappeared. A post on Chinese-forums indicates that the designer has since started work on another project called ‘Pinwean’. (Webmagnets. ‘Wean yourself from pinyin with PinWean’. Chinese-forums.com. January 12, 2019. <https://www.chinese-forums.com/forums/topic/57737-wean-yourself-from-pinyin-with-pinwean/> (accessed July 6, 2019)).

⁷⁴ I will not detail my relationships with the designers of those or other tools to maintain anonymity.

acquisition inspired by the game ‘Guitar Hero’: the model was highly original, but proved difficult to develop beyond early levels, so that the tool was never publicly released. Finally, ‘Tea Story’ is an original adventure/exploration game inviting the learner to play as Oonay, a Taiwanese-American teenager selling Bubble Tea for his father in Chinatown to earn pocket money. The Appstore listing describes the app as ‘Chapter One’ but no ‘Chapter Two’ exists, and the last review dates from 2013.

While developing those contrastive case studies, I identified a number of tools and resources that were often mentioned yet did not show strong patterns of integration with the central cluster. These included two well-known Chinese learning tools, each developed by a charismatic founder and operating in relative isolation: Yoyo Chinese by Yangyang Chen, offering instructional videos, and Chineasy by Shaolan Hsueh, an image-based character acquisition method available in print and digital format. There is also Chinese Skill, a gamified app similar to Hello Chinese, and Wenlin, a text reader with integrated dictionary for web-browser.⁷⁵ I came across two Chinese language schools that both offer digital classes or tutorials and produce learning videos circulating online: Hanbridge and Sexy Mandarin, the latter noticeable for its controversial approach of producing highly eroticized videos. I encountered two websites that played a particular role in bringing together a digital community of learners (Chinese Forums, the largest online discussion board for Chinese language learning), and shaping popular discourse on independent learning (‘Fluent in Three Months’ by digital celebrity ‘Benny the Irish Polyglot’). Five language learning tools supporting Chinese and other languages were repeatedly mentioned by my interviewees and referenced on websites and forums: Duolingo, Rosetta Stone (a pioneer of digital language learning, founded in 1992, and now offering app versions of earlier CD-Roms), HelloTalk (offering peer-to-peer chats between language learners), LingQ, an app allowing the learner to gather native content, extract vocabulary and review it through flashcards, and Lang-8, a

⁷⁵ Wenlin started as a project in 1987, and was incorporated in 1996. It is one of the oldest organizations focusing on digital tools for Chinese language learning. The Wenlin ‘brand’ encompasses a number of tools beyond its Chinese text-reader. Wenlin’s founder, Tom Bishop, developed what is known as the ‘character description language’, a model for describing the structure of Chinese characters that played a role in the development of Unicode standards for Chinese characters. Although Wenlin played a central historical part in digital Chinese language learning, the tools it proposes are now more closely targeted either at programmers or academic learners. This is why, after some hesitation, I chose to leave Wenlin out of what I considered the ‘central cluster’ that I studied for this thesis.

peer-learning community founded in 2006, where participants offer comments and corrections on personal blogs in a target language. The teachers I interviewed all mentioned generic quiz creation software Quizlet and Kahoot, and a number of websites listed Anki, a generic flashcard app with integrated spaced repetition software, as a free alternative to Skritter. Going one step further, I took into consideration six broadly used websites or apps that were mentioned in interviews or in reviews and language learning advice I encountered online: WeChat, Google Translate, MeetUp, Twitter, Facebook and YouTube.⁷⁶ I did not develop case studies for those, but conducted desktop research to better understand their functionalities, as well as the organizations or people developing them.

The following list details the forty tools that formed the primary data source for the empirical aspect of my research.⁷⁷

- **Nine complementary tools forming a ‘central cluster’**
 - **Best in show:** Pleco, Skritter
 - **Leading authorities:** Hacking Chinese, Chinese Grammar Wiki
 - **Ecosystem leaders:** Italki, Chinesepod
 - **New kids on the block:** Hello Chinese, The Chairman’s Bao, FluentU
- **Nine contrastive tools**
 - **Learning games:** Mandarin Madness, Mandarin Shooter Quest, Slowmersion
 - **Academic tools:** Clavis Sinica, Chinese Island
 - **Remote teaching for regional schools:** MyChineseTeacher
 - **Discontinued tools:** Duable Chinese, Fourtones, Tea Story
- **Twenty-two system shapers**
 - **Chinese tools impacting the landscape:** Wenlin, Chineasy, Yoyo Chinese, Chinese Skill
 - **Chinese language schools:** Sexy Mandarin, Hanbridge
 - **Opinion shapers:** Chinese-forums, Fluent in Three Months

⁷⁶ Web browsers and Google Search are used extensively by learners, teachers and designers, but were not mentioned as learning tools during my interviews – indicating they may be taken for granted. I will return to the role of this underlying infrastructure through the thesis.

⁷⁷ I generically use the word ‘tool’ as a shortcut here, although strictly speaking, in relation to Chinese language learning, popular websites or apps WeChat, Google Translate, MeetUp, Twitter, Facebook and YouTube constitute what I referred to as ‘resources’ in Chapter One.

- **Generic language learning systems shapers:** Duolingo, Lang-8, LingQ, Rosetta Stone, HelloTalk
- **General learning (flashcard) tools:** Anki, Kahoot, Quizlet
- **Popular websites or apps used as ‘resources’ for digital Chinese language learning:** WeChat, Google Translate, MeetUp, Twitter, Facebook, YouTube.

When developing comparative case studies, I also identified and tracked the various stakeholders that may impact the evolution of digital Chinese language learning tools, and therefore influence their use, circulation and value. A high-level map of these stakeholders, derived from first-order observation, participant interviews and personal auto-ethnographic insights, is presented in Appendix Three.

3.5 Summary

Combining morphological analysis, digital ethnography, and comparative case studies was crucial for me to define and understand my object of study. I conducted the process iteratively rather than linearly, meaning that insights gathered through digital ethnography often led me to revise elements of my morphological analysis, or formal elements identified through the latter led me to ask additional questions during an interview, or conduct further desktop research. Part Two primarily consists of formal analysis inspired by Moretti while Part Three is focused on digital ethnography and comparative case studies. In early drafts, I separated those three methods, using each method to inform the development of a different chapter. This, however, soon proved to be a constraint that stood in the way of richer analysis, and would not allow me to properly reflect on the relationships between tools – nor address my key research question and supporting questions. In the final version of the thesis, therefore, each chapter relies on multiples sources of data and modes of analysis, reflecting the complexity of the object.

Part Two: Learning Chinese in the digital age – new tools, new practices

To map the emerging landscape of digital Chinese language learning tools, it is essential to understand their value. This, in turn, requires that we understand not only the contexts in which those tools are used, but more broadly how digital technology as well as social and geopolitical shifts are affecting the communicative contexts in which the Chinese language is used – and therefore the value of different learning practices, as they develop different types of communicative competences. From a practical angle, the purpose of this research is to support more effective use of digital tools by learners and teachers – but what makes a tool effective cannot be determined without normative agreement on the function of the tool, or its intended effect.

In that regard, over the course of this research, I was surprised to find that two discourses relevant to digital Chinese language learning were being produced in parallel silos: one of these discourses explores the impact of digital technology on communicative practices, and the other explores its impact on language learning and teaching practices. The purpose of Part Two is to weave together those two discourses in order to offer an original perspective on Chinese language learning tools, to reveal how digital technology and globalization have affected both learning methods and learning goals. Such a perspective is needed to assess the value of digital Chinese language learning tools on their own merits, rather than in relation to institutional systems and pre-existing paradigms.

So, what does it mean to learn Chinese in the twenty-first century? In Chapter Four, I explore the changing conditions in which Chinese L2 competence is developed, valued and deployed, using Bourdieu's field theory and Jenkins' theory of convergence culture as key theoretical lenses. In Chapter Five, I turn to the tools themselves. Following a formal analysis informed by Moretti's approach to distant reading, I construct a functional typology of tools, and propose key factors that define their relative value. I then consider various mechanisms through which these tools may be developing into a relatively cohesive system. This second part of the thesis concludes by positioning the discussion against the background of ongoing tensions around the politics of learning Chinese, including the role of language learning in identity definition and cultural differences in appraising the goal of education, which I interpret in the light of Bourdieu's field theory.

Chapter Four: Learning Chinese in an age of technological disruption

4.1 Learning Chinese in the twenty-first century: sinophones and China-experts in times of disruption

To understand the value of digital Chinese language learning tools, one simple starting point would be to propose that it depends on their capacity to support practices enabling a learner to master the various elements of the Chinese linguistic system: phonetics, characters, lexicon, syntax, a pragmatic system defining how the language is used in context and, arguably, elements of what may be called ‘Chinese culture’. Precise value benchmarks, however, depend on the situations where learners intend to make use of this acquired competence, and are therefore field dependent.

At a first level of analysis, learners may have primarily communicative goals (that is, to use the language as a medium to exchange ideas or build relationships), and/or reflective goals (such as, to understand the structures of the language and become able to articulate a discourse about it). In a paper titled ‘The “中国通” or the “Sinophone”? Towards a political economy of Chinese language teaching’, Edward McDonald proposes two contrasting figures of successful Chinese learners, which he calls the China-expert or 中国通 (*Zhongguotong*), and the sinophone (McDonald 2011a). The *Zhongguotong* accumulates ‘knowledge about China and/or of a repertoire of Chinese language’, and uses this knowledge primarily outside of a Chinese speaking environment. By contrast, a sinophone is an individual who has developed a capacity to interact as part of a Chinese speaking environment. Beyond grammatical and lexical competence, this involves a broader capacity to identify contextual cues, make use of language adequately in diverse settings, and develop a Chinese-speaking identity.

To qualify as a sinophone, a learner must develop a capacity to handle what Bourdieu describes as bilingual situations ‘in which the speakers adopt one or the other of the two available languages according to the circumstances, the subject of conversation, the social status of their interlocutor (and thus his degree of culture and bilingualism), etc’ (Bourdieu 1977, p.26). Doing so requires a ‘practical spotting of cues which, in enabling speakers to situate others in the hierarchies of age, wealth, power, or culture, guides them unwittingly towards the type of exchange best suited in form and content to the objective situation between the interacting individuals’ (ibid). In other words, becoming sinophone may be described as developing a habitus enabling participation in fields where the Chinese language

is needed to ‘play the social game’. By contrast, a *Zhongguotong* is an individual for whom mastery of the Chinese language represents a form of cultural capital valued in fields where their first language is dominant: for instance, a Chinese language diploma can provide access to Chinese teaching jobs in their country of origin, or the embodied capacity to speak Chinese is a mark of distinction that yields benefits for business networking, or confers authority in the media.

A more complete analysis, however, requires that we consider things from another angle. Sinophones make use of their Chinese language mastery in fields where the dominant language is Chinese. In such fields, embodied competences pertaining to the culture and/or language of origin of a sinophone – for instance, a touch of accent or a capacity to share first-hand experience about their country of origin – may serve as cultural capital, and part of their habitus involves the capacity to understand and make use of this cultural capital, or their own ‘non-Chineseness’ as a form of cachet.⁷⁸ Similarly, to use their knowledge of China in

⁷⁸ A distinct matter affecting L2 Chinese language learning is the rise of the Chinese diaspora, resulting in growing numbers of individuals who learn Chinese as a heritage language. On this point, it is important to note that similar levels of communicative competence achieved by people of Chinese and non-Chinese background are acknowledged differently in China or among L1 speakers of Chinese. Personal experience, as well as anecdotal evidence, reveal a common pattern whereby L1 Chinese speakers readily praise Caucasian L2 speakers and mock ethnically Chinese L2 speakers for a similar performance. In their study of British Confucius Institutes, Li and Zhu note that students of Chinese background list two key reasons for learning the language: the sense of opportunity associated with the rise of China and embarrassment at not knowing Chinese: learning Chinese is therefore a way to ‘become oneself’ (Zhu & Li, W. 2014 p.332). This is echoed in a broad range of papers researching the motivation of heritage learners – and the value they ascribe to Chinese language fluency – which indication a combination of instrumental goals and a strong sense of identity attached to the learning of the language (Mu 2014b, pp.478-479). Using Bourdieu’s framework, ‘Chinese-speaking societies or Chinese-favourable families’ could be described as a ‘field’ (Mu 2014b, p.483). Heritage learners (who are born and grow up in Chinese-speaking families and typically exposed to Chinese-speaking social environments) develop a certain habitus that could be defined as ‘Chineseness’ (Mu 2014a, p.499). This habitus both involves and positively impacts the acquisition of communicative competence in Chinese (Mu 2014a, p.506). This communicative competence is a valuable form of embodied cultural capital in other fields (e.g. conducive to educational recognition or professional opportunities) (Mu 2014b, p.485), but it is also conducive to the formation of social capital in the ‘Chinese speaking field’, by supporting stronger family ties with older, Chinese-speaking family members, or closer ties with other members of the Chinese diaspora (Mu 2014b, p.486). All those factors uniquely contribute to heritage learners’ motivation (Mu 2014b, p.488). As I discussed in Chapter One and Chapter Three, my primary focus for this thesis is the perspective of designers. Therefore, exploring the question of heritage learners in more detail exceeds the scope of this thesis.

different fields (e.g. language education, foreign affairs or the media in their country of origin or a different country of which they speak the dominant language), a *Zhongguotong* will need to develop a certain habitus enabling them to properly ‘navigate’ those fields. Finally, the two roles of sinophone and *Zhongguotong* are not mutually exclusive, in the sense that the same individual may play either or both, though in different settings and at different times.⁷⁹

In all cases, assessing the value of different digital Chinese language learning tools and the practices they support requires that we identify not just what level of language mastery can be derived from using a certain tool, but also how this linguistic mastery will be judged in the field(s) where the learner intends to deploy it, and in particular, what benchmarks of achievement are most relevant in that field – either in the form of language certificates or recognizable ‘levels’ of embodied competence. The value of a tool, in other words, depends on its capacity to help a learner acquire cultural capital valuable in a field where they intend to conduct their social practice.

Relatively clear benchmarks exist as part of institutionally accredited examination systems, defined locally or nationally. This applies, for instance, to high school students in the Australian state of Victoria who select Chinese as an option for the Victorian Certificate of Education (VCE), or undergraduates enrolled in Chinese studies or who select a Chinese language module as part of another degree.⁸⁰ Examination results, as measured by the institution, will impact the learner’s capacity to select options for further studies and access certain locally defined positions: for instance, a language diploma may be needed to work as

⁷⁹ Or at the same time, but only in rare circumstances, for instance, when an individual orders a meal in Chinese in front of English speakers, thus behaving as a sinophone in relation to the waiter but also asserting their credentials as a *Zhongguotong* in front of their peers.

⁸⁰ The VCE is a credential for students in the state of Victoria who successfully complete the final years of high school and is particularly valued in that scores at the VCE play a critical role in admission to different university courses. Languages (including Chinese language) are one of the potential options that a student can choose for the VCE, with impact on final scores. The same type of situation applies in a broad range of jurisdictions around the world where Chinese language is a potential option for a diploma that impacts access to further education. In such cases, the value of a tool supporting high scores at the exam is more directly tied to the desirability of entering a certain institute of higher education.

a Chinese teacher, or a minimal grade is needed to join a certain university program.⁸¹ In China, the *Hanyu Shuiping Kaoshi* (HSK) is a formal requirement for international undergraduate enrolment at university. For instance, Tsinghua university requires students to have at least an HSK4 to enrol in the first year of study, and HSK5 beyond the first year.⁸² More recently, since 2017, HSK scores have been taken into consideration in the PRC as part of a new point-based visa system for foreign experts.

The value of the HSK, however, is far from firmly established. Although its recent use as part of a visa system indicates a potential increase in value, it is at present unclear to what extent it constitutes a widely-recognized form of cultural capital in China itself beyond narrowly defined institutional contexts. As for its value beyond China, it is even more uncertain. It is clear at least that, for now, the value of the HSK does not yet match that of equivalent English language tests – IELTS, PTE or TOEFL – primarily because the appeal of undergraduate studies in China or that of Chinese student and work visas do not match the appeal of university studies or similar visas in Anglophone countries.⁸³

⁸¹ Among Chinese language educators in Australia, this manifests as recurring conversations on the best way of assessing heritage and non-heritage speakers, to ensure that Chinese language education remains attractive to the latter, and that assessment is generally fair.

⁸² ‘Admissions FAQ’. Tsinghua.edu.cn. https://www.join-tsinghua.edu.cn/publish/bzw2019/12168/2019/20190516195249711809554/20190516195249711809554_.html (accessed 25 October 2019). The HSK has 6 levels, which have been presented by Chinese authorities as equivalent to the six levels of the European Common Framework for Language Levels (CEFR). However, German and French language experts have contested this view, instead proposing that HSK level 4 is equivalent to a CEFR A2 (elementary level), HSK 5 to a B1 and HSK 6 to a B2. Tsinghua, therefore, welcomes first-year students with only elementary command of the language. It should be noted that those indicate rather low levels of linguistic competence: by contrast, Monash university requires an average IELTS score of 6.5 for undergraduate enrolment, corresponding to a CEFR B2 or HSK 6. On the equivalence between HSK and CEFR, see ‘Erklärung des Fachverbands Chinesisch e.V. zur neuen Chinesischprüfung HSK’. Fachverband-chinesisch.de. June 1, 2010. https://www.fachverband-chinesisch.de/fileadmin/user_upload/Chinesisch_als_Fremdsprache/Sprachpruefungen/HSK/FaCh2010_ErklaerungHSK_dt.pdf (accessed January 18, 2020) and Bellassen, Joel. ‘Is Chinese Eurocompatible? Is the Common Framework Common? The Common European Framework of Reference for Languages Facing Distant Languages’. http://www.joelbellassen.com/wp-content/uploads/2019/07/Is-Chinese-eurocompatible-The-CEFR-facing-distant-languages_TOKYO-WolSec-2011.pdf (accessed January 18, 2020).

⁸³ As for other certificates – for instance, a Master’s in Chinese Studies or a Chinese language diploma awarded by an Australian university – their cultural capital value is highly field dependent. In the case of a Chinese

The value of Chinese language certificates is more generally affected by a trend whereby certifications are, to some extent, losing currency. As early as 2000, Zygmunt Bauman observed that university education no longer led to the prospect of long-term stable employment, describing this trend as ‘the end of meritocracy’ (Bauman 2000). This trend, which has only accelerated since 2000, was reflected in the way that LE2 described their own Chinese language certificates gained during studies in China: ‘I got up to nominally the highest level of the language, and then I did two units of business translation. I felt that that was just a piece of paper essentially.’ Instead, LE2 found their time in China valuable because it allowed them to develop language skills through a combination of autonomous learning and different professional experiences, eventually leading to a full-time job in Beijing.

The uncertain cultural capital value of Chinese language certificates in comparison with personal experience, or non-accredited communicative competence, directly affects the perceived value of digital tools. Assessing whether a tool is conducive to better test results for a diploma is relatively straightforward. If the desirability of the diploma itself is in question, however, then the relative value of different tools becomes harder to assess. This is particularly important to note as two phenomena impact the way that Chinese language is used, and therefore the relative value of learning tools. One is the rise of technology affecting how the Chinese language is used and learned, the other pertains to technological and geopolitical shifts that affect the political, social and media conditions in which Chinese is used, and therefore the value of different forms of linguistic competence. I explore both of those points in the rest of this chapter.

4.2 Chinese language learning in the twenty-first century: new goals, new practices

4.2.1 New technolinguistic systems

Changes in digital technology have affected what Thomas Mullaney calls ‘technolinguistic systems’ (Mullaney 2017, p.21). One notable area of impact has been that technology has made the Chinese language more ‘accessible’. The character-based script is

language diploma from an Australian university, for instance, its value is high in the Australian education field, but its value in other fields, for instance in the Australian field of commerce as a ‘China expert’ credential, or in another country, or in the PRC, is considerably more uncertain – particularly its value *relative* to, for instance, personal experience living and working in China.

often considered the most challenging aspect of Chinese for learners. Software enabling Chinese text processing – Chinese fonts and input systems – would count as among the most fundamental Chinese language learning tools.⁸⁴ Since the beginning of the twenty-first century, most digital devices have a Chinese input functionality built into their core operating system, with two modes of entry for characters: users can type a pinyin transcription or draw characters on the screen or touchpad.⁸⁵ This is typically accompanied by predictive features. When a user ‘draws’ on the screen or touchpad (or starts typing pinyin), they are presented with a set of potential characters, and select the one they want.⁸⁶ For instance, when typing ‘yao’ on an iPhone, the first two suggestions are 要 (want) and 药 (medicine).⁸⁷ When typing ‘yaoshi’, the suggestions become ‘要是’ (if) or 钥匙’ (key).⁸⁸

Digital dictionaries developed out of this technology are widely available and are used in a broad range of online and offline settings: to build vocabulary, look up a word as part of text messaging, read a text, write an email or during oral interactions online and offline. This was reflected in the way that LE2 described the value of technology as

not necessarily for rote learning material and sitting down and having it in your hand for half an hour, but for those moments when you go, oh shit, I’ve forgotten this character, and you just want something to back you up, or cement it a little bit more,

⁸⁴ Some tools specifically intended to assist in setting up Chinese fonts and Chinese input are listed in Appendix One. Those were of primary importance in earlier phases of digital development, but this has changed now that Chinese input is standard on iOS and Android devices. Detailed study of this technology exceeds the scope of the present thesis.

⁸⁵ Pinyin is the standard transcription format for characters used in the PRC. Another system called zhuyin or Bopomofo is standard in Taiwan. More generally, other modes of character input exist, including a number based on character shape. Various input systems are either available as standard, or can be downloaded for free. A number of tools, listed in Appendix One, also allow to automatically ‘convert’ any Chinese text in a digital format to different transcriptions (i.e. pinyin to zhuyin to characters or vice versa), and convert a text from traditional to simplified characters, making those two writing systems functionally equivalent in digital environments.

⁸⁶ This feature even affects first language speakers, who often hesitate before writing an uncommon character, and ascribe this to the habit of relying on digital input.

⁸⁷ In an age when emoticons are playing an increasing role in digital written communications, the third option is a ‘pill icon’.

⁸⁸ The experiment was conducted on October 1, 2019.

or as a tool to start a conversation [...] so usually short bursts of 30 seconds to one minute.

One of the most famous bilingual dictionaries today is Pleco, originally developed for palm devices by American IT student Michael Love during a stay in China in 2000, by combining a Chinese handwriting engine licensed from Motorola and a digital version of the Oxford Chinese dictionary. It became so successful within its niche that people would buy a palm device specifically to use it. Commenting on the importance of this development, Michael Love, founder of Pleco, said in a 2014 interview: ‘When you consider that for centuries, the only way to look up the word for ‘panda’ was to count the number of strokes for the radical component of 熊, consult a series of charts, and then hope that the suggested definition remotely made sense, the convenience of Pleco marks a major turning point in the history of Chinese language learning’.⁸⁹

Smartphone hardware has increased the number of affordances offered by digital dictionaries. An important one is optical character recognition (OCR), available as an add-on on Pleco, which allows learners to identify the meaning of a new character directly from a photograph.⁹⁰ Another is audio: Pleco offers a recording of each word in the database, allowing learners to check pronunciation. Beyond pre-recorded audio, software converting text to speech, now generically available, allows a learner to have a text ‘read’ to them. Voice-to-text technology, though less advanced, is readily improving. This allows new writing practices such as the one described by LE4:

And, what I do to write is I often use the microphone system of my iPad. And then I simply speak, and then I recognize the characters. And sometimes If it’s not recognized, the voice recognition system sometimes doesn’t know what I meant, then I have to back it up, and then I use the stroke thing – and I start trying to recognize the character, especially when it’s very complex. And then sometimes it knows what the next character is supposed to be based on the context, and I click click click. And that’s how I write an article in Chinese.

⁸⁹ Horwitz, Josh. ‘Meet the man behind Pleco, the revolutionary Chinese language learning app that’s older than the iPhone’. Technasia.com. June 25, 2014. <https://www.technasia.com/mike-love-pleco-interview-chinese-language-mandarin-language-learning-iphone-dictionary-app/> (accessed October 26, 2019).

⁹⁰ OCR is available on many other digital dictionaries, and even Google Translate.

An additional point is the rise of interactional writing or chatting. Chats occur in quasi-real time, use large amounts of shorthand writing and emojis, and may combine written text with voice messages.⁹¹ As chatting occurs through a digital device, it is possible – and common – for learners to make use of dictionaries to support those interactions. Multimedia resources are also used as part of written communication. One remarkable example is given by Li Jin. As part of a 2017 study describing the use of WeChat by students, Li Jin observed that one beginner student was able to participate in a Chinese-language conversation, even when they did not fully understand the meaning of what was being said and were unable to contribute linguistically, simply by sharing Emoticons or GIFs instead of written output (Li J. 2017, p.10).

One step beyond dictionaries are automatic translators such as Google Translate, which used to be an object of mockery among language professionals, but now typically provide translations that are functionally sufficient for general comprehension. Combined with voice processing software, this type of translation software might herald a paradigm change for language learning.⁹²

Technology has dramatically transformed the accessibility of Chinese in a variety of ways online: it has made Chinese content and interactions with Chinese speakers widely available. A twentieth century learner would have had access only to a limited selection of Chinese language materials from their local library or bookstore, limited capacity to meet other learners outside a classroom, and limited capacity to meet Chinese speakers. A learner today can access almost unlimited amounts of Chinese audio, video and textual materials on their phone, interact with Chinese speakers on forums such as Zhihu, Guokr or Douban, or on

⁹¹ HelloTalk, for instance, makes use of this feature: the interface is structured like a chatting app, but with added functionalities to assist learning.

⁹² This technology is evolving and improving fast. In 2019, Google presented ‘the translatotron’, an AI prototype that not only directly translates oral input from one language to another, but even reproduces the intonation of the speaker (Vincent, James. ‘Google’s prototype AI translator translates your tone as well as your words’. The Verge. May 17, 2019. <https://www.theverge.com/2019/5/17/18628980/google-ai-translation-tone-cadence-voice-translatotron> (accessed November 1, 2019)). During my fieldwork, contacts working in technology consistently directed me to similar tools, or to videos demonstrating them, and questioned the importance of learning Chinese when a ‘babelfish’ device, fitting neatly in a user’s ear, would soon be available – indicating the possibility that language learning may become perceived as functionally obsolete.

Weibo, WeChat and other forms of social media.⁹³ If they want to meet like-minded learners or language exchange partners in their city, MeetUps and other websites have facilitated the proliferation of language exchange groups and digital forums where language learners can interact with each other or with first-language speakers online.

For Chinese language learners, WeChat plays an important role in that respect, as reflected in the way that LE2 spoke about it. They reported using the app to keep in touch with friends they met in China (using Chinese as a language), but also to communicate with their family (in English), and added:

I also occasionally use it as a learning tool. I'm a member of a number of big groups on WeChat, in particular one that is looking at translation for people who are doing the NAATI qualification, and this has interesting conversations about how to translate technical phrases and terminology. And then also I follow a couple of public accounts, in particular one, Papi Jiang, who is really really cool. She's a Shanghainese comedian, and, she does, you know, five minutes, you know, videos, that are rapid speed, so they really really test my listening.

Together, these changes redefine communicative competence, opening a new type of practice I would like to call 'mediated immersion', which is both a form of language practice, and digital engagement to be enjoyed in and for itself. Tools enabling mediated immersion may be conceptualized as occupying a space somewhere between digital Chinese language learning tools properly understood and what I have called 'resources' in Chapter One.⁹⁴

With regard to Chinese language learning as a form of cultural capital, technology has an ambivalent effect. 'It feels like this technology is almost required for Chinese language

⁹³ Dating platforms are a good example. In 2013, during a term of studies at Nanjing university, I made extensive use of a gay chatting app then popular in China, Jack'd, to practice my language skills and meet with locals. As a Caucasian man, I found it easy to meet a range of people with whom I had numerous conversations online and offline, entirely in Chinese, or in a combination of Chinese and English. As the primary purpose of the app is connection among gay men, rather than language exchange, there was no particular expectation that I would need to provide any English language support in exchange for speaking Chinese, and I was able to develop conversations and relationships with people who had no English competence whatsoever. A number of Australians learning Chinese have reported making use of dating apps for the same purpose.

⁹⁴ I will return to this point when reflecting on ways to categorize tools and resources in relation to their possible use as part of bricolage practices in Chapter Five.

learning to take off at a large scale,’ says DE6, reflecting on the difficulty of the language ‘because otherwise it’s just not fair, there’s too much, too many strokes, too many characters, too many tones, too much’. The value of digital technology as a whole, then, is that it makes Chinese easier to learn. As such, it is likely to detract from the cultural capital enjoyed by L2 speakers who have become fluent in Chinese. In this connection, as fluency in Chinese becomes more normal among people who learn it as a foreign language, and as digital tools enable those who do not speak Chinese to translate their communications into Chinese, the ability to speak Chinese fluently (as an L2 speaker) may become increasingly perceived as a quaint aristocratic achievement. It also means that learning how to use digital technology properly – including knowing online politeness codes, such as the appropriateness of using dictionaries during a bilingual communication, or appropriate uses of WeChat emojis – must become part of the sinophone’s core skillset. In that respect, the extent to which learners have been trained to use technology for communicative purposes is likely to be an important factor in their assessment of the value of online learning (and the tools supporting online learning).⁹⁵ This is particularly true to the extent that technology is also changing teaching practices and the education environment more broadly, creating a measure of uncertainty among learners, teachers and designers, as to the respective value of different tools and practices.

4.2.2 Technology and education: four disruptive possibilities

The 2016 edition of the *Routledge Handbook of Language Teaching and Technology* opens with a quote by Ray Clifford from the Defence Language Institute, stating ‘Computers will not replace teachers. However, teachers who use computers will replace teachers who don’t’ (quoted in Healey et al. 2008, p.2)’ (Farr & Murray 2016, p.30). This was reflected at language-focused conferences that I attended during my candidature, where technology was discussed with a mix of excitement and fear.

Digital technology has transformed pedagogical practice in classrooms. All the teachers I interviewed reported using technology, the most commonly quoted tools being YouTube videos, Quizlet and Kahoot. Digital technology also affects administrative aspects

⁹⁵ It may also affect the perceived value of language certificates, particularly when what they measure is not congruent with the rising role of digital technology – for instance, examination systems that place a high level of emphasis on handwriting. In that regard, it is notable that the HSK test is shifting to a digital model, whereby writing tasks are conducted with a computer, so that handwriting is no longer assessed.

of teaching, from electronic grade reporting to email interactions with students or ‘resources’ and course content uploaded on a Learning Management System (LMS). Both of those aspects, however, fall under the category of what Christensen would describe as a form of incremental or sustaining innovation (as opposed to disruptive innovation). Are digital Chinese language learning tools set to disrupt Chinese language learning?⁹⁶ There are four technologically-driven scenarios to consider.

The first falls under the broader category of ephemeralization, to borrow R. Buckminster Fuller’s term, namely the capacity offered by digital technology to deliver services to a large number of users at a very low cost. This is based on the fact that text, audio and video content, once produced, can be circulated across the world at zero marginal cost. Many universities record their lectures so that students can access them remotely for convenience, and sometimes use this feature to recycle content year on year. MOOCs go one step further and make recorded lectures accessible globally, with added quizzes and even the possibility to generate certificates. This capacity to circulate content at scale through digital technology is relevant, though in different measures, to all of the forty tools and resources I focused on for this research and listed at the end of Chapter Three.

A second area is a shift to digitally mediated tutoring. This is already enabled by digital classifieds, and now by Italki, a two-sided online marketplace that offers language teachers and language learners a common platform in which to meet, interact and conduct remote tutorials. Tutors differentiate their offers by indicating, for instance, their areas of expertise or ‘what they’re into’. Italki serves as a vetting platform and payment facilitator. Pedagogically, such developments could replace or supplement classroom education, in particular for error diagnosis and language coaching. Economically, the diverse mix of professionals and amateurs on the platform must affect the quality of the learning and teaching experience but whether and to what extent learning and teaching is affected negatively or positively cannot be measured with any certainty. Equally, it remains unknown whether learning via sites like Italki may prove so successful that they lead to an

⁹⁶ I use ‘disrupt’ here in the meaning that the word takes in Christensen’s theory of disruptive innovation. By which I mean, are digital learning tool designers creating cheaper alternatives to classroom learning that would initially only satisfy a market of non-users, but could gradually increase in quality, and eventually displace learning institutions?

‘uberization’ of language teaching.⁹⁷ What is evident is that by making it possible for learners outside China to access tutors based in the PRC, Italki is able to offer competitive prices in relation to Australia or US-based tutors. This can be described as a disruptive possibility.⁹⁸ The rise of the gig economy, remote working and personal branding are important elements to consider in relation to the growing popularity of this type of online learning.

The third area falls under the broad category of artificial intelligence. Narrow applications are already common: one in particular is spaced repetition software, integrated with the Skritter flashcards (and many other flashcard systems).⁹⁹ The most important innovation, however, may be chatbots, a form of artificial intelligence capable of interpreting semantic input and reacting with a response, mimicking the way that a human would interact. For learners, this is more stimulating than written language exercises or multiple-choice questions. In a presentation given at the 2016 Language Con conference at NYU Shanghai, Hans Horkhoff identified chatbots as the current frontier in language learning. Indeed, at the time of writing, they are still a relatively new form of technology for Chinese language learning. Simple bots are already used in the virtual environment Chinese Island, a Monash University teaching tool which uses Second Life, though those are limited in their capacity to understand non-standard input. More advanced bots are integrated with certain versions of Duolingo (Spanish and Portuguese) though not available for Chinese at the time of the research.¹⁰⁰ The advent of chatbots may challenge seemingly self-evident statements, such as

⁹⁷ Some teachers use Italki as their major source of revenue, while for others, it is a source of additional income and/or personal enjoyment, in the form of vicarious travel. Studying this in more detail exceeds the scope of this thesis.

⁹⁸ One added element of value is the reduced cost of travel to and from class. TE1 mentioned the need for ‘a full function online classroom application’. They currently use WeChat to conduct private tutorials at a distance, but find it inconvenient to share PPT slides. Travelling for face-to-face classes is a cost for them and/or their students, and they would be willing to pay to reduce it. More generally, when teachers start teaching online, they need to create systems to ensure continuity among students who may not be too regular: improving those backend learner management systems can increase the quality of experience for learners.

⁹⁹ Spaced repetition is based on an algorithm that selects revision cards for a learner on the basis of past errors, optimizing for memorization, and replacing the insights of a tutor.

¹⁰⁰ In Chapter One, I mentioned a new tool that only appeared after I completed my fieldwork, ‘Lily, the first AI speaker that can help you learn Chinese’ – which is in essence a chatbot. Another new tool developed after the end of my fieldwork and using a chatbot as its key feature is Eggbun, originally developed for Korean, then extended to Japanese, Chinese and English. Those appeared too late to feature properly as part of the research.

this one from DE6 saying ‘for now, there is no replacement for humans as a conversation partner.’ Chatbots will also compound the effect of ephemeralization and allow for some types of learning experience that resemble interactions with a human to scale. In fact, these experiences may even be superior to those provided by humans, as evidenced by LE3 saying: ‘you don’t second guess with a computer because it doesn’t really have emotions, it doesn’t judge you for being wrong’. The capacity for AI to disrupt language education should thus be understood in the broader context of cultural change when it comes to interaction with machines, particularly in terms of the emotions attached – from Siri to fem-bots and care-bots for the elderly.

The fourth area of development concerns the increasing capacity of digital technology to organize peer-learning communities. This can be simply digital spaces where learners get together through competitive gamified experiences, such as the monthly ‘challenges’ coordinated by Olle Linge through Hacking Chinese Challenges, exchanges of tips and mentoring on forums or social media platforms, or more structured language exchange arrangements mediated digitally through tools such as HelloTalk, Lang8, or the community section of Italki. This extends offline to language exchange groups enabled by websites such as MeetUp. Language peer learning is part of a more general trend whereby the Internet enables new forms of participatory cultures in which interactions among peers become more important than asymmetrical teacher/student, producer/consumer or buyer/seller interactions, in line with models described by Jenkins, and more generally with what has come to be known as the peer economy or the sharing economy. It indicates a potential shift of paradigm for language education: instead of learning being a structured experience delivered in an institution, it becomes a form of apprenticeship conducted in a community of practice.¹⁰¹

Disruptive innovation creates a new market for a product or service by offering an alternative to existing options that is of sufficient quality to satisfy previous non-users who value different aspects of the service or product. Teach Yourself methods, in print, cassette or CD-rom format, were previously available, but their quality remained insufficient to effectively bring large numbers of people to desirable levels of communicative competence, particularly before digital technology had made the Chinese language more easily

¹⁰¹ I will return to the question of peer learning as a new social and pedagogical practice in Chapter Five, and the underlying economics in Part Three.

accessible.¹⁰² The combined effect of the four disruptive changes listed above and changes in technolinguistic systems define new social environments where different types of competence will be valued, and indicate the possibility for digital tools to disrupt language education.

4.3 Speaking Chinese in the twenty-first century

The cultural capital value of L2 competence in Chinese is closely tied to the value that can be derived from interacting with people in Chinese: quoting Bourdieu, ‘a language is worth what those who speak it are worth’ (Bourdieu 1977, p.652). Its value, however, also depends on the difficulty of the language, which impacts the relative rarity of L2 competence, and therefore its distinctive quality. I will consider those two aspects in turn.

4.3.1 Chinese as a global language

The value of linguistic competence in Chinese is closely connected to the global rise of the PRC in the late twentieth and early twenty-first century.¹⁰³ Simply put, communicative competence in Chinese is increasingly valuable because the PRC is increasingly rich and powerful. In that regard, it should be noted that the Chinese language is exceptional in the sense that, as Andrew Kipnis points out, ‘there is perhaps no other language in the world that attaches so closely to a single nation-state yet still attracts so many foreign students,’ qualifying Mandarin as ‘a global but no multinational language’ (Kipnis 2011, p.167).¹⁰⁴

¹⁰² Ongoing technological progress increases the chances that digital tool may successfully compete with offline experience. One area of potential progress in that regard is the rise of virtual reality. On 2018, an Australian-New Zealand company called ‘ImmerseMe’ launched the browser version of a virtual reality environment for language learning, inviting learners to ‘virtually step [...] into a beautiful and authentic location to learn a language’ (‘Home’. Immerseme.com. <https://immerseme.co/#home> (accessed September 10, 2019)). This tool launched in desktop version in 2018, then phone and tablet version in 2019. A full Virtual reality version, for HTC Vive and other devices, launched in early 2020. Such developments mark a step forward in terms of scalability, as life-like interaction can now be made available globally at zero marginal cost.

¹⁰³ A more in-depth analysis would consider the earlier *local* value of communicative competence in various Chinese dialects in cities or regions with strong Chinese diasporas, particularly in South East Asia – as well as the ongoing value of communicative competence in Chinese dialects other than *Putonghua*, both locally and globally. Large-scale interest for the Chinese language, however, can be more closely tied to the rise of the PRC on the global stage. Studying those dynamics in more detail exceeds the scope of this thesis.

¹⁰⁴ Reflecting on the strategies behind the constitution of nations, Bhabha argues that those are produced through a narrative strategy, one element of which is the elaboration of a common language, made common by

This, therefore, invites further reflection on what form of L2 Chinese competence exactly has most value as cultural capital in relation to the rise of the PRC.

Standard Chinese, or *Putonghua*, has been central to the PRC's nation-building efforts. As Edward McDonald notes, 'questions of language have always been at the forefront in both traditional and modern China, and language *reform*, that is, deliberate and official endeavours to manage and direct language use, has been an essential part of modernization in China since the early twentieth century' (McDonald 2011b p.133).¹⁰⁵ One manifestation is the 2001 Language Law of the PRC: the law not only provides guidelines for official language use on the territory, but also includes norms regarding the type of Chinese that should be taught to foreigners, with article 20 stating '*Putonghua* and standardized Chinese characters must be used when teaching Chinese to foreigners' (Kirkpatrick & Xu 2001, p.2).

This effort at language reform and linguistic control by the PRC government is accompanied by state-led global promotion efforts. Beginning in 1987, the PRC established the Chinese Language Council International (Hanban) to administer and support Chinese language programs abroad, as a way to reduce international barriers to engagement. Since then, it has launched several initiatives to facilitate the teaching of the Chinese language in foreign countries, including preparing teachers to teach Chinese to non-Chinese speakers, developing Chinese language teaching materials and establishing radio-, television and internet-based Chinese language distance education programs, or organizing a program of international Overseas Volunteer Chinese Language teachers. The most often discussed initiative is probably the Confucius Institute project, launched by Hanban in 2004 with the goal of 'developing Chinese language and culture teaching resources and making its services available worldwide, meeting the demands of overseas Chinese learners to the utmost degree, and contributing to global cultural diversity and harmony' (Pan 2013, p.25). By 2019, over

occulting regional peculiarities. Individuals who speak this language and belong to this collective are thereby also defined as 'people' (Bhabha 1994, p.207). This close connection between the concepts of nation, people and language is supported by the paradoxical ontological nature of language, which exists both inside and outside the speaking subject.

¹⁰⁵ One often quoted example is Lu Xun's statement in 1936 that if Chinese characters are not destroyed, the Chinese state is lost.

500 Confucius institutes had been opened in over 100 countries in the world, teaching *Putonghua*, in line with the requirements of the language law.¹⁰⁶

This PRC-led promotion of standard Chinese, however, has occurred at the same time as the language is increasingly hybridizing. One factor for this is the rise of English usage in the PRC, particularly due to the growing presence of foreigners and returned overseas students. English is now used in conversations among L1 speakers of Chinese, online and offline, or at events occurring in the PRC (Ma & Xu 2017). Analyzing this phenomenon, Xu proposes that speakers use language to build distinction as part of a ‘language market’, and develop ‘anglicized Mandarin’ as a strategy of distinction. This is particularly the case for ‘Chuppies’ or Chinese yuppies who integrate English in their language practice to form a new type of *Putonghua* as a way to construct a multiplex identity, both in terms of age (young), class (professional), and nation (cosmopolitan and Chinese) (Xu 2009, p.132).

Another cause of hybridization is the use of the language internationally among the members of the growing Chinese diaspora. In a 2013 paper, Li Wei and Zhu Hua describe a group of students from a Chinese heritage background identifying their use of Chinese as an emerging ‘global Chinese’, defined as ‘an emergent variety that draws from different varieties of Chinese, occasionally intermixed with elements from other languages, for lingua franca communication amongst heritage Chinese users’ (Li, W. & Zhu 2013 p.520). This diasporic Chinese, as well as the anglicized Chinese described by Xu, more resembles the interlanguage described by Firth and Wagner (Firth & Wagner 1997) than the unified *Putonghua* presented in the 2001 language law.

This hybridization of the Chinese language is thus in tension with its role in holding together the nation. More generally, it presents learners with a potential hesitation between striving to learn standard *Putonghua*, or more hybrid forms of ‘global Chinese’ to interact with diverse diasporas, online and offline.¹⁰⁷ This is particularly important in relation to the

¹⁰⁶ A list is available at ‘Confucius Institutes Around the World – 2020’. Digmandarin.com. Last updated February 15, 2020. <https://www.digmandarin.com/confucius-institutes-around-the-world.html> (accessed July 6, 2020).

¹⁰⁷ This tension is something I have personally experienced in the context of public pedagogy. From 2017 to 2020, I have run a weekly Chinese-English collaborative translation event in Melbourne, derived from my earlier work on Marco Polo Project as a digital collaborative translation platform. I have delegated text selection for this event to a participant from Hong Kong, and regularly face complaints from PRC attendees. Sometimes, those complaints have to do with the content of a text being perceived as ‘anti-Chinese’ on what may be termed

difficulty of learning the language, thus raising the question as to whether it is a better investment to learn standard *Putonghua*, or whether a learner can expect more benefits from developing translanguaging competence in hybridized Chinese.

4.3.2 Chinese language as cultural capital: result and process.

Chinese is notoriously difficult to learn. The US Foreign Service Institute created a ranking of foreign languages by difficulty, based on the average number of hours required to reach general professional proficiency. Mandarin Chinese is ranked in the most difficult category, alongside Korean, Japanese, Arabic and Cantonese.¹⁰⁸ In China itself, for native speakers, learning to write characters is seen as a character building exercise (Kipnis 2011, p.167).

As a result, within the Chinese speaking world, the mastery of Chinese as a second language is highly valued as a form of embodied cultural capital. Bourdieu's account of how cultural capital enhances a person's social standing is pertinent here:

The objects endowed with the greatest distinctive power are those which most clearly attest the quality of the appropriation, and therefore the quality of their owner, because their possession requires time and capacities which, requiring a long investment of time, like pictorial or musical culture, cannot be acquired in haste or by proxy, and which therefore appear as the surest indications of the quality of the person (Bourdieu 1984, p. 281).

One sign of the distinctive value assigned to second-language learners who speak Chinese fluently can be seen in the section titled 'notable non-native speakers of Chinese' on the Wikipedia page dedicated to 'Chinese as a foreign language'.¹⁰⁹ By comparison, the short Wikipedia page on 'français langue étrangère' (French as a foreign language) presents

political grounds, but more often, the complaints are phrased in relation to the style or quality of the writing, which is described as too Cantonese or 'not proper Chinese'.

¹⁰⁸ This appears on the official website of the US Department of State (Foreign Service Institute. 'Foreign Language Training'. State.gov. <https://www.state.gov/foreign-language-training/> (accessed January 15, 2020)). The source indicates that the average number of hours for an L1 English speaker to master the language is about 2200, or three to three and a half times as much as what is required to reach a similar level of competence in Spanish or Italian, with an estimated 600-750 hours.

¹⁰⁹ 'Chinese as a foreign language'. Wikipedia.org. https://en.wikipedia.org/wiki/Chinese_as_a_foreign_language (accessed January 4, 2019).

nothing on notable speakers of French – and we would not expect to find a Chinese-language Wikipedia page listing ‘notable speakers of English as a foreign language’. Those notable non-native speakers are sometimes able to access positions in China itself, in part or largely due to that linguistic mastery, including in language education.¹¹⁰ As an example, Canadian-born and Chinese TV celebrity Mark Henry Roswell, known in China as Dashan, listed on the Wikipedia list of notable speakers of Chinese, is also host of a Chinese language learning program on CCTV called ‘Sports Chinese’.¹¹¹

It is important to note that as Chinese becomes more mainstream, applicants for positions that involve the Chinese-speaking world in some way may increasingly be required to have some level of L2 competence in Chinese. Few learners, however, would ever attain the level of L1 skills that the ranks of ‘notable non-native speakers of Chinese’ possess. Nor would this necessarily be seen as a failure by those learners. Indeed, for most Chinese language learners, the value of L2 Chinese competence – and the effort required to reach that competence – has become much more open to interpretation in the digital age. In particular, competence is more closely tied to the capacity to accomplish communicative tasks in digital and offline environments where translanguaging practices are the norm, rather than aligning with norms of correct usage or institutional evaluation.

In fact, from my fieldwork, it was clear that learners themselves attached significant value to the *process* of learning the language itself, not just to ‘having achieved’ a high degree of L2 competence. One clear indication is the appeal to Chinese language learners of the many in-country language scholarships that are funded by the PRC, Taiwan, and the learners’ home countries. ‘I had a scholarship, it’s a great opportunity in my life’ said LE5, a learner of Nigerian background who was studying in Tianjin on a PRC scholarship when I interviewed them. ‘I can see the rest of the world, just like that’. I myself benefited from a

¹¹⁰ I had first-hand experience of this during my studies in Nanjing in 2013. A friend from Australia who was studying at Nanjing University at the time had become a minor celebrity on Jiangsu TV after being part of the show *If you are the one* (非诚勿扰). He filmed a few episodes of a local travelling show, and even once presented the weather forecast. He also worked with Jiangsu TV to bring Chinese-speaking foreigners on TV shows. I thus found myself participating in a day-time quiz-show, where I earned about 500 Yuan.

¹¹¹ ‘Learn to speak Chinese’. CCTV.com. <http://www.cctv.com/program/learnchinese/01/index.shtml> (accessed October 19, 2019). Another example is Richard Sears, an American programmer (now retired) with a passion for Chinese etymology who created a website focusing on Chinese characters, and became a celebrity on the Chinese Internet under the name ‘uncle hanzi’ (汉字叔叔). I will return to this story in Chapter Eight.

Hamer scholarship, granted by the Victorian government, to study for a term at Nanjing University in 2013: this was critical in supporting me in early stages of my work on the Marco Polo Project.¹¹²

Beyond scholarships, learning Chinese enables the development of social capital with other individuals who have an interest in Chinese and China and more generally in East Asian languages and cultures.¹¹³ As China's economy continues to grow and as its global influence deepens, the social capital value of having a strong China and East Asian network of professional collaborators and acquaintances with shared interests can be expected to grow in value. In Australia, the expression 'the China space' is commonly used to refer to the range of people – Australian citizens, migrants and temporary residents – who gather periodically for various China-related social and professional activities, often with some support from government bodies or large organizations interested in promoting China literacy and soft diplomacy.¹¹⁴ We could define this 'China space' as a field-of-sorts in which individuals who possess different types of China-related knowledge and who are competent in the Chinese language to varying degrees, mutually recognize these capabilities as cultural capital that can be converted into economic capital. The activities conducted within this 'China space' also enable the participants to acquire and build social capital that derives from their shared interests in the Chinese-speaking world. As for professional expatriates working in the PRC, who numbered some 800,000 in 2017, learning Chinese has become a way of building social capital with their professional Chinese counterparts (Ma & Xu 2017).

In all those cases, what matters in the digital twenty-first century may not be so much advanced competence in spoken Chinese (of the level required for TV work in the PRC), but rather the capacity to communicate in an interlanguage, or to enjoy Chinese popular culture or Chinese-language entertainment with the aid of digital language tools. The 'China space'

¹¹² This research itself was supported by a scholarship, and it is likely that the perceived importance of China played at least some part in this project receiving funding.

¹¹³ It is particularly conducive to social capital formation for heritage learners, within their families and as part of the Chinese diaspora, as I discussed in note 78.

¹¹⁴ This expression ties into the contemporary use of the word 'space' to define a certain professional / social / cultural environment somewhat akin to what Bourdieu defines as a field, particularly one gathering younger people whose careers combine freelance work, community involvement and entrepreneurial projects. People talk in this manner about 'the tech space', 'the education space', or 'the innovation space'.

in countries outside China and multilingual environments in-country, where expatriates socialize with locals in the Chinese Mainland and Taiwan, exist because of increasing human movement under conditions of globalization. One effect of digital technology is that it enables people to ‘find their tribe’ more easily. Digital technology also affects the type of communication that occurs in our increasingly fluid online environments, and the increasingly varied forms of linguistic competence they require. I will now turn to this question.

4.3.3 Inhabiting new digital spaces

Digital technology, by affording global access to Chinese language content and the capacity for people located in different places to interact in Chinese with ease, is challenging the previous correlation between nation, language and territory that was once central to nationalist constructions. Indeed, from the end of the twentieth century, the convergence of technology and globalization has brought forward new transnational spaces which Appadurai calls ‘diasporic public spheres’, where individuals share the same media content or news irrespective of geographical location (Appadurai 1996, p.33). The result is a new potential disconnect between ‘imagined communities’ (formed of people sharing the same language and cultural knowledge) and geographical boundaries.¹¹⁵

The global circulation of media content, facilitated by the Internet, has also given rise to a phenomenon that Jenkins calls ‘pop cosmopolitanism’. This term refers to the appetite for media from other countries pursued purely for ‘fun’, as a form of popular cultural distinction (i.e. knowledge of pop cosmopolitanism as cultural capital) (Jenkins, Ford & Green 2013, p.275). Contact zones between diasporas, pop cosmopolitans and cultural imports give rise to ‘impure’ cultural hybrids, but also a genuine appetite for language and cultural understanding. In fact, the appeal of language learning may be not only to engage with content in that language, but also to join fan communities, argue Jenkins, Ford & Green (2013, pp.288-289).

¹¹⁵ The concept of an ‘imagined community’ comes from Benedict Anderson, and refers to the work of imagination associated with the constitution of the nation state, consisting of a shared language, but also shared narratives, references and symbols (Anderson, B. 1983).

The growth of such transnational digital spaces, combined with the hybridization of the Chinese language discussed previously, has pedagogical implications. As the authors of a paper on ‘Technologies, Identities and Expressive Activity’ argue:

Emerging arrays of online environments now constitute primary settings through which routine constructions of identity are created, and curated, through the use of textual and multimodal expression, some of which arguably involve new literacies, communicative genres, hybrid linguistic varieties, processes of group formation, and social practices (Thorne, Sauro & Smith 2015, p.216).

In her introduction to the Spring 2014 issue of *The Modern Language Journal* on ‘Teaching Foreign Languages in an Era of Globalization’, Claire Kramsch reflects on the need for new models to define competence in the new communication paradigm defined by digital technology, particularly around changing standards of linguistic adequacy.¹¹⁶

The network communications of the Internet have introduced fundamental changes in socially distributed genre and register conventions and have problematized the communicative norms, appropriate pragmatics, and standard grammar that language teachers strive to teach their students. On the Internet, people no longer observe a strict separation between languages; comprehensibility online trumps accuracy and appropriateness (Kramsch 2014, p.300).

In line with this evolution, the value of a learning tool may increasingly depend on its capacity to enable language acquisition in non-linear and interactional ways – or the capacity to pursue translanguaging communication effectively.

The concepts of the *Zhonguotong* and sinophone presented earlier should be reconsidered accordingly. Participants in transnational communities online may neither aspire nor need to develop the same level of mastery over cultural cues, pragmatics, and grammar as a sinophone intending to interact offline – nor acquire the sinological expertise of a *Zhonguotong*. Lower levels of Chinese linguistic competence are sufficient for people to engage in mediated immersion; higher levels of competence may be developed later on. The

¹¹⁶ Kramsch earlier proposed that the contemporary situation called for an expansion of communicative competence towards a broader ‘symbolic competence’, that combines ‘the ability to express, interpret and negotiate meanings in dialogue with others’ and ‘the ability to produce and exchange symbolic goods in the complex global context in which we live today’ (Kramsch 2006, p.251).

point, again, is that the process of learning Chinese, as part of an engagement with others in online transnational communities, may in itself be of sufficient value to warrant continuation in the activity, irrespective of achievement.

This is reflected in a study of teenagers using WeChat for Chinese learning by Li Jin, where the author notes that the social media network allowed them to demonstrate their identity as a competent Chinese language user, which, in turn, increased their learning motivation (Li J. 2017, p.20). The capacity to negotiate identities determines what Norton calls ‘investment’.¹¹⁷ ‘If learners ‘invest’ in the target language, they do so with the understanding that they will acquire a wider range of symbolic resources (language, education, friendship) and material resources (capital goods, real estate, money), which will, in turn, increase the value of their cultural capital and social power’ (Norton 2013, p.5).¹¹⁸ Consequently, when considering the value of a ‘Chinese language activity’, one needs to ascertain the extent to which the activity, and the tools supporting it, are likely to appeal to learners.¹¹⁹ If language learners are willing to invest time and effort in a ‘Chinese language activity’, and in learning to use the tools for pursuing it, chances are that they see the activity and its related tools as highly useful in helping them to negotiate and explore their identities as Chinese speakers. Social media channels have become highly relevant for language learning in this regard. In the digital age, L2 competence is acquired not only in the classroom but through online conversations conducted in the Chinese language as well as participation in bilingual or Chinese-dominant online chats. As noted earlier, even if one is not capable of conversing fluently, one can participate through the use of emojis or machine translation of one’s own and other people’s words.

In conclusion, it appears that the combined effect of new technolinguistic systems making Chinese more accessible, and the rise of translanguaging practices among diverse

¹¹⁷ The concept of investment is more specific than that of motivation articulated by Dörnyei and Ushioda (2009). Rather than a psychological construct (perceived desire to learn), investment refers to an observable practice that involves decision and execution.

¹¹⁸ This is particularly relevant for heritage learners, as I discussed in note 78.

¹¹⁹ I use the expression ‘Chinese language activity’ here to describe both activities conducted by a Chinese language learner for the explicit goal of learning the language (e.g. reviewing vocabulary on flashcards), and activities I earlier described as ‘mediated immersion’ conducted for their own sake (e.g. watching a subtitled film in Chinese). The deliberately loose expression ‘Chinese language activity’ reflects the continuity between those activities.

learners interacting online and offline as part of transnational communities, has ushered in a new set of communicative conditions. Under these conditions, communications in Chinese that are effective and easy to achieve (i.e. digitally mediated translanguaging) arguably command greater value among large numbers of Chinese language learners today than communications that meet institutional standards of Chinese language proficiency. This shift of perception compounds with the impact of digital technology in making online learning tools for language learning globally available at an unprecedentedly low cost. To what extent is this a situation of innovative disruption? How do designers of Chinese language learning tools make use of the affordances of digital technology to create new types of learning experience? These are among the issues that I will consider in Chapter Five.

Chapter Five: Navigating a new learning landscape

5.1 Articulating a typology

5.1.1 Pre-digital tools

Digital Chinese language learning tools have affordances that enable new types of learning experiences. To properly understand the type of innovation presented by those tools, however, it is important to understand what was available beforehand. The description below is based on a first-order observation of tools available for language learning within institutions of learning and autonomous language learning, developed through a combination of online search and observation in bookstores and libraries. On this basis, I developed a list of 11 types of learning tools, each forming a distinct material unit, typically consisting of printed pages bound together as a book or booklet (or distinct sections of a book).¹²⁰

- **Dictionaries.** These can be bilingual or monolingual, general or specialized.
- **Thesauruses & vocabulary books.** These vary by extension, and how they are structured (e.g. by level, topic or both).
- **Posters.** These present key grammar rules, or Chinese characters organized by level or topic (e.g. body parts, fruits, animals).¹²¹
- **Flashcards.** These feature a character on one side and its translation and/or pinyin transcription on the other. They can be either bought as a set or handcrafted by the learner, and support memorization exercises conducted autonomously or in groups.
- **Exercise books.** These include guided exercises (e.g. order words, match words with images, and so on). They also include blank character practice books, with a set of lined squares and greyed models.
- **Grammar books.** These present coordinated chapters with explanations and instructions, typically focusing on the Chinese phonetic, writing and grammatical systems, often integrating elements of pragmatics.
- **Graded readers.** These present a set of Chinese language texts ordered by difficulty – typically based on the number of characters required to read them. Graded readers

¹²⁰ Or in the case of posters and flashcards, hung on a wall or used together as part of a revision practice.

¹²¹ Often seen hanging on the walls of classrooms, they can also be used for autonomous learning. A recent such example is the Mandarin Poster, with two versions presenting either the 1000 or 2000 most common characters ('Home'. Mandarinposter.com. <https://mandarinposter.com/> (accessed July 6, 2020)).

may contain authentic or adapted material, and may be annotated or accompanied by vocabulary lists and/or grammar notes.

- **Bilingual books.** These present classic or modern Chinese texts, formatted for learners, sometimes with annotations and/or vocabulary lists.
- **Textbooks.** These typically consist of situated dialogues gradually introducing new vocabulary and grammatical elements. Each dialogue is typically followed by a vocabulary list, grammar points, and exercises.
- **Teach Yourself books.** These offer complete methods for learning the language autonomously. Often targeted at beginners, they typically consist of graded bilingual dialogues, accompanied by vocabulary lists and grammar rules, prefaced by a general introduction containing learning advice.
- **Travel phrasebooks.** Intended for travellers, these present a list of commonly used sentences and key vocabulary, organized by topic.

These eleven types of tools share certain features that can be described as core functional units. In Chapter One, I referred to digital tools such as Skritter and Pleco as having a core functional unit each, with Skritter providing flashcards and Pleco functioning as a dictionary. With regard to pre-Internet tools, I identified six core functional units shared across different types of tools. These are:

- **Vocabulary lists.** Lists of characters or words translated, glossed or defined, and organized by topic, radical and/or alphabetical order of pinyin or translated terms. Those lists can either aim to capture vocabulary in a relatively exhaustive manner (e.g. dictionaries), or only contain a set of words related to a specific text or context (e.g. new words from a textbook lesson, list of words for a level of the HSK test).
- **Grammatical explanations.** These can be descriptions of standard word order and word combinations, or descriptions of the possible uses of particles and other grammatical words. They can be presented either in the learner's first language, or in Chinese, with different levels of sophistication.
- **Advice/instructions on language learning.** Instructions to learners about the process that they should follow in order to learn a language. This extends from the introductions of Teach Yourself books or textbooks to instructions in exercise books.

- **Model sentences.** These can be presented on their own or with a translation, either as model dialogues in a textbook, as examples in a dictionary, or as model sentences in phrasebooks for travellers.
- **Chinese text formatted for learners.** These texts can be fiction, essays or dialogues. They can be written in simplified language, annotated, or accompanied by a translation, making them more accessible to a learner.
- **Practice exercises.** These consist of instructions and text inviting interaction or input from readers. Exercises include fill in the blanks, associating word & meaning, ordering characters to form a sentence, texts and associated questions, or suggested writing exercises.

Audio and video technology has increased the range of tools available, adding the following:

- **Recorded lists of sounds, words or model sentences.** These are either intended to support integration of the phonetic system or support memorization of words and/or grammatical patterns.
- **Graded audio dialogues.** These typically accompany text books and Teach Yourself books, and can present simplified or slowed down language, or integrate accompanying explanations in an instruction language (for instance, dialogues in Chinese which integrate segments in English explaining a word or structure).
- **Graded learning videos.** These can be either a recorded lecture (e.g. explanation of a point of grammar or advice on language learning) or a situated dialogue.

Audio and video tools made it possible for learners to practise and improve their pronunciation without a teacher and they also made new spaces available for learning. For instance, portable cassette and CD players in the late twentieth century made it possible for language learners to listen to language tapes while driving or walking. However, it was digital technology that greatly broadened the uses of audio and video tools.

5.1.2 A functional typology of digital Chinese language learning tools

It was not difficult to outline the print, audio and video tools listed in the previous section because of the limited number and material discreteness of pre-Internet language learning tools. As noted in Chapter One, the ontology of digital tools and their very large number meant that I could not directly produce such a list. Instead, as explained in Chapter Three, I started by defining an ‘extended canon’ of 190 tools. Then, I looked at functionally

significant formal elements – akin to what Moretti describes as devices – that would allow me to distinguish between distinct ‘genres’ of tools, in line with the methodology that I described in Chapter Three.

First-order observation of those 190 tools, with particular attention to the 9 tools I listed as ‘core of the system’ and the 22 that I listed as ‘system shapers’ in Chapter Three, combined with consideration of the ways those tools are described in blogs, online reviews, and on the Appstore, allowed me to develop a typology where I distinguished 35 types of digital Chinese language tools. I then sorted these 35 types into six ‘macro-categories’. The full list of these 35 tool-types sorted into the six macro-categories is provided below, with a short description of each type. A complete ‘extended canon’, sorted according to those 35 types, is provided in Appendix One, with a full list of the tools that fit under each type. I explain the rationale and criteria that I used to define macro-categories immediately after presenting the extensive list of types below.

Reflecting about this list and its intended practical usage, I see myself as *articulating* a typology, in the sense that I am highlighting connections that can be made among these digital tools. In that regard, the six ‘macro-categories’ indicate a range of functions that may potentially act as nodes or connections for two or more tools to work complementarily. I should point out that my typology seeks to enhance the prospects of such complementarity.

Macro-category 1: language accessibility tools¹²²

1. **Chinese text processing.** Software enabling input and processing of Chinese characters, e.g. Chinese fonts or character drawing functionalities on touchpads.¹²³
2. **Input converters.** Software to ‘convert’ the format of a text, e.g. characters to pinyin or traditional to simplified characters.
3. **Analytical tools.** Software to extract characters/words from a text and organize them e.g. by frequency, and/or annotate them.

¹²² I use the expression ‘language accessibility’ to describe tools close to the language accessibility features afforded by digital technolinguistic systems described in Chapter Four. I return to this category as intermediate between tools and resources later in this chapter.

¹²³ As indicated in Chapter Three, this marks a hazy border between what I called ‘tools’ and ‘resources’. In Appendix One, I listed three tools focused on helping learners set up Chinese fonts. The decision to include those in this list is primarily intended to illustrate the continuity between underlying Chinese text processing software and learning tools. I return to the hazy border between tools and resources at the end of this section.

4. **Dictionaries.** Software offering translation and/or definitions of characters or words.
5. **Pop up dictionaries.** Dictionary embedded in a browser, displaying translation/pinyin when the user hovers on a character in a text read on the browser.
6. **Text readers.** Software where the user can paste Chinese text in a ‘window’, and have it annotated or translated.

Macro-category 2: learning advice and support

1. **Language learning advice websites and blogs.** Advice on e.g. learning how to learn, grammar points, or what resources to use for what goal.
2. **Self-learning e-books.** Structured advice for learners on learning how to learn.¹²⁴
3. **Grammatical explanations.** Description of Chinese grammar points, typically ordered by communicative goal or level of complexity.
4. **Vocabulary lists.** Lists of words/characters, gathered and sorted by frequency or topic.
5. **Introduction to phonetics (text only).** Description of the Chinese phonetic system.
6. **Interactive pinyin charts.** A table of all possible Chinese syllables with audio.
7. **Videos on pronunciation.** Videos showing correct articulation of different sounds.
8. **Character memorization tools (based on visualization).** Lists of characters, words or chengyus with associated visual mnemonics.¹²⁵
9. **Character memorization tools (based on etymology).** Lists of characters, words or chengyus with associated etymology, including older graphic representation.

¹²⁴ Self-learning e-books may be understood as having the same content as learning advice websites and blogs, but presented as exhaustive and ordered. In fact, Olle Linge, who runs the language learning advice blog Hacking Chinese, also wrote an e-book of the same title. The content of the e-book is largely derived from existing posts on the Hacking Chinese blog, presented in a more systematic manner.

¹²⁵ Chengyus are idiomatic constructs composed of four characters (in contrast with common Chinese ‘words’, which consist of two characters), based on cultural references and literary allusions, and somewhat equivalent to proverbs. Understanding and using chengyus appropriately is often considered a sign of advanced communicative competence in Chinese among L2 learners.

Macro-category 3: multimedia courses¹²⁶

1. **Video courses.** Series of videos, typically presented in successive order of difficulty.
2. **Audio courses.** Series of audio segments, typically presented in successive order of difficulty.

Macro-category 4: formatted content¹²⁷

1. **Graded readers.** Stories or essays written in simple Chinese (i.e. with a limited number of characters), sorted by difficulty, and typically annotated and/or translated.
2. **News-based readers.** Software presenting Chinese-language news stories written in simple language, with customizable options to show annotations or translations.
3. **Curated multimedia content.** Software offering a selection of Chinese language video/audio content, sorted by difficulty, and typically presented with scaffolding options (e.g. customizable subtitles).¹²⁸
4. **Adapted audio content.** Software presenting Chinese language audio segments (stories, songs or phrases) formatted and curated for learners, e.g. sorted by accent, slowed down, and/or using simple language.

Macro-category 5: games and drills

1. **Character tests.** Software allowing a learner to evaluate how many characters they know.

¹²⁶ Both audio and video courses typically bundle a range of functionalities. Beside the core functionality described here, they typically integrate flashcards and/or quizzes, as well as grammatical explanations and vocabulary lists. Those are the closest multimedia equivalent to Teach Yourself books. Courses offer various combinations of instructional videos and/or ‘situated dialogues’. For video courses, those typically include customisable subtitles and/or transcripts; for audio courses, they typically include English language explanation in the audio, and come with transcripts.

¹²⁷ ‘Formatted’ content here indicates that the adaptation of Chinese language content for online pedagogical purposes through the use of distinctive ‘formal’ elements such as customizable options for digital display.

¹²⁸ This type of tool is continuous with videos courses, listed above. In fact, Yabla, LingQ and FluentU, listed in the appendix, propose a combination of instructional videos (produced in house for learning) and ‘native’ videos from the Internet.

2. **Flashcards.** Software allowing a learner to review and memorize vocabulary by showing e.g. the character and testing their knowledge of e.g. the pinyin or English meaning.¹²⁹
3. **Listening practice drills.** Software allowing a learner to practice their capacity to distinguish tones or sounds, using a model similar to that of flashcards above.
4. **Speaking practice tools.** Software that invites a learner to repeat words or text and automatically assesses the quality of their pronunciation.
5. **Character learning arcade style games.** Software where the learner must identify characters at relatively fast speed, e.g. by clicking on the character corresponding to a certain image.
6. **Character learning mnemonic games.** Software that associates characters with images and invites the learner to ‘play’ with those images.
7. **Gamified courses.** Software that proposes a series of interactive quizzes of increasing difficulty (e.g. match a word and image, order words to form a correct sentence, type a sentence you hear), forming a complete beginner course.
8. **Adventure games.** Software inviting the learner to guide a character through an imaginary world (e.g. choose your own adventure story).¹³⁰

Macro-category 6: engagement platforms

1. **Online tutoring.** Software allowing learners to connect with individual tutors for remote lessons, e.g. through Skype.
2. **Virtual classrooms.** Software allowing learners to join a remote class, e.g. through Skype.
3. **Written language exchange communities.** Software allowing learners to receive feedback on their writing from native speakers.
4. **Oral language exchange communities.** Software allowing learners to engage in practice conversations with native speakers, e.g. over the phone or as chats.
5. **Learner support and advice communities.** Software bringing together learners to exchange tips, e.g. on forums.

¹²⁹ Many include spaced repetition, whereby words that a learner failed to identify appear more frequently in a deck, in order to optimize memorization.

¹³⁰ This category is probably the most heterogeneous in the list, and groups a set of choose-your-own-adventure texts, an adventure-exploration game and a game to learn how to ask directions in Chinese. This type of tools seems both promising and underdeveloped.

6. **Immersive environments.** Virtual worlds where learners interact with their environment, other learners and/or chatbots.¹³¹

This list of 35 types, derived from first-order observation, invited further articulation. Indeed, it appeared that some types, though distinct, presented clear resemblances with each other. This was evident, for instance, in the case of audio and video courses, or written language exchange communities and oral language exchange communities. By categorizing the 35 types of tools I had identified into macro-categories, I was able to reflect these resemblances as functionally significant formal similarities.

A paper by Jenkins titled ‘Rethinking “Rethinking Convergence/Culture”’ guided my development of the six macro-categories. Responding to criticism of his work, Jenkins clarifies the distinction between two concepts which have often been confused when discussing participatory cultures, interactivity and participation:

For me, interactivity is a property often designed and programmed into the technology and thus is much more likely to be under the control of media producers.

Participation, on the other hand, is a property of the surrounding culture and is often something communities assert through their shared engagement with technologies, content and producers (Jenkins 2014, p.283).

I have used this distinction to structure the first-order typology of digital tools that I developed into ‘macro-categories’. A tool is interactive to different extents, depending on the degree to which the digital interface invites the learner to ‘do things’ as part of the learning practice (i.e. click, type, talk, and so on). Participation, by contrast, indicates the degree to which a tool allows a learner to engage with other learners and/or digital content circulating on the Chinese language Internet and therefore join in digital communities, real or imagined. Using those two concepts, I constructed a quadrant where each corner corresponds to one recognizable tool ‘genre’ or macro-category (see Figure 1 below).¹³²

¹³¹ It is important to note a potential overlap between this type of tool and what I listed as ‘adventure games’ under ‘drills and games’. The primary difference is the possibility to interact with other humans in the virtual environment, or not. The development of chatbots offering human-like interactions might make this distinction more ambiguous. I will return to this point later in this chapter.

¹³² This two-level articulation of my extended canon calls for reflection on the relationship between what I call ‘types’ and ‘macro-categories’. Moretti proposes that genres originate from ongoing formal experimentation by

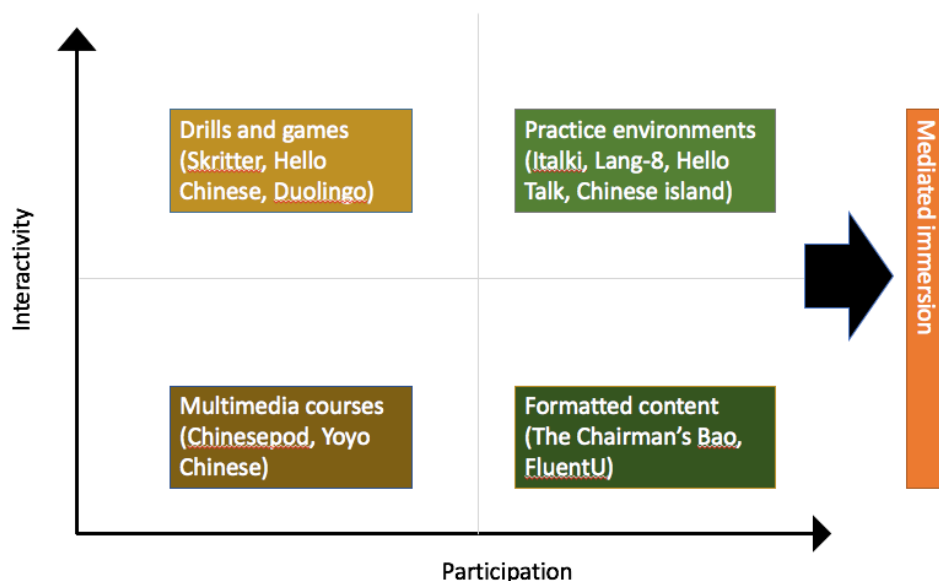


Figure 1: A functional interface typology

Two things should be noted about this quadrant. First, the two qualities of interactivity and participation are not symmetrical. The tools on the right-hand side of the quadrant present a step towards what I called mediated immersion in Chapter Four (as represented by the arrow leading to the orange box on the right). As such, increased ‘participation’ both defines a different type of learning experience, and represents a goal in itself. By contrast, interactivity is a different quality, whereby less interactive tools are

writers, resulting in the development of what he calls ‘devices’: functionally significant formal elements that trigger interest among readers and lead to the success of a book. This success then prompts imitation, defining a genre – but this process of imitation itself includes variations, leading to the emergence of subgenres. The example I gave in Chapter Three was of significant clues as a ‘device’ characterizing the detective novel genre, and first appearing in the works of Arthur Conan Doyle. In the case of digital tools, it is not altogether clear which of the two levels of articulation (‘types’ or ‘macro-categories’) should be considered as primary. The macro-categories I have proposed are a retrospective construction that makes the present landscape of digital Chinese language learning tools easier to grasp. However, this construction has no explanatory force when it comes to understanding the mechanisms driving the emergence of new tools. The basic analogy I am drawing between my macro-categories and Moretti’s ‘genres’ allows me to suggest that the ‘types’ I have identified correspond to ‘subgenres’. However, there are limitations to this analogy. While it is important to more fully address the complexities that bedevil the categorization of digital tools, this pursuit exceeds the scope of this thesis.

primarily suited to train ‘passive’ competencies (i.e. reading and listening), while more interactive tools can train both ‘passive’ and ‘active’ competencies (i.e. writing and speaking).

Second, the quadrant lists only four of the six macro-categories into which I organized the 35 types of tools presented above (together, those four categories combine 20 of the 35 types). What, then, of the two macro-categories missing from Figure 1, and the 15 types of tools they gather? Exploring this is an opportunity for further reflection on the distinction between tools and resources which I articulated in Chapter One.¹³³

The first macro-category missing from Figure 1, which I called ‘language accessibility tools’, hovers on the border between learning tools proper and the language accessibility features available as part of broader technolinguistic systems which I described in Chapter Four. A dictionary like Pleco is continuous in its functionality with Google Translate, and what I call ‘input converters’ (automatically converting pinyin into characters or vice versa) are continuous with Chinese language input features integrated into standard operating systems, where the user can type pinyin on the keyboard and characters appear on the screen. In both cases, it is not altogether clear whether the primary purpose of the tool is to help a user learn Chinese or help them use Chinese, i.e. read Chinese language content or communicate in Chinese with the support of technology. For these reasons, the ‘language accessibility tools’ macro-category is perhaps best regarded as consisting of ‘quasi-resources’.

When it comes to the tools in the second macro-category missing from Figure 1, ‘learning advice and support’, I originally thought of merging them with the ‘multimedia courses’ macro-category. What prompted me to do so is that the types of tools in ‘learning advice and support’ can be considered as ‘parts’ (or even ‘core features’) of multimedia courses. Indeed, complete multimedia courses do typically include learning advice, vocabulary lists, grammar explanations, phonetic descriptions, and so on. In the end, however, I chose to group tools focusing on just one aspect of language acquisition (e.g. phonetics or grammar or vocabulary) under ‘learning advice and support’ so as to distinguish them from ‘multimedia courses’ as a distinct macro-category. As with ‘language accessibility tools’, the tools I have grouped under ‘learning advice and support’ can also be described as

¹³³ As a reminder, I proposed that a tool is designed for learning, while a resource is used for learning but not originally designed to that end.

‘quasi-resources’. What is distinctive about these quasi-resources is their fragmentary quality, indicating that they are employed in bricolage fashion by individual users.

Moreover, in reflecting on ‘interactivity’, it became necessary for me to consider how Chinese language learners experience mediated immersion in two distinct ways online, via Chinese social media and Chinese language content platforms. To recall Jenkins’ distinction between interactivity and participation, those two types of resources both involve a high level of participation but differ by their level of interactivity. This led me to attempt a classification of tools, resources and quasi-resources used for digital Chinese language learning practice along the two axes of interactivity and participation, presented in Figure 2 below.

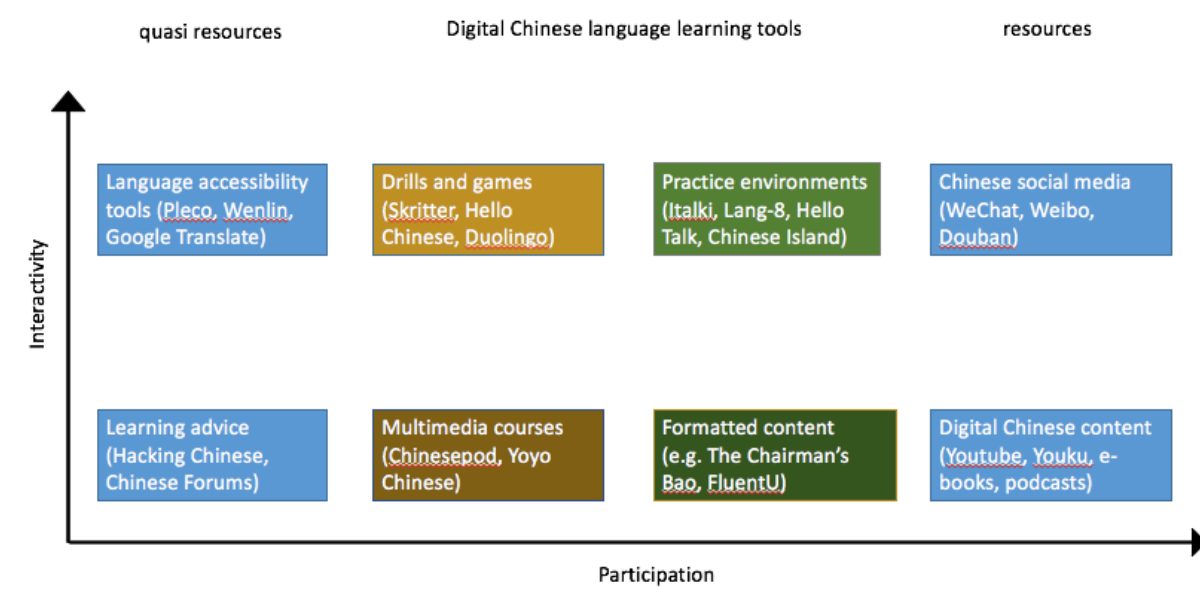


Figure 2: Tools and resources

This functional typology is intended to help learners, teachers and designers navigate the landscape of digital Chinese language learning tools with greater ease. However, the value of a tool cannot be simply determined in relation to the type or macro-category that it belongs to, for the perception of value is highly contingent on the use made of the tool by an individual user. Relatedly, different users will use different criteria to assess which tools are more useful to them, precisely because digital tools *can be used* in bricolage fashion to support a wide range of learning practices. Moreover, changes to how Chinese language ‘mastery’ is defined and evaluated in a changing technological environment, as discussed in Chapter Four, further complicate how users might value a given language learning tool. The

next section of this chapter outlines key issues to consider in relation to using digital tools to learn Chinese.

5.2 Guiding the learner

5.2.1 Tools, resources, practices

In Chapter One, I reflected on the continuity between resources and tools. The granular articulation of different types of tools presented in the previous section will allow me to explore this distinction in greater detail.

As I described in Chapter Four, new technolinguistic systems enable new types of learning practices in the mode of mediated immersion. One form this takes is the practice of language learners reading a news article from the Chinese web and using a dictionary like Pleco to look up unknown words. Now, instead of using Pleco, a learner may prefer to use a ‘pop up dictionary’ like Zhongwen, allowing them to translate characters by hovering over them as they read the news article on a web-browser. They might also use a text-reader such as Wenlin or Clavis Sinica, allowing them to display the pinyin, and/or tone marks and/or translations of certain words or characters. Pleco, Zhongwen and Wenlin or Clavis Sinica, then, can be described as ‘learning tools’ to the extent that they enable a certain learning practice: users can read a text in Chinese, without knowing all of the word-forming characters.¹³⁴ To the extent that learners choose the text from among an undefined set of ‘resources’ on the Internet and select the supporting tool in a somewhat ad hoc fashion, each of the practices described in this paragraph may also be considered a form of bricolage.

I choose to use the word bricolage to describe those practices by contrast with what a learner does when using, for instance, The Chairman’s Bao. In this latter case, they pick a news article from an already curated selection (where articles are sorted by level) and use the software’s built-in features to check the translation of the text or display the pinyin. This practice can be defined as functionally equivalent to the ones described in the previous paragraph (i.e. where a user reads a text with online dictionary support). The key difference is that The Chairman’s Bao presents a set of complementary features (text selection, texts

¹³⁴ Or alternatively, they might be described as ‘resources’, as it is not altogether clear that their purpose is primarily learning, as opposed to providing easier access to Chinese language writing for its own sake, as I argued in the previous section. This further indicates the relative nature of the concepts of ‘tool’ and ‘resource’ that I proposed in Chapter One, and the continuity between both.

written for learners using a limited number of characters, texts sorted by level, embedded reading help), making it more convenient than the ‘bricolage’ equivalents listed in the previous paragraph.¹³⁵ A first hypothesis to understand the value of the tools I identified as forming the ‘core of the system’ in Chapter Three, therefore, would be that they offer a convenient equivalent to learning practices that would otherwise be conducted in bricolage fashion.

The analysis presented here could, indeed, be extended to other tools I listed as being at the ‘core of the system’. Skritter offers an alternative to a vocabulary revision practice conducted on a generic flashcard software such as Anki, where the learner uploads a database of characters, using an Android handwriting plugin for character input.¹³⁶ Italki offers a convenient alternative to Craigslist or other online classifieds or forums that help language learners find language tutors. These sites offer a preselected list of tutors, with clear information about their interests, areas of expertise, and the cost of a lesson. These sites also feature an integrated system for scheduling the lessons and payment for them.

Under the ‘multimedia courses’ macro-category, I would consider Chinesepod and Yoyo Chinese as exemplars. Both offer a convenient alternative to online self-learning practices conducted by aggregating learning advice, grammar points and vocabulary lists from forums or independent blogs, combined with Chinese learning videos from YouTube. As tools, Chinesepod and Yoyo Chinese offer a more systematically curated set of items, organized by order of difficulty, and conveniently aggregated in one location. They include several extra features, such as flashcards for reviewing vocabulary items from the curated lessons. The added level of ‘convenience’ afforded by those tools derives from two attributes:

¹³⁵ The same analysis would apply to FluentU which, like The Chairman’s Bao, belongs to the category that I labelled ‘curated content’. It offers a convenient alternative to selecting videos from the Chinese Internet, using voice-to-text software to transcribe the text (or otherwise look for subtitled videos), and a dictionary to translate unknown words.

¹³⁶ Both Skritter and Anki, which include a spaced repetition algorithm, offer a superior level of convenience in relation to bricolage alternatives using pen and paper. LE1 mentioned such an alternative explicitly during their interview when talking about Anki, saying: ‘I actually developed the same system in an offline fashion just by using several decks of cards, and each deck represented a level of learning. The less I knew, the more frequently I revised, until all my cards were in the ‘I know’ deck. I didn’t know it was a well-established researched methodology which you can turn into an algorithm to be even better.’ This shows a clear continuity between digital and non-digital learning practices.

curated materials (tools offer a selection of content, explicitly labelled for users to select in relation to their interests and level of competence), and the presence of what I will call ‘scaffolding software’ (software that helps users access content, for instance a dictionary plugin).

On this basis, it would be possible to conceive of digital learning tools as *facilitating* a learner’s journey towards mediated immersion, offering an added level of convenience in relation to otherwise available bricolage practices. This is reflected in Figure 3 below.

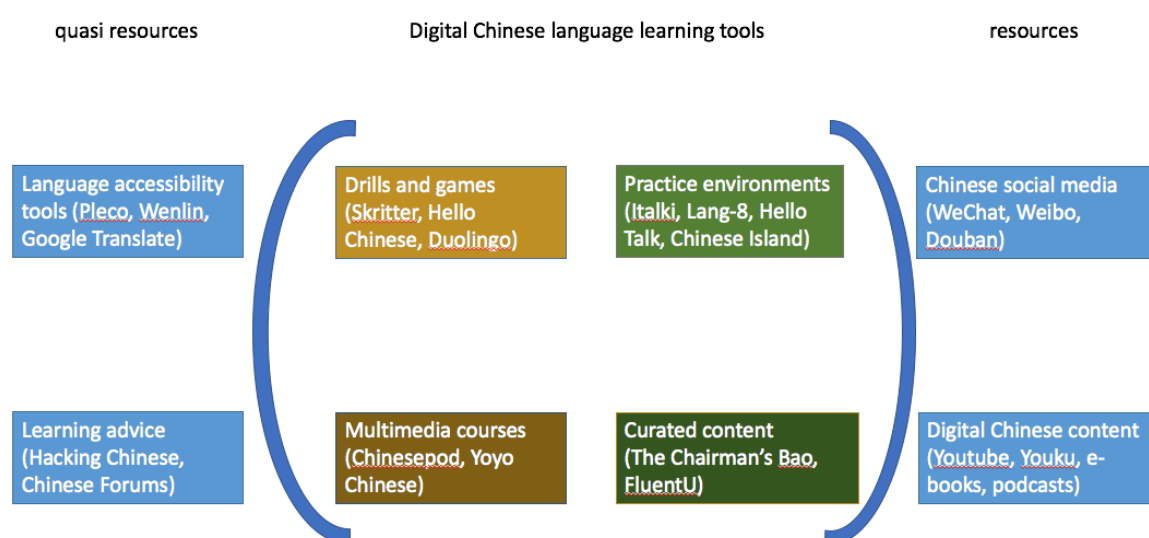


Figure 3: Digital tools facilitating language learning

One implication of this analysis is that the most motivated and/or tech-savvy learners could dispense with the learning tools in brackets in Figure 3, and conduct a learning practice entirely through what I called ‘resources’ and ‘quasi-resources’. However, by increasing convenience for the learner, digital Chinese language learning tools contribute to the possibility of disruption: they do so because they make digitally mediated Chinese language learning accessible to a broader range of learners, and therefore create conditions where digital learning conducted through a range of such tools is more likely to start competing with offline alternatives. I will now consider the formal elements that increase ‘convenience’, first by looking at the design challenges involved in the development of individual tools, before considering whether these tools lend themselves to forming a set of complementary tools.

5.2.2 Three design challenges for individual tools

5.2.2.1 Learning on the go: self-contained units

LE4, when asked about what made digital tools valuable, stated that ‘digital tools have helped make it so that any moment I want interaction with the language, I have it, it’s right there, I can just open up LingQ or open up something, The Chairman’s Bao or any other digital tool that I might be interested in, and have that kind of contact with the Chinese language.’ The result is that ‘It’s really helped to keep my Chinese alive, it’s helped make it available anytime, anywhere’.

This is a direct consequence of the mobility afforded by smartphones: they give learners control over how, when and where to conduct their learning practices.¹³⁷ In particular, they make it possible for people to learn in spaces and at times previously thought of as vacant (e.g. while waiting in a queue or travelling on public transport). The ready availability of these digital tools means that there are a range of time and cost reductions. For instance, learners save the time that they would otherwise require for travelling to and from a Chinese language class. This is not altogether new, since Teach Yourself books or cassettes in a Walkman of the 1990s were used in the same way. The difference with digital tools accessible via mobile devices is that they allow learners to carry a complete learning toolbox with them at all times. They normalize a contemporary experience of time characterized by ‘the end of the separation of working time, personal time, and family time’, where ‘the penetration of all time/spaces by wireless communication devices [...] blur[s] different practices in a simultaneous time frame through the massive habit of multi-tasking’ (Castells 2010, p.xli).

This situation, however, presents a basic design challenge. To satisfy learners’ desire to learn on the go, tools must support practices that consist of short self-contained sequences with many potential points of interruption – sequences that can be started in seconds, completed in a few minutes, and undertaken while walking or waiting for the bus.

¹³⁷ Digital tools not only affect the time and space where learning occurs, but also pacing and rhythm at the micro-level. TE2, when asked why digital learning tools were good, said: ‘[It] is the ability for the learner to be in control of the pacing. Being able to go back and reuse something, to try something again, to hear it five or six times and adapt it to their pace.’ This can have a positive effect on learner’s anxiety. Anxiety tends to be focused on oral skills, and is correlated to the learner’s capacity to control the flow and speed. It is therefore particularly acute for activities that occur ‘in real time’ (Norton 2013, p.160).

5.2.2.2 Measuring success: lenient rules

Visualizing progress stimulates the desire to learn: this is a well-known driver of motivation, and a common element of ‘gamification’ projects. This was reflected in tools belonging to the ‘drills and games’ category. Skritter presents progress in the form of bars and statistics that show a learner how much time they have spent on an activity and the number of characters they have memorized. In 2017, Duolingo launched an ‘achievement’ feature to that end: users receive badges when they complete a certain number of actions or maintain ‘streaks’ of regular practice over a period of time.¹³⁸ Chinese Skills, Hello Chinese and Duolingo all indicate progress by gradually unlocking more ‘levels’ where learners can practice their Chinese. The Chairman’s Bao and ChinesePod present dashboards that show progress in the form of the number of lessons ‘studied’, and vocabulary acquired through the built-in flashcard system.

In order to measure progress and visualize it, however, success measures need to be clearly defined. As Savignon writes in a paper that reflects on the communicative method and its adoption, ‘many a curricular innovation has been undone by failure to make corresponding changes in evaluation’ (Savignon 1991, p. 266). Developing correct evaluation measures is a condition for both gamification and pedagogical success.¹³⁹ This is particularly important when evaluation is made not by a human teacher, but by a machine. Defining appropriate evaluation measures, then, must be considered a central design challenge, connected to but distinct from that of defining the tasks a tool performs.

This is particularly important for the category that I called ‘drills and games’. The majority of tools in this category are based on a simple principle that I will call ‘input conversion’. The learner sees a certain type of ‘input’ (e.g. the pinyin), and must associate it with the matching ‘output’ (e.g. the right character): all the flashcard apps that I observed work in this way, as well as the tools that I have described as tone and pinyin drills, speaking practice apps, and arcade game style vocabulary learning. More generally, this input-output matching model is being gamified in apps such as Hello Chinese. There are, however, two distinct ways of assessing if a learner is correct: one where the learner chooses among a set of

¹³⁸ ‘Achievements’. Duolingo Wiki. Duolingo.fandom.com. <https://duolingo.fandom.com/wiki/Achievements> (accessed October 1, 2019).

¹³⁹ In an informal interview, a learner mentioned LingQ as their favourite tool because it shows progress so clearly: ‘everyone likes to see their progress’, they said.

elements (multiple-choice questions), and one when the learner must manually provide the answer, by talking, writing, or typing in pinyin or English.

In the latter case, an important element of design is whether and to what extent the machine will accept a margin of error: for instance, slight variations from the standard in writing or speaking, correct pinyin input with the wrong tone or without a tone, alternative translations for a word or sentence, or even common typos. For a tool like Skritter, where learners draw characters on a touchpad or touchscreen, this is an important part of the value proposition. The software needs to recognize the patterns drawn as corresponding to a standard Chinese written character, and designers must decide what level of variation from the norm – whether in terms of the position of traits or stroke order – will lead to an answer being accepted as ‘correct’ or ‘incorrect’. This, in fact, is acknowledged as the main differentiator between Skritter, with its handwriting input recognition interface developed specifically for learners, and generic flashcard tools like Anki, which relies on generic handwriting recognition plugins. An important design challenge here is to properly set the level of accuracy that will determine whether an answer is considered ‘right’ or ‘wrong’. In the context of World of Warcraft, Bonnie Nardi identifies lenient rules as a crucial element for enjoyment: gamers will value environments where they are not punished harshly for small mistakes (Nardi 2010, p. 61). When users get rewarded for getting a correct ‘streak’, this is particularly important, as punishment by the machine for an accidental typo may lead to frustration and affect motivation.

This feature is important not only for drawing characters or speaking, but also when it comes to chatbots, as DE15 described, reflecting on their experience of designing a tool for use in a classroom context that involved learners at different levels. Non-background learners have ‘a definable set of knowledge with clear boundaries’, said DE15, and chatbots can be programmed in accordance. However, non-background learners ‘come in with an established vocabulary, it might be another dialect, their ability to cross over is quite strong. A lot of them have existing oral communication habits, certain ways of saying things that they have developed in their home environment and work for them. [...] They’d ask a legitimate question that was way too advanced, and the [chatbots] would drop the bundle – for [...] students, that is negative.’ Developments in artificial intelligence have significant impact in

that regard, in that more advanced algorithms can use data to a) increase the range of decisions considered correct and b) identify the right balance of leniency.¹⁴⁰

5.2.2.3 Customizing the sequence: supporting non-linear learning

Pre-digital learning practices, as conducted in classrooms, follow a controlled sequence taking the learner through a range of codified steps towards higher and higher levels of competence and autonomy.¹⁴¹ However, while a teacher knows and controls the progress of their students through regular feedback loops, designers engage a diverse and anonymous set of learners, who may jump into the proposed sequence at different points, and come with different types of pre-existing knowledge – different levels of vocabulary and grammar, but also different cultural assumptions or understanding of communicative pragmatics. To satisfy those learners, designers need to conceive of a tool that will allow them to start at any point in a language learning sequence, jump ahead or leave a certain amount of time between learning sessions so that each unit within the sequence should be designed as pedagogically self-contained. This is a third key design challenge.

To design a tool that enables the learner to choose multiple paths is a way to reduce the risk of boredom. Reflecting on a principle driving the design of a tool they contributed to, DE6 stated ‘the spirit of the product [...] is, learning Chinese is fun, learn what you want to learn, and to me that meant you needed to be able to pick and choose. [...] You should be able to choose and follow different pathways but still learn what you need to learn.’ This is echoed by LE6 stating ‘I personally really hate going on a linear path, because, it’s just boring.’ Boredom is dangerous because as LE6 says ‘you’ll lose engagement with the user really quickly, because, it only takes like a minute, less than a minute before someone gets bored, and, you know, never touches the app again.’ The capacity to support non-linear learning was why LE6 expressed a liking for Quizlet, HelloTalk and Lang8, ‘because it’s non-linear, it just fits around you.’

This adaptation to the level of the learner can be done in three main ways. One is allowing the learner to customize testing modalities, as Skritter does (e.g. allowing the

¹⁴⁰ This is in fact how Duolingo operates, using aggregated user data to better determine correct answers to questions.

¹⁴¹ The question of sequencing has been the object of study in the field of SLA, particularly in relation to the question of self-regulated learning (Lai & Gu 2011).

learner to be tested only on meaning or pinyin). The second is to sort the content by level: for instance, ChinesePod classifies lessons by level. Each podcast forms an autonomous unit, allowing learners to choose different itineraries – although, for learners looking for more guidance, selected dialogues are presented as part of more structured ‘courses’. When sorting content by level in that manner, the HSK is adopted as a common benchmark by tools such as The Chairman’s Bao. Finally, some tools allow the learner to test their language level. Clavis Sinica offers a tool that allows a learner to evaluate how many characters they know by extrapolating from a short test based on a random sample. Duolingo offers users the capacity to ‘test out’: if a learner is able to answer a set of questions adequately, they can skip early levels and start engaging directly with more complex material. The most flexible form of adaptation, of course, is offered by Italki, where learners have customized lessons with private tutors.

Although individual tools support the capacity to learn in a non-linear sequence while ensuring that the difficulty matches the learner’s level, the capacity to conduct such non-linear yet consistent learning practices across tools remains limited. At the Morrison Summit in August 2015, which gathered young Australian leaders in China engagement at the ANU, I asked a Chinese learner – recently graduated from university – to describe a tool they would need and which does not yet exist. They replied: ‘I would like something where I can measure my progress on all the various learning apps that I use, in one spot’. LE1 made a related observation: ‘this whole idea of trying to trap somebody in a single tool, that does annoy me. If I use Skritter to practice handwriting, and then FluentU to learn new vocabulary from movies, I don’t want two discrete sets. I am one person, I don’t want to learn twice in different silos. [...] To the point where I actually believe what’s needed in the ecosystem is a generic exchange format for what level of Chinese or writing you have.’ The expectation behind both statements is that digital Chinese learning should evolve towards a unified experience, where data is transferred smoothly from one tool to another, supporting what I propose to call a transmedia learning experience. LE1 captured this absence (and the associated frustration) succinctly, stating: ‘If you got tools to work together and interact – dictionary, flashcards, chat software – and all automatically worked together, that’s the killer tool [...]. That’s categorically not out there.’

5.3 Towards a learning ecosystem?

5.3.1 A chaotic environment: what makes a tool valuable in context?

Commenting on the large number of tools in existence, DE1 stated: ‘[I] believe that there is an ecosystem,’ by which they meant that ‘you should use everything that works for you, and that means ideally if you have a live human being, yes, you should have a flashcard app, you should have a great dictionary app, you should get input from audio, when you’re travelling, on the road, these are all things [I] think you should use.’ This quote indicates DE1’s perception of maximal complementarity between different types of tools, with users being able to choose how to use them, as an achievable ideal situation. By contrast, LE1 stated that ‘there’s no set of tools that work well together as a cohesive ecosystem. [...] There is tool A, tool V, and they don’t really work well together. [...] It’s up to the learner to establish. In an inefficient manner, [the learner] becomes the system.’ Those opposite comments from a designer (DE1) and a learner (LE1) indicate nonetheless that both share the view that the value of digital learning tools is greatly enhanced if they can be used in combination with *great ease*. For this to happen, the tools must have the cohesiveness of an ‘ecosystem’.

This longed-for cohesiveness depends on two things: the presence of formal elements allowing, for instance, the transfer of vocabulary from one tool’s internal flashcard system to another, but also a shared understanding among the people using and making these tools about how different tools can be used together to reach certain learning goals. This cohesiveness, therefore, cannot be directly inferred from observation of formal characteristics, but rather, by joint observation of the tools themselves, the practices of learners, and the explanations given by individuals making and using these tools. Understanding this cohesiveness is essential to improve both learners’ and teachers’ capacity to make the most efficient use of the tools that are currently in existence. It is also essential to consider the disruptive possibility of digital Chinese language learning tools: can these tools – individually and used in combination as a ‘set’ of sorts – offer a learning experience that at least matches or even exceeds that of offline alternatives?

To answer this question, let us return to the typology discussed in the previous section. Typically, tools within each type are functionally equivalent (e.g. Hello Chinese and Chinese Skills are both gamified apps for beginners with a highly similar interface). In some cases, that equivalence is quite uncontroversial (for instance, the five pinyin charts I listed in

Appendix One are clearly interchangeable). In others, it may be possible to discuss the comparative value of different tools belonging to the same type on the basis of higher production quality, lower cost, or better design. For instance, Skritter may be deemed the best flashcard tool because it is best at assessing correct character drawing on a touchscreen with an optimal level of leniency. In other cases, it would seem that many users of these tools value functional variety, even among tools that are seemingly equivalent, simply because 'kids like new things' (as TE3 stated, reflecting on their use of learning tools in a classroom context) and so might adult learners. This is likely to be the case for different types of drills and games, as well as for curated content and multimedia courses. When it comes to different types of tools within the same macro-category, some are complementary (for instance, vocabulary lists, pinyin charts and grammar points are clearly complementary) while others seem to be functionally equivalent (for instance, audio vs video courses). Across macro-categories, tools are generally complementary (for instance, it makes sense to use both a multimedia course and one or more 'drills and games' for vocabulary memorization). However, it remains unclear overall how learners should best balance different practices conducted on different tools, if learners should stick to one tool per type, or in what order and at what pace they should use different tools, depending on their learning goals.

Finding this balance is essential for learners, who must choose from many different available tools in the limited time they have for studying Chinese. This situation is analogous to Zygmunt Bauman's evocative description of the contemporary world he observed in 2000, as one that increasingly appears as 'an infinite collection of possibilities: a container filled to the brim with a countless multitude of opportunities yet to be chased or already missed' (Bauman 2000, p.61). With an ever-multiplying number of possibilities, Bauman noted, the question of 'how to reach a certain goal' becomes superseded by the more elusive question of 'what should the goal be' (ibid.).

Reflecting on his experience of using digital Chinese language learning tools, DE3 said 'people need structure and guidance, and there is far too little of that. This is why courses are popular, and why courses are good. There are so many decisions to make on your own if you don't [have the necessary guidance].' This echoes the statement I made earlier in this section: that the problem of cohesiveness should be understood not as primarily related to technology (or formal elements of the tools themselves), but to pedagogy and common knowledge (or the practices conducted through the tools and the discourses that accompany them) – in the same manner that 'media convergence', as theorized by Jenkins and as I

discussed in Chapter Two, is a matter of experience rather than technology. DE7 indicated that it would be possible to break down the components of language learning and use technology to bring some of the best practice to the students at scale. 'For that to be adopted, students need to change expectations and behaviours: that's the challenge going forward.' The pathway DE7 proposed was to start with young people as early adopters of digital tools, and then when positive data becomes available and the number of users increases, institutions and other academics would happily come on board. This, however, takes time. 'It's a decade long process', said DE7.

It is important, however, to explore how this process might unfold. As I discussed in Chapter One, the value of a tool is connected to its function, which in turn is defined by its affordances – and affordances are only present when they can be perceived. For tools to be valuable, learners must be able to perceive the value of their affordances, that is, to relate their formal features to a practice that, in turn, will yield a desirable outcome. In an occasional paper sponsored by the McArthur Foundation, a team of researchers led by Henry Jenkins explored 'media education for the 21st century'. The paper encourages changes in educational cultures and processes, with the goal that young people should be socialized into 'emerging ethical standards' that would 'shape their practices as media makers and participants in online communities' (Jenkins et al. 2005, p.4). The paper describes access to digital best practice as a form of 'hidden curriculum' that will shape which youth will succeed or be left behind, and proposes to shift conversations on the digital divide away from technology per se and towards experience and participation in the use of technology instead.

Using Bourdieu's theory as a lens, we may say that Jenkins' advocacy of digital best practice as a 'hidden curriculum' is aimed at developing a habitus in which learners would become increasingly adept at distinguishing between digital tools and knowing how to use an appropriate mix of tools effectively, to facilitate their pursuit of knowledge. This habitus, in turn, is field dependent, and closely tied to the intended purpose of a learning practice: whether it is about getting a certain certificate with the least possible effort, building a digital portfolio that will open desirable career opportunities, or developing a certain form of embodied competence – which may be the capacity to interact online in hybrid Chinese through a combination of characters and emoticons, or the capacity to read and write standard

Chinese.¹⁴² The value of a tool and the practice(s) it supports, therefore, must be understood as highly field and context dependent.¹⁴³

Changes in technolinguistic systems create a high level of uncertainty when it comes to defining desirable goals. Building on the analysis I proposed in Chapter Four, I would like to clarify a distinction between two ways of defining the value of a tool. The first has to do with effectiveness: to what extent does a certain tool, by virtue of certain formal characteristics, support a practice that leads to an anticipated outcome? This could be the object of comparative studies conducted, for instance, by second language acquisition (SLA) experts, using the typology of tools and the design elements articulated earlier as a starting point: for instance, SLA researchers could test the vocabulary retention outcomes of different learning practices conducted with different sets of tools. The second would distinguish among tools that support different learning goals, on the understanding that these goals can vary greatly. Studying this would call for a very different type of approach. One would need to ascertain what goals are valued by what learners and for what reasons, for instance through surveys and focus groups among existing or prospective learners. Keeping this distinction in mind is critical, as my fieldwork showed that when a learner, a teacher or a designer stated that a tool was ‘not good’, it was not altogether clear whether they meant that the tool was not conducive to its intended goal or that the tool was designed for a goal perceived to be of little value.¹⁴⁴

¹⁴² In a similar line of thought, Gee (2004) describes the capacity of elite teens to gather the right ‘portfolio’ of experiences as a way to get a head start, in a strategy that could be framed as accumulation of cultural capital.

¹⁴³ On this matter, I will specifically consider institutions of learning and enrolled students in Part Three.

¹⁴⁴ This line of reasoning also applies to the question of convenience discussed earlier. I previously described the practice of using The Chairman’s Bao as functionally equivalent to selecting a text on the Chinese Internet and using Pleco or Wenlin for reading support. The validity of this statement depends on the way that the intended goal of the practice is understood. Assuming that the learning goal is limited to the development of a relatively well defined linguistic competence (e.g. acquiring new vocabulary or increasing reading speed), although we may speak of functional equivalence, it is not altogether certain whether convenient access to a curated selection of text and software scaffolding will improve outcomes. Studies from SLA experts would be needed to ascertain whether, for instance, the extra effort to draw characters in the Pleco dictionary is more conducive to memorization than accessing texts on The Chairman’s Bao. Convenience may thus be a trade-off for long-term retention, or other areas of linguistic competence development. At a second level, positing functional equivalence depends on an implicit understanding that the goal of the practice is, indeed, increased linguistic competence. However, other goals may be desirable: for instance, developing a meta-learning

When it comes to measuring ‘what works’, that is, what makes a given language learning tool efficacious, the pace of innovation tends to be too fast to warrant proper research; but even when studies are available, they do not seem to be widely read, let alone systematically used to improve and assess tools in existence.¹⁴⁵ Rather, my fieldwork showed that learners, teachers and designers hold different sets of beliefs which do not seem to derive from careful and systematic study, but rather ‘ambient knowledge’ or ad hoc readings. The following statements from my interviewees illustrate this point. LE6 explained they rejected linear learning models because ‘that’s not how you learn as a child, speaking, you just, all these random bits just came in your head and, you piece it all together sort of intuitively, but as you grow into an adult, you’re encouraged to learn in this linear way, so this + this equals a correct sentence, you know, especially grammar, and it’s just such a boring way to learn.’ DE9 stated that ‘It’s just my belief that when you’re immersed you’re going to learn faster.’ DE14, referring to a certain digital project, described it as valuable ‘to create the muscle memory that apparently is very useful for learning mechanical actions like that.’ TE2 referred to Krashen’s theory of ‘comprehensible input’, suggesting that you can build vocabulary by

competence (learning how to learn), or learning how to use technology in multilingual contexts, or even the development of different literacies, including emotional resilience in the face of ill-designed software. In that respect, convenience may support the development of good learning habits, or it may impair learners’ ability to develop bricolage skills. Understanding this would entail a more open-ended assessment of the affordances of a given tool or range of tools, and appreciation of all learning deriving from any practice conducted with the tool(s), than merely appreciating the impact of a tool on communicative competence. I return to this question when reflecting on the possibility to provide a cost-benefit assessment of digital Chinese language learning tools in Chapter Seven.

¹⁴⁵ For instance, a review of Skritter on the website ‘Chineseedge.com’, which claims to document ‘the best resources for Chinese language learners’, states: ‘If you are looking for a way to revise Chinese vocabulary so that you can remember how to read and write the characters and words, I haven’t found a solution that is as good as Skritter’ (Angie. ‘Skritter.com: A Full Review’. Chineseedge.com. <https://chineseedge.com/skritter-review/> (accessed July 6, 2020)). A 2013 conference paper from Felicia Zhang on ‘An evaluation of the effectiveness of a Chinese character learning software on Chinese character retention for English speaking background learners of Chinese’, which looks at the effect of Skritter on a small classroom cohort of Chinese learners, concludes more hesitantly that ‘if students are motivated, they will find Skritter useful in their learning. Skritter itself is not innately motivating’ (Zhang 2013, p.13).

reading things that are only just beyond your level.¹⁴⁶ By contrast, DE11 was inspired by Berry Farber's *How to learn any language* (Farber 2001). The method Farber proposed for systematic vocabulary acquisition is to pick up a text in the target language, highlight all words you do not know, look them up in a dictionary, write the meaning, make flashcards, and then progress through other texts, gradually highlighting fewer words as you progress. DE 11 attributed their success in learning Chinese to using this method and stated that it influenced the design of their tool.

This lack of agreement regarding the best way to measure 'what works' was most manifest in relation to one tool, about which I encountered the most polarized opinions. That tool is Chineasy, which consists of a set of cards (later developed as an app) associating images with characters (for instance, 日, the character for 'sun', is presented as a window with a yellow sun in the right hand corner, or 木, the character for 'tree', with a green semi-circular shape representing the leaves of a tree, and a slightly elongated vertical stem representing the trunk). Those images are intended to help users understand the meaning of characters and memorize them. Chineasy became widely popular after its founder, Taiwanese entrepreneur Shaolan Hsueh, introduced the model in a 2013 Ted Talk.

Three of the designers I interviewed explicitly mentioned Chineasy as ineffective, with some using unequivocally negative language. The apparent reason for their criticism was the commercial success of the method. In an article from *Tech in Asia*, published on May 20, 2015 during the Kickstarter campaign for a new etymological dictionary by 'Outlier Linguistics' (a project which attracted interest from other designers at the time), Josh Horwitz, author of the article, said about this proposed dictionary. 'How can they prove their legitimacy when so much garbage already floods the market?' – with a hyperlink on 'so much garbage' redirecting to the webpage for 'Chineasy'.¹⁴⁷

By contrast, one of the teachers I interviewed mentioned Chineasy as a useful tool for supporting character memorization as part of classroom practice, and incidental conversations

¹⁴⁶ Reflecting on their discovery of this theory, and its successful application to their own learning practice, TE2 indicated a shift of mindset, from the idea that something needs to be challenging and hard to learn towards valuing easier material for extensive listening – and used this to justify their interest in Chinesepod.

¹⁴⁷ Horwitz, Josh. 'Outlier Linguistics is teaching what most Chinese courses don't – how characters work'. TechnAsia.com. May 20, 2015. <https://www.techinasia.com/outlier-linguistics-is-teaching-what-most-chinese-courses-dont-how-characters-work> (accessed November 1, 2019).

with learners over the course of my fieldwork indicated a mostly positive reception of Chineasy. Shaolan Hsueh's Ted Talk presenting the concept for Chineasy had attracted over 4.5 million views by January 2020, which is a clear sign that this method of learning had attracted widespread interest.¹⁴⁸

5.3.2 Questions of style: from UX to narratives

In Chapter One, I identified three central elements to the value proposition of a tool: cost, production quality and design (as adaptation of a tool's form to its intended function). Assessing the first two is relatively straightforward, while the typology outlined earlier in this chapter, together with the design challenges detailed in the previous section, offers a potential point of departure for measuring design quality. Another element that seems to play a role in assessing the value of a tool is best described as 'style'. By style, I mean the 'look and feel' of a tool, its aesthetic quality. Style thus defined exists somewhere between design and production quality, and manifests in two primary areas: the tool's user interface and what could be called its branding.

The quality of a digital tool's user interface is now recognized as crucial for user experience, or UX. The choice of colour, font, layout and digital architecture all help to determine user interface (UI) and UX quality. 'If it's got a bad interface, usually, I just uninstall it immediately,' said LE2 when asked what elements of a learning tool irritated them. When asked to expand on this statement, they commented 'bad interface, oh God, it's just, usually everything is way too big. And there are too many colours'. LE2 also mentioned nestled side-bars and other 'unnecessary' features as adding to the sense of clutter. The dynamic digital environment in which tools are developed has an impact on how people assess the UX quality of tools. DE2, commenting on their own work as a designer in that regard, described it as being about 'how people visually understand what they see.' A good interface, in their analysis, is determined by the way people use digital services. 'On modern

¹⁴⁸ I propose that this reflects designers perceiving Chineasy as a threat. DE13 explained Chineasy's success by stating that 'a lot more people are interested in the idea of learning a new language than are interested in putting in the years of work it takes to actually do it.' Based on conversations with other designers who criticized Chineasy, I propose that they share a perception that Chineasy makes a false promise to learners, and fear that disenchantment will affect not only Chineasy itself, but also other tools. Such a risk is particularly important in a context of normative chaos, where establishing a joint discourse on what works and what is desirable is precisely one of the key elements required to increase the value of digital Chinese learning tools as a whole. I return to this point in Chapter Seven and Chapter Eight.

websites, people don't really read, they don't expect to, you know, have instructions and having to – we don't have the luxury to be able to explain to people what you're supposed to do [...], but you need to make them get it right away, or engage them through very simple steps to achieve something.' This relates to the first design challenge outlined earlier: tools need to a) define bite-sized tasks suitable for learning on the go, but also b) engage learners in those tasks through a simple interface.

As both comments indicate, however, 'style' here is about more than just simplicity: it is rather about a user experiencing the tool as somehow 'natural' and 'beautiful'. To that extent, style is appreciated on the basis of a judgement of taste, distinct from any appreciation of the tool's form as related to its intended function. To give another example, in a review of the latest version of Wenlin on his blog Sinosplice, John Pasden stated: 'despite all its usefulness, the software still looks and feels like Windows 95 (believe it or not, that particular OS is already 16 years old)'.¹⁴⁹ Adding to the confusion I described earlier, it therefore seems that tools will be appreciated at least in part in relation to their 'freshness' or alignment with prevalent digital trends.¹⁵⁰

Another element of style is what I call the branding of a tool, which is manifested in the choice of imagery and language intended to attract the learner and create an emotional attachment. Different tools choose different strategies in that regard.

A striking example is offered by a digital school based in Hong Kong called 'Sexy Mandarin'. The learning videos they produce, as well as their landing page, feature 'sexy' female teachers in lace underwear and heavy make-up. Pronunciation videos show close-ups on lips covered in red lipstick, sensually mouthing Chinese sounds.

By contrast, a number of tools deliberately adopt 'cuteness' as their brand. In a notice posted on the outsourcing website '99design' to commission a logo for Skritter, the founders explained the design brief as follows: 'We wanted the name Skritter to reflect our product's writing focus but leave us room to have a furry/fuzzy mascot. As such, we chose to combine the words "Sanskrit" (ancient Asian script) with the word "critter". If you look at our website,

¹⁴⁹ Pasden, John. 'Wenlin 4.0 Review'. Sinosplice.com. February 16, 2011.

<https://www.sinosplice.com/life/archives/2011/02/16/wenlin-4-0-review> (accessed July 6, 2020).

¹⁵⁰ I will return to this point in Chapter Six, when considering the need for designers to access financial resources – or otherwise have the time and skills – in order to maintain a tool.

the red blob sitting on our company name is our mascot, a Skritter!’¹⁵¹ When providing further details for the design brief, they explained their needs in relation to the expected audience of their tool. In striking contrast with sexy Mandarin, their design brief included the following statement: ‘We would like the logo to be inoffensive and non-suggestive because we plan to expand our market focus in the coming months to include home school families (predominantly a Christian demographic), college instructors (who like safe/politically correct purchases), and international students.’ The winning design is presented in Figure 4 below.



Figure 4: Skritter logo: winning brief

Branding manifests in the logo and tool name, but can also extend to the narrative proposed by the tool, as it relates to the identity of the expected learner. One of the tools I observed, *Tea Story*, stood out as the only one foregrounding a learner of heritage background: it is an exploration game centred around a second-generation Taiwanese-American teenager who sells bubble tea in a Chinatown setting on behalf of his father.

Other tools offer learners the capacity to project themselves as action heroes – for instance, an arcade game called Alpha Team, where the learner can impersonate a young male character in traditional costumer and ‘use their Mandarin knowledge to save China’.

¹⁵¹ 99designs is a website where individuals or companies can commission the development of a logo or website to a pool of freelance designers. The client posts a brief, and selects among a set of proposals. I will return to the role of this and other outsourcing websites in Chapter Six. The source of quotes in this paragraph is ‘Skritter Logo’. 99designs.com.au. <https://99designs.com.au/logo-design/contests/skritter-logo-learn-write-chinese-online-25672> (accessed November 1, 2019). I was unable to secure copyright authorization for rejected design briefs, but those can be observed at the address above: comparison of the winning proposal with two rejected briefs indicates a preference for the ‘cuter’ option.

Those contrasting pictures (and associated narratives) indicate different attempts to invest digital Chinese learning with meaning, and more generally increase emotional investment from the learner, whether through an eroticized orientalist fantasy, a return to childhood, echoes of their own experience in a migrant family, or fulfilling a hero fantasy.

The ‘narrative’ proposed by tools can even be an opportunity to increase learners’ investment through an element of gamification known as ‘epic calling’. An earlier version of the ChinesePod landing page, which I observed in 2016, offers an example of this. The screen presents a short video, with a still image showing a quirky young woman looking at the screen with a defiant look, holding a panda soft-toy in her arms. Above the video, large character text says ‘You are about to embark on an awesome Mandarin-learning journey’, while below the picture, the screen shows two large sharing buttons, for Facebook and Scritter, with large character text that says: ‘learning Mandarin is something worth bragging about. Share it with your friends’. The enthusiastic language (with exclamation marks in the opening sentence), the comic invitation to ‘brag’, the expression ‘embark on an awesome Mandarin-learning journey’ creating a sense of adventure, and the quirky picture of a woman holding a panda, all contribute to creating a sense of fun and momentous occasion.

The style of a tool thus cannot be properly analyzed as a formal element that ties to a function, yet it plays a role in engaging the learner emotionally. More importantly, consideration of style shows how tools reflect changing fashions and their capacity to engage learners in different types of imaginary experiences is indicative of the tools’ value to their users. In this regard, a stylish tool can become a significant part of a learner’s digital experience and contribute to their online identity.

5.3.3 Language learning advice: setting norms in the digital space

Tools do not exist in a void, but among a rich ‘digital tissue’ of reviews, blogs, and social media channels, collectively curated by learners, teachers and designers. This ‘tissue’ plays a role in defining and structuring digital Chinese language learning as a possible common field of operations. It is also how information about the relative value of different tools and the practices they support get circulated.¹⁵²

¹⁵² In addition, value judgements are impacted by discourses and recommendations made offline, either by peers through word of mouth, or by teachers in a course. I will return to the relationship between tools and institutions of learning in Chapter Six and Chapter Seven.

From first-order observation, considering authorship and mode of circulation, I was able to distinguish five types of communication in this ‘digital tissue’ contributing to norm-setting:

- presentations of digital tools (e.g. as video or text), developed by designers to train users in using their tools, explain their benefits, or even briefly introduce them e.g. on the Appstore
- user reviews of specific tools, on the Appstore, forums, or independent blogs (some of those being presented on a tool’s landing page in the form of ‘user testimonials’)
- discussions among learners and teachers about digital Chinese language learning tools on social media and forums, both as organized threads or circulating in a looser manner (e.g. when the user of a tool posts something about it on their personal Facebook page, or asks for advice from online friends in choosing a tool)
- language learning advice, presented particularly on blogs and associated social media channels (in text or video format)¹⁵³
- discourses on language learning, digital learning and/or the Chinese language, circulating online as media articles (e.g. on Tech in Asia), videos (e.g. Ted Talks), books or academic papers.

The first item on the list is produced by designers themselves and may be considered an ‘extension’ of learning tools. As discussed in Chapter One, tools exist as ‘brands’ with multiple points of digital presence: in the form of accounts on different social media platforms (particularly Twitter and Facebook), blogs created to introduce new features or to share the story behind a tool’s creation, and newsletters which are directly sent to subscribers’ email inboxes.

These points of presence evidently increase the reach of a tool’s publicity, ensuring that it becomes more widely known. In the digital knowledge paradigm, where curation has been replaced by searching, the value of a tool has to do with how easily it can be found.¹⁵⁴

¹⁵³ Learning advice may come from other learners, designers, teachers sharing advice online or ‘online influencers’, raising questions as to the pedagogical validity of this advice. I explore this in more detail in the rest of this section.

¹⁵⁴ Ethan Zuckerman talks about the shift that happened in the 1990s from news being dominated by curation to it being dominated by search: ‘People quickly grew accustomed to the idea that they could use a search engine to discover information on any topic of interest. Exploring the Internet moved from directionless ‘surfing’ to

Beyond social media networks, the success of any product (including digital language learning tools) depends on it having a memorable name, as well as on search engine optimization, and good rankings and reviews.¹⁵⁵ ‘People would find us organically,’ said DE9 to explain the success of their tool, ‘we ranked pretty highly for certain words – learn Mandarin, learn Chinese. It’s very important in the Appstore to appear as the top results.’ The distinction between ‘marketing’ and ‘learning’ is thus relatively blurred in the case of digital learning tools. Indeed, the purpose of those various points of digital presence seems to combine promotion (for instance, by announcing new features or special offers, with the goal of increasing sales), supporting users by sharing learning tips or learning resources, creating a space for learner interaction in the comment section, or creating opportunities to connect and exchange with other designers.

Language learning advice is produced and circulated by the designers of learning tools and can also be considered as a type of language learning tool in its own right. Of the 35 types of tools I listed in the first section of this chapter, Hacking Chinese is the most famous example of a tool that includes language learning advice as one of its functions. Hacking Chinese offers tips for learning Chinese in line with the ‘hacker’ philosophy: trialling and using a range of techniques to support independent language learning. Each post focuses on one specific learning challenge, for instance ‘make sure listening practice is not a practical problem’ or ‘how to find more time to practice listening’.¹⁵⁶ Posts combine very practical advice (e.g. buying new cheap earphones on eBay to ensure their absence is not an obstacle),

goal-oriented searching. Being able to find exactly what you wanted to know invites you to question authority figures – editors, educators, doctors – who argue there are topics you need to know beyond those you want to explore. Companies like Google realized that a conceptual shift was underway and built a business around the idea that you knew what you wanted to know better than any expert ever could.’ (Zuckerman 2013, p.94).

¹⁵⁵ TE4 described a tool they found valuable but didn’t know how to access. LE2 referred to grammar compendia websites used during their studies, but because they did not save the hyperlinks, they did not know how to find them in subsequent searches. I also noted, in my review of the extended canon, two distinct websites offering 1-on-1 Skype tutoring called ‘iChineselearning’ and ‘eChineselearning’: those demonstrate that a memorable name does not need to be original.

¹⁵⁶ Linge, Olle. ‘Make sure listening isn’t a practical problem’. Hackingchinese.com. June 22, 2011. <https://www.hackingchinese.com/make-sure-that-listening-is-not-a-practical-problem/> (accessed November 1, 2019); Linge, Olle. ‘How to find more time to practice Chinese listening. Hackingchinese.com. August 28, 2011. <https://www.hackingchinese.com/how-to-find-more-time-to-practise-listening/> (accessed November 1, 2019).

and reflections on the respective value of variously focused types of listening activities. The Hacking Chinese website offers a broad selection of articles, searchable by level (beginner, intermediate, advanced) and competency (speaking, writing, listening, reading). Hacking Chinese's founder Olle Linge also edited a selection of posts and released them as an e-book in 2015. Moreover, he circulates new and old posts through social media – Twitter and Facebook.

Beyond the social media channels of tools themselves and language learning blogs, an important role is played by digital influencers. 'We do reach out to a lot of influencers,' explained DE1 'whether they're bloggers or video people [...] they have great audience members who we want to reach out to.'¹⁵⁷ Engagement with influencers aligns with Jenkins' statement that 'the best way to reach anyone in a community is to find the few prominent people who influence most of the members' (Jenkins, Ford & Green 2013, p.80). Indeed, the very idea of digital Chinese language learning cannot take root without the involvement of tool producers and users in an evolving participatory culture.

One such influencer, quoted by three of my interviewees, was Benny the Irish polyglot, known for a project he created called 'Fluent in Three Months', where he publicly engages in the challenge of learning a new language autonomously, and shares his method and progress through Facebook, YouTube, and public conferences. Reflecting on the role played by Benny, DE3 expressed concern at the potential danger of viewers forming unrealistic expectations about language learning. However, they praised Benny for playing a positive role in building people's appetite for autonomous language learning by both showing it as achievable and offering aspiring learners a method and a role model to emulate.¹⁵⁸

¹⁵⁷ The concept of influencer is articulated by Malcolm Gladwell in *The Tipping Point* (Gladwell 2000) and has gained great currency in discussions about marketing and public relations via social media. The concept is derived from observations of the 1967 'small-world experiment' conducted by social psychologist Stanley Milgram, which proposed students in Nebraska to find ways of circulating a letter to a broker in Boston, using only known contacts, and showed that on average, only six connections were needed. Those studies were reproduced and informed various social experiments and games. Observing the structure of networks through which information or messages circulate, Gladwell proposes that certain individuals play a disproportionate role connecting the network, and calls them 'influencers'.

¹⁵⁸ In this regard, Benny may be said to play a structuring role in line with the way that Jose Van Dijk comments on the role of influencers, saying 'online sociality needs influencers as much as followers, personalities as much

The role played by influencers invites reflection on the type of cultural capital that is put into play to influence collective value judgements on digital Chinese learning tools. Online celebrity, acquired through a combination of performative language learning, relatable videos and strategic meme sharing, might come to determine a tool designer's or user's capacity to influence Chinese language learning more than a teaching credential, in a pattern corresponding to what Bourdieu calls 'heteronomy', whereby the structure of one field impacts the structures of other fields. The role played by influencers, bloggers and social media may be seen as a shift in the source of authority corresponding to Bauman's analysis that 'in the world of uncertain and chronically underdetermined ends it is the number of the followers that makes – that is – the authority' (Bauman 2000, p.67). However, this reading is itself tied to an assumption that the goal of learning tools should be appreciated in line with linguistic success measures stemming from a pre-digital era, for instance as an individual's embodied capacity to conduct interactions in standard Chinese offline. If, however, the goal was to make one's communications intelligible in Chinese, as part of everyday personal or commercial activity in multilingual digital communities, then the ready availability of free digital translation tools and professional translators who can be hired online has already redefined linguistic success.

5.3.4 Peer-learning: building a community of practice

The existence of a 'digital tissue' surrounding learning tools indicates another important element in the practices they support. Those tools support individual learning practices, but also collective practices, which I will refer to here as peer-learning. Peer learning is a pedagogical practice where skills or knowledge are developed through interactions among learners, rather than between a teacher and students. In the context of language learning, two types of 'peer' relationships need to be distinguished: between two learners of the same target language exchanging tips or emulating each other, and between speakers of different languages who use language exchange to improve their spoken skills in a foreign language.

Interaction between learners can take the form of friendly competition. Tools can directly enable this interaction through leader boards allowing learners to compare their achievements: Duolingo, for instance, offers such a feature. It can also be organized through

as admirers, creators as much as consumers, professionals as much as amateurs, editors as much as readers' (Van Dijk 2013, p.159).

external channels. Hacking Chinese, for instance, runs monthly challenges where a group of learners publicly commit to a certain writing, reading, or character learning target (the numbers of people joining can vary from 20 to 100 or more). Challenges that focus on character acquisition are organized in partnership with Skritter but reading or listening challenges can make use of other tools, for instance those I labelled as ‘curated content’ or even ‘multimedia courses’. As for collaborative interactions, McGonigal describes how helping others go through puzzles is a way to achieve a state described as ‘naches’, or the satisfaction of seeing someone whom you have mentored overcome a difficult obstacle (McGonigal 2011, pp.86-87). This often happens when more advanced learners share their knowledge with learners whose language skills are more limited on Chinese Forums or in social media conversations.¹⁵⁹

When it comes to language exchange practices, several tools act as ‘engagement platforms’ – for instance HelloTalk, Lang-8 and Italki. One benefit of peer-learning here is perceived authenticity, as observed by two of the learners I interviewed. ‘it’s not like when you’re learning from a teacher,’ says LE3 about learning with peers online, ‘you’re learning from his or her experience. It’s not a one-sided exploration of Chinese. You get a wide... it’s like the knowledge base from every Chinese person in the world.’ This is directly echoed by LE6 stating ‘With HelloTalk, you know, [...] it’s just real people chatting with each other.’ In a peer-learning environment, authenticity trumps expertise, as peers become a proxy for direct engagement with the Chinese world, as opposed to the more artificial environment of a classroom.

Professional educators I spoke with, however, raised doubts about those models. Some of their concerns pertain to linguistic accuracy. At a 2016 conference organized by LCNAU, a Chinese teacher shared their experience of directing students to Lang-8 for practice: ‘it’s just random native speakers replying. Often, they don’t really know what they’re talking about, and what they’re saying is just not right’ – a statement that exactly reverses the perspective presented by LE6 earlier. Those conflicting perspectives may be best understood in relation to different implicit goals: if the intended outcome is to increase a

¹⁵⁹ The same mechanisms are put to use in classrooms. TE3, describing an activity based on Quizlet, stated that ‘either you can become a champion, get a certificate, or you get points, you become the winning team – so the motivation is to win.’ But also ‘the good kids are telling the weak kids which answer is correct, the weak kids see it again, and this is a reinforcement for them.’

learner's communicative competence in an interlanguage, then expressions that are 'just not right' (by institutional standards) but coherent and engaging (by everyday standards) may be perfectly adequate.

A different challenge was raised by two of the designers I interviewed, namely the lack of pedagogical ability. 'The teacher is an experience that is guaranteed' explains DE1, 'they have a strong incentive to make sure it's a great experience, and that's their job, they've been trained to do this.' Language partners, by contrast, do not know how to properly build language scaffolding. 'Most people don't have a clue how to do this, and most language exchanges [...] have fallen apart after two or three times, right. [...] I can tell you that five hours with a teacher is gonna be radically different from five hours of kind of just random talking about whatever is on your mind.' Peer learning may provide a more authentic experience at a lower cost, but when it comes to learning outcomes, the return on time invested is less predictable, and on average likely to be lower than with a teacher. This makes peer-learning models particularly challenging for teachers looking to introduce them as part of learning institutions, as was reported by DE15.

An alternative which preserves human connection but removes the uncertainties of peer-learning is to use digital technology as a medium that reduces the cost and increases the flexibility of teaching or tutoring arrangements. This is the model behind numerous digital language schools offering access to online classrooms. This is also the model proposed by Italki, which offers a double-sided marketplace where tutors and learners come together. On Italki, the learner is connected with a tutor who designs and facilitates learning activity for them. Direct connection to a teacher is a social enhancement offered by Italki, which the tool's co-founder Kevin Chen has put forward as a reason for its success.¹⁶⁰ Italki checks the

¹⁶⁰ I heard this argument made during a talk given at the 2016 Language Con conference in Shanghai, and found it in a number of interviews circulating online. For instance, in a 2015 piece on Technode, Kevin Chen states that the reason people are unable to have a basic conversation after years of study at school, is that 'traditional language education is missing human communication', and that 'anyone who became fluent in a foreign language spent time speaking with real people'. Connecting with 'real people' is precisely what Italki proposes. (Lee, Emma. 'Building A Global Language Learning Company in China: Italki Founder'. Technode.com. May 27, 2015. <https://technode.com/2015/05/27/expat-preneurs-italki/> (accessed January 16, 2020)). The same point is repeated in a 2020 piece about Italki from Business Insider (Chen, Connie. 'I signed up for an Italki account to see why it's a leading platform for online language learning – here's how it works'. Businessinsider.com. January 16, 2020. <https://www.businessinsider.com/italki-how-to-learn-a-new-language-online?r=AU&IR=T#the-bottom-line-9> (Accessed January 16, 2020)).

credentials of tutors, and coordinates payment and class scheduling, but pedagogical elements are left to the discretion of the tutors. Payment for classes provides incentives for tutors to give a quality experience, to the benefit of learners, while the structure of the platform, offering an open marketplace, increases the pool of available tutors, with both professionals and amateurs participating. The result is not only an increase in the availability of tutoring and reduced tutoring costs, but also the fostering of new relationships between speakers of different languages: indeed, some of the teachers indicate that their motivation for tutoring through Italki is not only financial, but also involves the possibility to interact with students across the world, offering a form of vicarious travel.

It is worth noting that positive descriptions of peer learning and its potential by technology enthusiasts often fail to take the need for cultural and pedagogical scaffolding into consideration. ‘Students might learn a foreign language by serving in a neighborhood with a large immigrant population that speaks that particular tongue’, writes Jeremy Rifkin when discussing the future of language learning (Rifkin 2014, p. 92). The proposition implies a belief that language learning happens ‘naturally’ when interacting with L1 speakers, through a non-defined process of ‘symbiosis’. The experience of tool designers indicates the limits of this belief. ‘We used to think that everything could be crowdsourced, right,’ said DE1, ‘but what we learnt is that it’s tough to do. [...] There is a misunderstanding that a lot of communities are self-operating, and I don’t think that’s true, particularly in such a global community.’

The difficulty of developing global peer-learning communities brings us back to the importance of the ‘hidden curriculum’ mentioned at the beginning of this section. The emergence of new digital environments supporting new learning practices produces disruptive innovation, where new technology creates new markets. For instance, digital Chinese language learning tools draw in users who had previously not thought about learning Chinese. Moreover, these new digital environments must also be understood in relation to the participatory cultures they enable, and the transmedia experiences that are integral to these participatory cultures. Finally, as can be seen from digital Chinese language learning tools, existing field structures are affected when these digital tools make affordable a range of learning goals that are beyond the control of educational institutions. This invites reflection on the implicit ideology guiding the design and evaluation of tools, individually and as a set. This is what I will now turn to, with a focus on how political and cultural factors affect the value proposition of digital tools.

5.4 The politics of learning Chinese

5.4.1 Overcoming the ‘Great Walls of Discourse’

To conclude the second part of this thesis, I turn to the role of digital technology in enabling the formation of new types of relationships and identities as part of translanguaging practices. As Lam Wan Shun Eva writes in a 2000 paper on ‘L2 Literacy and the Design of the Self’:

language use is not only a matter of deploying existing representational resources according to conventions, but also a dynamic process of adopting and reshaping existing resources in different measures to create new meanings and ways of representing reality. [...] Through their collaboration in designing [those new meanings], people may alter and renegotiate their identities within their social communities. As a consequence, the communities in which they obtain representational resources are critical to the design of their identities and their literacy development (Lam 2000, p. 461).

Language learning, as it occurs through digital technology, not only offers individuals more opportunities to communicate in Chinese but is more broadly transformative of the individuals involved and the communities they join in the course of their learning. Similarly, McDonald observes that ‘in an increasingly globalized world, more and more people with a personal and/or professional relationship with China are crossing the divide between the ‘Chinese’ and the ‘Foreign’, so long taken as an unquestioned given, and transforming it irrevocably in the process’ (McDonald 2011a, p. 2). In turn, this means that language learning practices enabled by digital technology have a political dimension, to the extent that they redefine the perceived boundaries of human groups and norms of interactions within and between those groups.

If the goal of foreign language education in an era of globalization is to raise awareness of what language can and cannot do ‘then teaching [foreign languages] necessarily becomes a political activity, that is, an activity in which power relationships get discussed and negotiated’ (Kramsch 2014, p.307). This remark by Kramsch resonates with a point raised by McDonald regarding dominant teaching models developed in the PRC. Those models, argues McDonald, are designed to keep foreigners apart by teaching a form of Chinese that marks them out as foreigners (McDonald 2011a, pp.1-2). That is, the grammatical and vocabulary structures taught in class are not those which would be (fully)

used by L1 speakers of Chinese in their daily life, but constitute an artificial language developed for foreign learners of Chinese.

McDonald attributes the teaching of this ‘artificial language’ to an intentional attempt at keeping foreigners from penetrating Chinese inner circles. Language thus becomes the ultimate gatekeeper, keeping symbolic power away from foreigners. Building on the expression ‘Great Walls of Discourse’ coined by Haun Saussy, McDonald writes about this phenomenon that ‘such ‘Great Walls of Discourse’ [...] permeate not just the formal pedagogical apparatus of textbooks and descriptions of the Chinese language but also the mindset of many teachers of Chinese, creating a rather dispiriting and demotivating atmosphere for the potential sinophone seeking entry into the sinophone sphere’ (McDonald 2011a, p.7). The situation, argues McDonald, draws upon centuries of practice where the Chinese state sought to keep foreigners a distinct group isolated from Chinese society, and reflects a ‘sinocentric’ model that tends to regard interactions ‘in an exclusively unidirectional way outwards from the presumed ‘centre’ of the sinophone sphere to the eager foreigners gathered at its gates’ (McDonald 2011a, p.10).¹⁶¹

Digital technology, as it enables new forms of interaction across national boundaries, is a serious challenge to this sinocentric model. This is particularly relevant in a context where the increasing authoritarianism that has evolved under the leadership of Xi Jinping is occurring in a context where an emerging Chinese middle class is aspiring to greater digital integration. The response of the government has been to increase control over what content people can access online, through a large-scale Internet censorship system often referred to as ‘the Great Firewall of China’.

In this regard, when conducting an initial survey for this thesis, I was surprised to find a lack of cross-over between two types of digital tools (and the people developing them), namely, tools focused on Chinese language learning and tools for improving one’s knowledge about China or ‘Chinese studies’ websites. Reflecting on this lack of cross-over, DE6 remarked, ‘you know, Chinese history is so long, and impenetrable, and Chinese characters so numerous and inscrutable, you almost have to pick one, you cannot do them

¹⁶¹ One clear sign of state Sinocentrism is the name of the official organization devoted to teaching to foreigners, generally referred to as Hanban. Its full name, in English, is ‘Office of Chinese Language Teaching International’: looking at its name in Chinese, 国家对外汉语教学领导小组办公室, McDonald notes how it includes the words ‘对外’, literally meaning ‘for the outside’.

both, it's so overwhelming.' What this indicates is that users tend to do one or the other: mostly, they are either looking for language aids or seeking more information on a given China-related topic. This lack of overlap indicates a broader disconnect between efforts to build *China* literacy and *Chinese language* literacy. DE6 suggested that there 'may also be a distaste for politics' on the part of most Chinese language learners.

The materials presented by The Chairman's Bao, which presents itself as 'the world's leading Mandarin news-based graded reader for students and teachers,' illustrate this lack of interest in politics.¹⁶² The titles of three articles published on January 22, 2015 are indicative of the news content proposed to support language study: '7-year-old boy drives his drunk father 15 miles home', 'What to Avoid When Giving Gifts in China' and 'Restaurant gives free food to beautiful people'. Those articles would neither risk censorship on political grounds, nor would they offer cultural capital for a learner keen to qualify as a proper China watcher in order to take part in foreign policy discussions in their home country. They would, however, offer a good basis as conversation starters with prospective Chinese conversation partners – and may be conducive to a greater sense of emotional connection with China, thus playing a function somewhat akin to that of the narratives I described in the previous section.¹⁶³

Over the course of my fieldwork, I noted more generally that individuals with an interest in what we may call 'Chinese studies' or 'China literacy' – teachers, learners or designers with an interest in decoding contemporary China and mediating it to a non-Chinese audience – were particularly interested in questions of Internet censorship, which were discussed in relation to freedom of speech, public opinion, propaganda or freedom of

¹⁶² 'Home'. Thechairmansbao.com. <https://www.thechairmansbao.com/> (accessed October 1, 2019).

¹⁶³ To use Benedict Anderson's term, one may say that learning Chinese online entails entering a certain 'imagined community', as mentioned in note 115. Appadurai has elaborated on this concept, by describing 'something critical and new in global cultural processes: the imagination as a social practice...' where 'the imagination has become an organized field of social practices, a form of work (in the sense of both labor and culturally organized practice), and a form of negotiation between sites of agency (individuals) and globally defined fields of possibility' (Appadurai 1996, p. 31). 'The work of the imagination, viewed in this context, is neither purely emancipatory nor entirely disciplined but is a space of contestation in which individuals and groups seek to annex the global into their own practices of the modern' (ibid. p.4). I propose here that the relatively 'apolitical' articles proposed by The Chairman's Bao may be of great value to support this 'imagined' sense of connection with China.

information. By contrast, in my interviews with tool designers or in my interactions with people focusing on Chinese language learning, questions of Internet censorship were either absent, or differently understood. In my interview with DE2, Internet censorship was mentioned not in relation to questions of freedom of speech but the technical inconvenience of using a VPN to access Google Docs: rather than a political issue to discuss, Chinese Internet censorship was framed as a technical problem to solve.

This is not altogether surprising, since many users of digital Chinese language learning tools desire an optimal complementarity of their preferred tools. Here, the very structure of the Great Firewall stands in the way of learners enjoying a seamless experience of mediated immersion. Key social media channels from the global Internet – Twitter, Facebook, YouTube – are blocked in the PRC, where other channels are in use, particularly WeChat.¹⁶⁴ Although none of the tools I reviewed were blocked in China, nor was censorship a direct concern, China's filtering system had a serious indirect consequence: the lack of a global 'digital tissue' capable of organically bringing together Chinese speakers and language learners. More generally, it was an obstacle for designers looking to optimize circulation of content and marketing for learning tools, or otherwise curate social media channels to engage language learners located both in and outside of the PRC, and possibly support interaction with L1 speakers of Chinese.¹⁶⁵

¹⁶⁴ Internet filtering in the PRC is in constant evolution, changes day to day and region to region, and is not fully predictable in its effects. Something like a Facebook plugin can cause a website to be inaccessible somewhere, some day, or be completely benign in another city at another time. VPNs, used to 'jump the wall', are equally erratic – sometimes working perfectly, other times only affording a very unstable connection.

¹⁶⁵ I will give one personal example of how this separation manifests. As part of my Chinese learning practice, I like to conduct 'background listening', and do so by playing Chinese songs by default. I developed a series of Chinese language playlists on Spotify – which is my preferred app for music. I was hoping that this would also direct me to discover new Chinese music, or that Chinese music would also gradually start appearing in automatically generated playlists. However, I noted that even on weeks when I listened primarily to Chinese music, no Chinese song would appear on my 'weekly suggestions'. When discussing this with tech-savvy friends, they suggested a likely cause would be a bias in the algorithm, either that Chinese characters are not detected, or that the number of users listening to Chinese songs was too small to provide appropriate recommendations. An alternative would be to use Chinese apps like Douban music, but not only is the Chinese language interface less natively comfortable to me, it would also require a change in my default technological landscape, instead of smoothly integrating Chinese to my existing technological preferences.

This is particularly important to note since media circulation is increasingly determined automatically through technology, constituting what Eli Pariser has called a ‘filter bubble’. ‘The new generation of Internet filters looks at the things you seem to like – the actual things you’ve done, or the things people like you like – and tries to extrapolate. [...] Together, these engines create a unique universe of information for each of us – what I’ve come to call a filter bubble – which fundamentally alters the way we encounter ideas and information’ (Pariser 2011, p.9).

We might easily imagine a future where language learning tools offer an experience of mediated immersion intended to gradually increase our linguistic competence: an experience where we find ourselves exposed to content we like, at a suitable level of difficulty, as part of our day-to-day digital lives, with appropriate scaffolding software to help understand what is in our zone of proximal development. LE1 said of a Google Chrome extension that not only enables the definition of a word to be shown by hovering over it but also allows the word to be added to a list of revisions: ‘I use it so often that I forget I use it.’ TE3 described successful digitally mediated learning experiences in the following way ‘you learn when you are not realize [Sic.] that you are learning, just learning is happening, and then you realize – oh, I already mastered this.’ Artificial intelligence, whose importance is rapidly growing, could support such personalized learning by analyzing user data. As TE3 proposed: ‘Maybe one day you don’t need a teacher. You’ve got an app, and then you use the app, and get feedback about your accent, pronunciation, and your vocabulary, everything, I think that could happen.’ The horizon of a unified digital Chinese language learning ecosystem may thus resemble a filter bubble, consistently exposing learners to learning tools, the discourses these tools offer about language learning, and other prompts intended to gradually increase their language proficiency, as a seamless, fun and flexible integrated experience, making learning Chinese feel somewhat effortless.

A crucial question to consider, however – which I will conclude this section with – is whether, to what extent and for whom this would be a desirable goal.

5.4.2 Making Chinese easy to learn: ergonomics vs reflectivity

If tools support language learning by creating addictive gamified drills, will they speed up the acquisition of language skills at the expense of encouraging a fuller and more critically reflective attitude? TE5 describes the danger of apps with ‘a life of their own’ when it comes to school age children using them. ‘They focus on playing games, rather than seeing

that language learning is not just games, it has other components, and that's where the teacher, the role is important, to structure that.' I find John Dewey's reasoning relevant in that respect a century later: 'In the mastery of reading, writing, drawing, laboratory technique, etc. [...] sheer imitation, dictation of steps to be taken, mechanical drill, may give results most quickly and yet strengthen traits likely to be fatal to reflective power. The pupil is enjoined to do this and that specific thing, with no knowledge of any reason except that by so doing he gets his result most speedily; his mistakes are pointed out and corrected for him; he is kept at pure repetition of certain acts till they become automatic' (Dewey 1933, p. 51). Dewey, instead, was urging for an approach to education that would foster the student's ability to reflect on the process of learning itself.

Whether this approach can be embraced across different cultures, however, remains an open question. American educators insist on the connection between Western models of education and the training of the democratic spirit.¹⁶⁶ This same framework is at odds with Chinese education models. As Andrew Kipnis states in *Governing educational desire in China*: '[I]n the eyes of some educational sociologists, both in and out of China, the exam-oriented education [...] is inherently authoritarian. [...] In contrast to liberal desires for citizens who will think independently and be tolerant of difference and entrepreneurial, [its] purpose appears to be to produce a citizenry that will follow the models the government puts forth unthinkingly' (Kipnis 2011, p.73).

Kipnis, however, proposes an alternative way of appreciating Chinese education models based on 'rote learning': that copying characters and essays is a way to learn proper behaviour. Quoting anthropologist Terry Woronov, Kipnis summarizes assumptions that underlie language learning conducted in that manner as follows: 'At the heart of literacy pedagogy in Beijing there is an ideology of transformation: that learning to write, read, and speak standard language in the correct ways transforms children (...), and teachers are exemplars, 为人师表 (be exemplary enough in one's actions to merit the title teacher)' (Kipnis 2011, pp.106-107).

¹⁶⁶ This extends beyond the discourse of educators. At the opening of his book on disruptive innovation in high schools, Christensen lists four goals of education, one of which is to 'facilitate a vibrant, participative democracy in which we have an informed electorate that is capable of not being 'spun' by self-interested leaders' (Christensen, Johnson & Kagerman 2008, p.1). It is uncertain whether Hanban would subscribe to such a goal.

The contrast between Dewey's description of education as training democratic citizens and Kipnis' description of Chinese learning models as intended to develop moral character through imitation, indicates that the value of learning tools – and the associated questions of goal-setting – cannot be properly understood outside of a broader discussion on values and their cultural variation, which is highly field dependent.

This same line of reflection has been extended to digital education. In a paper titled 'When Chinese learners meet constructivist pedagogy online', Rainbow Chen and Sue Bennett look at the cultural appropriateness of online course design driven by a constructivist approach in a context of internationalized education. In particular, they apply Bourdieu's framework to propose a critical reading of what has been described as Chinese students' 'passivity' in class: the outcome of students' learning depends on the dispositions of the students and the nature of the learning environment (Chen & Bennett 2012, p.678). To what extent do and should learning tools and practices align with existing student expectations, as defined by their national habitus? In a context of growing hybridization, this is a particularly important question to raise in order to properly understand the value of different learning tools.

This is particularly important as China's technological capacity increases, leading to the potential development of powerful AI learning tools in the PRC. Should learning tools promote a critical reading of contemporary China or merely apolitical enjoyment of Chinese pop, given that the latter is likely to circulate more widely and attract far more users? These questions have a bearing on the future development of digital Chinese language learning tools, insofar as the perceived importance of different forms of habitus and cultural capital is likely to play a role in defining which tools are considered as effective, and therefore worthy of investment. The next and third part of this thesis takes up these questions in relation to the socio-economic conditions under which digital Chinese language learning tools have been produced.

Part Three: Building a new Chinese language learning ecosystem

In the opening chapter of *Theory of Practice*, Bourdieu denounces art historians who, aiming to understand a work of art, ignore the social conditions in which it was produced. He accuses them of being oblivious of their own position in relation to the object of study (Bourdieu 1977, p.1). When attending conferences and otherwise conversing with teachers about digital language learning tools over the course of this thesis, I observed that those tools were all too often considered in a somewhat similar manner. The pedagogical impact of individual tools in the controlled setting of a classroom was carefully studied, and the more general effect of digital technology on language education was an object of discussion, but the conditions in which learning tools are produced (and the various norms and incentives guiding their design) were altogether ignored. In particular, I did not come across any paper, or even experienced a conversation, that carefully explored the mutual influence of economic incentives and pedagogical design. This marked a theoretical shortcoming, but also a practical gap in identifying what incentives would result in better tools becoming available.

In this third and final part of the thesis, my aim is to track the conditions in which digital Chinese language learning tools are developed, maintained, and integrated as part of different systems of meaning and value. The practical purpose is to support not only better use of tools, but also open the possibility of collective action by teachers, designers and learners to improve the quality of tools individually and as a set. In line with this purpose, I will pay particular attention to the incentives that tool designers encounter, and their influence on the development of certain kinds of tools or certain types of relationships between tools. The theoretical purpose is to understand how socio-economic conditions of production determine the shape and content of digital artefacts, better understand the emergence of digital communities of practice, and consider those communities in relation to what Bourdieu calls the field of power, in a globalized age.¹⁶⁷

¹⁶⁷ The field of power can be understood as the social space where the dominant section of the different fields existing within society negotiate their respective positions and the respective value of the capital they hold. To recall the definition provided in Chapter Two, it is ‘the system of positions occupied by the holders of the different forms of capital which circulate in the relatively autonomous fields which make up an advanced society’ (Wacquant 1993, p. 20). During the time of Bourdieu’s research, the field of power could largely be equated with the nation state. With globalization, however, the concept calls for new understanding, as the

Chapter Six: Disrupting Chinese language education?

6.1 Setting the scene: between market and public good

In Chapter Three, I proposed Franco Moretti's practice of 'distant reading' as a model to understand the large and ill-defined landscape of digital Chinese language learning tools as an emerging canon. In *The Slaughterhouse of Literature*, Moretti describes markets as central to the process of canon formation.¹⁶⁸ 'Readers read A and so keep it alive; better, they *buy* A, inducing its publishers to keep it in print until another generation shows up, and so on.' (Moretti 2013, p.68). An information cascade follows, that leads to hits or flops. Moretti's analysis rests on the recognized role of markets as a valuable tool to reveal collective preferences. This role, however, is conditioned on markets being free, open, and transparent: thus, readers can select the most suitable books based on formal elements that they value (or in our case, learners and teachers select the most suitable learning tools). When it comes to digital learning tools, a number of market distortions come into play, and as a result, market mechanisms in themselves will not be sufficient to reveal collective preferences of learners and teachers. In order to properly map the landscape of digital Chinese language learning tools, it is therefore essential to understand those distortions.

As a first step, it is important to acknowledge discomfort when using the word 'market' for Chinese language learning tools, particularly among teachers, and also to some extent among learners and designers. This is something I observed in the course of my fieldwork, and in my own experience. I suggest that this discomfort can be understood in relation to the same ideological tensions I acknowledged in Chapter Two between the works of Bourdieu and Christensen, whereby the works of the first are concerned with uncovering

respective value of different types of capital also depends on power relationships between nation states and the growing importance of transnational fields (digital technology being a key example).

The two stated purposes of Part Three align with the nature of the present research as a transdisciplinary project which, as I described in Chapter Two, is characterized by four elements: the systemic integration of knowledge, a synthetic theoretical framework, an approach that questions the legitimacy of existing traditions, and research geared towards practical application (Thompson Klein 2017, pp.11-12).

¹⁶⁸ I use the word 'market' to refer to a system, space or institution where sellers of services and products meet with potential buyers, and transactions can be conducted between them. I also use it later in Part Three as it is used by Christensen, metonymically, to indicate a group of people willing to pay for a certain service or product.

hidden structures of power, while the works of the second are intended to help individuals in positions of power (e.g. business leaders) maintain or improve their position. In this chapter, as I attempt to further understand the structures of the ‘market’ for Chinese language education, I will also make use of Bourdieu’s field theory in order to better understand the discomfort raised by the use of the word market in the context of education, beginning from a high level, systemic perspective.

At a first level of analysis, the discomfort I refer to may be understood as a form of resistance from educators (as well as learners and, to some extent, designers) in the face of a perceived threat posed by the field of commerce to the autonomy of the field of education. In that regard, in my fieldwork, I noted the expression ‘commercial tools’, used by Chinese language teachers at conferences or in informal conversations, to describe tools developed by independent organizations and monetized in some manner. Those tools were viewed with a measure of suspicion, insofar as pedagogical and commercial goals are generally perceived as being at odds with each other.

Two of the designers I interviewed made explicit reference to such a tension between commerce and pedagogy. DE1, commenting on the typical cost structure of offline language education companies in China, stated: ‘if you pay 40,000 RMB, one third is going to a sales person, another 20% to administration, rent, whatever it is, at the end, only a sliver goes to the teacher. What [part] of this whole chain is relevant to your education?’ DE1 was thus reflecting somewhat pessimistically on how a commercial model of this sort fails to align with the needs of learners. DE7 expressed a similar pessimism when describing what, in their experience, was the typical evolution of an organization developing digital learning tools: when it starts to aim for a large-scale market, ‘the organization changes, becomes a sales organization; the priority is to support growth rather than product and technology innovation.’ The assumption of these two observations is that there is at best no alignment between commercial and pedagogical goals and, at worst, these goals are directly at odds.¹⁶⁹

¹⁶⁹ It is worth noting in that regard that four of the designers I interviewed indicated that their service was designed in a manner that aimed to reconcile commercial and pedagogical goals. It is also interesting to note that none of my interviewees indicated they pursued a purely pedagogical or purely commercial goal, but there were two instances when what they perceived as an excessive focus on commercial goals by another designer was commented on negatively. DE3 described Yoyo Chinese as ‘businessy’, then explained that this characteristic might account for the relatively low level of integration between Yoyo Chinese and other tools. Negative accounts of Chineasy, which I noted in Chapter Five, were driven by a similar line of argument:

To that extent, maintaining the autonomy of education as a field is essential as a means to ensure that education services continue to be developed in relation to pedagogical needs, not commercial interests (or, in other words, in relation to the values and norms of the education field, rather than the field of commerce).

At another level, the ambivalence evident among some Chinese language teachers when referring to ‘commercial tools’ may be relatable to the public structure of education (including Chinese language education) which is largely economically dependent on the state. The autonomy of education as a field depends on the availability of public funding, which in turn depends on education being recognized as a public good.¹⁷⁰ The reluctance I perceived in the use of the word ‘market’ among educators may thus be related to a sense of threat to the autonomy of their field, and hence a threat to well-established educational values.

Resistance to technology among educators may be analyzed in the same manner, as a way to preserve an autonomous field of education against the field of technology, and as part of a broader resistance against shifts in the field of power leading to loss of national autonomy – in this case, loss of state-based education autonomy in regards to multinational tech companies which are partly independent from any state jurisdiction, and arguably represent a new field of power in themselves. If we consider things from the perspective of

Chineasy was described as ineffective for learning, and its success presented as driven primarily by good marketing. Designers expressed concern that pursuing a commercial logic (try to sell more tools, and focus efforts on marketing and sales) is detrimental to all if it is not anchored in sound pedagogy (sell tools that positively impact learning, and focus efforts on pedagogy or other aspects of a tool perceived to contribute to better learning outcomes). I will return on this tension in Chapter Seven, and further look at the establishment of common norms among designers in the central cluster encouraging the joint pursuit of economic and social gains in Chapter Eight.

¹⁷⁰ The precise extent to which it is the case varies country to country. The general statement, however, is true at least for developed English speaking countries, which are the primary focus of this study. The precise relationship between the state and Chinese language education providers varies greatly from country to country, as do motives for funding specific Chinese language programs. Those go from the expected economic benefits of increasing the number of citizens who are fluent in a ‘strategically important’ foreign language to preserving language continuity among diaspora communities. This may even vary within a country, for instance when education is supported partly or entirely on a province or city basis. Various forms of local political interests, all the way to various forms of corruption, might also impact local funding allocation. Studying this in detail far exceeds the scope of the present research.

designers, the state-subsidized nature of education, including language education, combined with the nation-centric allocation of funding for education, presents a double challenge.

First, as a direct corollary of education operating as a public good, the end-user (or learner) is typically not the payer. In the case of public primary and secondary schools, the state typically covers most of the costs. In most countries, the private education sector is also state subsidized to some extent, with the family contributing a substantial amount through student fees.¹⁷¹ State and family subsidization often extends to university studies, with broad differences across jurisdictions and educational systems. When it comes to professional adult learning, the cost may be borne by individuals or the employer. As a result, from the perspective of the learner, certain types of offline education may be experienced as ‘free’ (because others cover the cost of providing them), or be available at a comparatively low cost. Sometimes, learning is even incentivized by scholarships, whereby people are de facto paid to learn Chinese – or can expect to be paid a stipend to learn Chinese if they meet certain criteria.¹⁷² These different conditions of learning will impact how a given learner perceives the value of digital learning tools, particularly their perceived comparative cost: subsidized education will be perceived as having a lower cost. This situation leads to an ambivalent relationship between digital learning tools and institutions of learning, which hovers between competition and collaboration.

Second, education continues to be largely state regulated and funded, while digital learning tools are global in scope, that is, exceeding state control and exceeding the mandate of state-centric education bodies. ‘From a consumer perspective, we’re looking for a global product,’ stated DE8, reflecting on the fact that the same scalable technology could benefit learners around the world facing similar learning difficulties – and that a global market offered greater commercial opportunities.

¹⁷¹ Here again, variations apply, including the parallel existence of public and private schools, availability of scholarships, free provision of learning materials or not, the extent to which publicly funded education is available, and the availability of Chinese language learning in different organizations.

¹⁷² Those scholarships, to make matter more complex, are provided by states for their citizens or residents (for instance, I received a Hamer Scholarship from the Victorian government, granting me AU\$ 10,000 to study in Nanjing for a term), but also by the PRC for citizens of others states. For instance, LE5, a learner from Nigeria, received a scholarship from China, and stated about it: ‘it’s a great opportunity in my life – I can see the rest of the world – just like that’. The criteria chosen to attribute those scholarships and conditions attached affect the perceived value of different learning options.

When DE9 designed their tool, they wanted it to be readily accessible for ‘everyone’, whether ‘a kid in Africa or a kid in Korea.’ The app, indeed, went global: ‘it was a popular app for a while in Korea and Taiwan. It was a featured app. We had an article in some Hong Kong newsletter, I think South China Morning Post.’ DE12, in the same way, describes how their tool reached a global audience: ‘Our thinking was originally that maybe we might be able to expand into other languages in the future, but we’ve been very surprised by the amount of sign up from Spain, Italy, Latin America – and probably people who have sort of basic English but can use the platform, and just want to study Chinese.’ In short, Chinese language learning, considered as a field operating within a market system, becomes far more fluid in the digital environment, where the state’s role is relatively limited.

In the words of Castells, ‘technological networks do not stop at the border of the nation-state, the network society constituted itself as a global system’ (Castells 2010, p.xviii). However, though digital learning tools service a global learning community, the economic structures for education remain largely nationally bounded. This lack of overlap is an obstacle to the development and coordination of an effective ‘set’ of learning tools, because designers face local competition from subsidized learning institutions, while efforts to create a globally accessible learning tool exceed the mandate of any state institution, and are therefore unlikely to be appropriately incentivized by public bodies.

In the present chapter, I focus on digital Chinese language learning tools as commercial entities, paying particular attention to their relationship with institutions of learning. In Chapter Seven, I take a broader perspective on the object, focusing on tensions between the fields of commerce and education, as well as other issues, as they affect the perceived value of digital Chinese language learning tools.

6.2 Digital tools as commercial entities

6.2.1 Entrepreneurial ventures in a low-cost environment

In Chapter Two, I proposed that digital Chinese language learning tools can be productively analyzed in relation to Christensen’s theory of disruptive innovation.¹⁷³ Indeed,

¹⁷³ As a reminder, Christensen’s model states that technological evolution enables the provision of new products and services at a cost far lower than existing alternatives. Initially, those new products and services underperform in certain aspects that are of critical importance to existing customers of similar offers. However, that very low cost opens the possibility of creating new markets, attracting previous non-consumers for whom underperformance in those critical aspects is of little concern. As technology evolves, the performance of those

the evolution of digital technology has made it both easy and cheap to launch a new tool, enabling low-cost Chinese language learning in digital environments.

Beyond large-scale access to the means of production and distribution – from laptops and Internet connections to blogging platforms, video editing software, social media channels or the Appstore – three additional factors allow designers to produce and distribute tools at low cost. First, designers can learn new skills online, such as coding or digital marketing, cheaply or for free. Second, the Internet increases a person's capacity to seek and receive help on a project: social media channels and forums make it possible to access potential supporters for beta testing, pro bono work or targeted advice (e.g. guidance on website and app development through digital communities like stack overflow), or hire the services of freelancers, while crowdfunding platforms allow designers to raise seed funding for a project.¹⁷⁴ Third, digital technology has enabled and normalized new forms of project management, variously known as 'agile' or 'lean', where new digital products are released early in imperfect versions and improved iteratively based on user feedback.¹⁷⁵ 'It used to be hard to be an entrepreneur', writes Chris Anderson to sum up the situation I described, but now 'any kid with an idea and a laptop can create the seeds of a world-changing company' (Anderson, C. 2014, pp.7-8). This statement fully echoes findings from my fieldwork.

Among the nine tools I identified as a central cluster in Chapter Three, Pleco and Hacking Chinese may be described as successful projects that came into being because of 'a kid with an idea and a laptop'. This is because both these tools were first conceived when their designers were students in China on scholarships. Skritter and the Chairman's Bao have

innovative products and services improves when it comes to those key aspects which customers of existing alternatives value. This enables those new products and services to displace incumbents.

¹⁷⁴ To give a personal testimony, I started Marco Polo Project in 2011 with no coding or web development skills. I recruited a first team of designers and developers through word-of-mouth, then gained support from a web-designer of Chinese background through an ad on Craigslist, and later recruited various teams of interns through universities and youth associations. All of those worked with me on a pro bono basis. I also raised AU\$3000 through a crowdfunding platform called Pozible to outsource some development work, which was managed on a pro bono basis by a Melbourne-based team member working in IT and enthusiastic about digital language learning.

¹⁷⁵ This is possible because of software plasticity. A tool published online can change after it has been made publicly accessible. The Chinese grammar Wiki offers a good example of this: it is an evolving, open-ended website organized as a wiki, or collectively edited text, like Wikipedia.

similar stories, the one difference being that they were initiated by *groups* of students rather than individual students.¹⁷⁶ Of the remaining five tools, four also began as entrepreneurial projects, though at a later stage in the careers of their designers. Chinesepod, FluentU and Italki were started by people in their late twenties and early thirties with a background in business, who turned to entrepreneurship after a few years in consulting or corporate careers. Hello Chinese was an entrepreneurial venture co-founded by a former language teacher from Chinesepod and a ‘tech’ partner of about the same age. Finally, the Chinese Grammar Wiki invites reflection on the distinction between a tool and the organization behind it. It was developed and hosted through AllSet learning, a Shanghai-based company which offers personalized Chinese learning advice to individuals and businesses, founded by John Pasden, who formerly worked with Chinesepod. One important common element is that all those tools have a clearly identifiable founder or team of co-founders, rather than being anonymously produced by large technology companies, or educational or state institutions.

The nine tools I chose for contrastive purposes show similar developments. Mandarin Madness and Duable Chinese started as hobby projects when their designers were students (like Pleco, Hacking Chinese, Skritter and The Chairman’s Bao). Mandarin Shooter Quest and MyChineseTeacher were founded as entrepreneurial ventures by Australians in their late twenties and early thirties after an early career in consulting or finance (like Chinesepod, FluentU and Italki). Slowmersion was developed as a side-project by a working professional, and Fourtones was referred to by its founder Sam Gilman as a ‘passion project’ in a 2013 interview.¹⁷⁷ I was not able to track the development of Tea Story, but the LinkedIn page of John Hsu, founder of Language Pilgrim LLC, the company listed as authoring the app on the Appstore, indicates that he was working as a senior software engineer for Educational Testing Services in Princeton at the time the app was first released, indicating that it was, in all likelihood, also a ‘passion project’. Tools such as Chinese Island and Clavis Sinica offer a variation on the model, in that their developers were academics who obtained small

¹⁷⁶ It is worth noting that, in the cases I observed, ‘a laptop’ should be understood as shorthand for ‘a laptop, Internet connection, and university education’. In many cases, the ‘laptop’ in question also came with access to free resources on campus and a scholarship. Studying in more detail the role of scholarships and other opportunities offered by universities in the early stages of digital innovation exceeds the scope of this thesis.

¹⁷⁷ ‘Interview with Sam Gilman, founder of Coindega’. BtcGeek. August 28, 2013. <https://btcgeek.com/interview-sam-gilman-founder-coindega/> (accessed November 20, 2019).

university grants and engaged tech-savvy students to work on these digital language learning projects.

Similar patterns of evolution characterize what I called system shapers. Fluent in Three Months, LingQ, Lang-8, Duolingo, Chineasy, Sexy Mandarin, Hanbridge, Wenlin, Chinese Skills, Yoyo Chinese and Duolingo are all entrepreneurial ventures on a continuum between the hobby project that grew and the start-up. This is also true of commonly-used generic flashcard tools: Quizlet was founded by a single developer (like Pleco), while Kahoot began as a side project for a team of academics. Anki, as the only open source tool in the list, offered a variation on this developmental model.¹⁷⁸ I was unable to track the origins of Chinese Forums, but early posts from one administrator indicate that it was a project initiated by one individual or a small group of enthusiasts, which later grew into a larger community.

Importantly, the same pattern of development can be found among tools which now play a critical role in shaping the whole digital environment. Twitter, Facebook, YouTube and MeetUp began as start-ups themselves, and are either about the same age as or slightly younger than the oldest digital Chinese language learning tools in my central cluster: whereas Pleco was launched in 2001 and Chinesepod in 2005, MeetUp started in 2002, Facebook in 2004, YouTube in 2005 and Twitter in 2006. As for Google Translate and WeChat, they are free products developed by technology companies (Google and Tencent) that were founded as start-ups in 1998, not much earlier than Pleco. This indicates a remarkable continuity between the tools I observed and some of the largest companies in the world today, in terms of age and origin story.

The only exception to the description I have presented is Rosetta Stone: founded in 1992, it is the oldest organization behind any of the learning tools I identified as system shapers, and which originally specialized in digital language learning courses on CD-ROMS. To that extent, it may be identified as a legacy organization from pre-Internet times which has adapted and integrated to the new environment. Using vocabulary borrowed from Christensen's theory, I would propose that the digital version of Rosetta Stone Chinese is best framed as a sustaining innovation, that is, a product developed using new technology to better service an existing market.

¹⁷⁸ Open source refers to a mode of software development based on principles of decentralized development and open collaboration. Source code is shared under a license that allows modifications and free sharing of the software.

To conclude this section, it is important to consider a different type of origin story: tools developed within an institution of learning (e.g. a university) through ad hoc grants, or commissioned by a public body to a large technology company on behalf of schools and/or universities falling under its mandate.¹⁷⁹ One such example is the ‘language learning space’, a website developed by an education technology provider called Education Services Australia in 2013, commissioned by the Australian government, and providing ‘learning resources and services for students of Chinese, Japanese and Indonesian languages and for teachers of those languages.’¹⁸⁰ Tools and resources of this type were not a focus of my study because they are not connected with the tools comprising the central cluster and ‘system shapers’ I listed in Chapter Three, nor were they listed on Hacking Chinese Resources, or other blogs and forums. Most importantly, most tools and resources of this type are not openly accessible and are designed to serve the specific needs of particular institutions. I know of the existence of those institutional tools and they were sometimes mentioned by my interviewees during my interviews with them. I have also heard these tools discussed at international conferences. I have even personally contributed to the development of one such institutionally-funded resource.¹⁸¹

By contrast with the tools listed earlier in this section, and on the limited basis of my own involvement in universities and conversations with teachers and technology professionals, ‘institutional tools’ benefit from comparatively large upfront investments by commissioning institutions. However, these tools must follow stricter compliance guidelines, leading to their higher production cost. Instead of early release and iterative improvement,

¹⁷⁹ This includes tools developed in the PRC for use in universities or Confucius Institutes, such as Hanyunet and Great Wall Chinese. As I indicated in Chapter Three, those tools were not integrated with the tools I identified as part of a central cluster, nor were they broadly discussed or mentioned in the communities I observed. Further exploring their differences and interactions (if any) with tools I identified as ecosystem-forming exceeds the scope of this thesis.

¹⁸⁰ ‘Home – Language Learning Space’. lls.edu.au. <https://www.lls.edu.au/home> (accessed November 20, 2019). I return to this tool when exploring the question of open access in Chapter Seven.

¹⁸¹ In 2013, I worked with La Trobe University on a project to create a series of videos on ‘how to learn a language’. Working with the teaching and learning centre and teachers across the European and Asian languages department, we produced a set of seven videos of 5 to 10 minutes offering advice on core aspects of language learning: how to speak, listen, read, and write better. This set of videos was made available on the university LMS, and accessible only to enrolled students.

their development tends to follow a linear model of project management (planning, execution, release) and there is no clear business model (or otherwise reliable funding model) to fund ongoing maintenance or upgrades, so that long-term survival is always an issue.

6.2.2 How does a tool establish itself and gain prominence?

It goes without saying that not every digital learning project initiated by ‘a kid with a laptop’ will eventually rise to prominence. At least three conditions must be met for a tool to have a chance to do so.

First, an aspiring designer with an idea for a potential new tool must put that idea into practice. Although I was not able to gather data about the rate of execution, incidental evidence indicates that it is low. Three of the six Chinese-language learners I interviewed mentioned ideas for learning tools they wanted to develop but – as far as I am aware – did not realize those ideas.

Second, a tool needs to be developed beyond the beta version. Among the tools I observed for contrastive purposes, four had been discontinued after early release. Duable raised funds at a start-up event in Singapore in 2013, but never went past the mock-up stage. A beta version of Fourtones was released (I was among the beta testers), but the project proved unviable and never developed beyond early levels of the game. The Appstore page for Tea Story offers a ‘Chapter One’ in-app purchase, but no further ‘chapters’ are available. As for Slowmersion, by October 2019 it was no longer available on Amazon, where it had been listed, and the associated Twitter account was no longer in existence.

Finally, a tool needs to be maintained over time. In Appendix One, I list an ‘extended canon’ of 190 tools. Among those, nine were discontinued between the time I started my research (early 2015) and when I wrote up my thesis (late 2019).¹⁸² An additional number of tools, though still available, seem to have gone dormant, insofar as they have not been visibly updated in a long time and, in certain cases, lost functionalities due to software obsolescence.

The question of maintenance is related to the robustness of a tool. There are three reasons for this. The first concerns the quality of backend programming. When a tool is programmed ‘from scratch’, it is generally more resistant to changes in the surrounding

¹⁸² By ‘discontinued’, I mean they could no longer be accessed at their original URL or through the Appstore. For all those tools, I merely noted that they could no longer be accessed, but did not trace the exact date when this happened, or the reason why, as this exceeded the scope of the present research.

technology than when it was built, for instance, through a pre-existing platform such as Wordpress: this is because it is less vulnerable to cyber-attacks or changes in the underlying software (e.g. plugins becoming incompatible with updates to the core software). More generally, to remain functional, a tool needs to remain compatible with the rest of the Internet and digital technology, which are continuously evolving. Two recurring issues that I came across in that respect during my fieldwork were (i) the difficulty of transitioning from a Web-based tool to an app as smart-phones became prevalent and (ii) the loss of functionality for tools initially programmed with Adobe Flash software.¹⁸³ Second, a tool may lose functionality through malware infection. This did not come up in my interviews, but one website in my extended canon called ‘Chinese characters’ was rendered partly non-functional through malware and abandoned.¹⁸⁴ Finally, tools with simpler functionalities and design are likely to be more robust overall. For instance, one of the panelists on my final dissertation review mentioned the text reader Dim Sum, indicating that they were using it in their language classes. They contacted the designer to suggest an improvement on a minor issue and were told that the designer was no longer interested in developing the tool further. Dim Sum, however, continued to be used as a classroom tool, indicating that the longevity of a tool is not entirely dependent on the designer’s maintenance or development of it. By contrast, ongoing resource allocation is required for tools that involve a community: this is because community management is labour intensive.¹⁸⁵ Another factor to consider is the

¹⁸³ Although web browsers are accessible on a smart-phone, redesign as an ‘app’ increases ease-of-use, and seems required to maintain value. This depends on the type of tool, and is particularly manifest for tools I classified as ‘drills and games’ (some of which only exist as apps, for instance Hello Chinese).

¹⁸⁴ I experienced this myself: when launching a new version of Marco Polo Project in 2013, our website became infected and automatically redirected to a pornographic website. Later that year, our website was hacked by a group of Turkish nationalists, and redirected to their page. Both issues were solved through a pro bono team member with IT expertise.

¹⁸⁵ This is particularly the case when it comes to moderating conflict. DE1 quoted the example of a tool which, in its early version, invited users to indicate their country of origin with a dropdown list. The list originally listed ‘Taiwan’ as a separate entry, raising negative comments from PRC users. This was replaced with ‘Taiwan, province of China’, which raised negative comments from users from Taiwan. In the end, the dropdown menu was replaced with a blank box for users to fill. Reflecting on this, DE1 said ‘That sounds silly, but I’m just giving you an example of how every political issue, every community, every religious and cultural issue that you could imagine could come [up], and then it takes effort to ensure that these things don’t spin out of control [...] and then you have to think, how much effort do you want to spend on this?’

rapid obsolescence of tools in a digital context of fast-changing norms regarding functionality and style, as discussed in Chapter Five.

In all cases, the underlying reason for a tool being no longer available and/or losing functionality is that the designer is no longer personally able or willing to maintain it, or lacks the resources to do so. This is an inherent weakness of digital tools developed through pro bono support. When developing their tool, DE15 worked with a ‘young Chinese lad’ studying IT and was dependent on him to troubleshoot whenever there were technical problems. This student left the project for personal reasons. ‘He was young, wanted to get married and do a PhD, and he became unavailable.’ This resulted in a period of stagnation for DE15’s tool, about which they said ‘I couldn’t fix things. I struggled for a few years.’ More generally, the risk of a tool being abandoned relates to the low-cost development opportunities made available by Web 2.0. DE4 explained this situation as follows: ‘there are a lot of ambitious students that have good ideas, they’re quick to build the next app, but the staying power is a little bit low, because, at least in this space, it’s very easy to be a start-up, have an idea, put together a website and a payment platform on top of this’. However, tool or app maintenance over the long term has proven far more challenging.

On this matter, in an interview with the founders of The Chairman’s Bao published on the blog ‘Sapore di Cina’, the interviewer states: ‘I know – from personal experience – that after a while it becomes difficult to invest time, energy and money on a project that, no matter how good it is, doesn’t offer a clear return of investment (be it money, career opportunities, fame or other).’¹⁸⁶ This statement aligns with what I observed during my fieldwork: a tool’s capacity to survive over time – and therefore rise to prominence – is tied to the designer’s capacity to gain some ‘return of investment’. However, since the cost of maintenance can be low (for instance, for the Chinese Grammar Wiki, or Hacking Chinese, or Dim Sum), after a more intensive initial set-up phase, a tool can be maintained by a single individual on a part-time basis, so that the needed ‘return on investment’ may not be high, and can take the form of ‘money, career opportunities, fame or other’. By contrast, Italki employs a small team (about 30-40 people by the end of 2016) and therefore needs to

¹⁸⁶ ‘The first Chinese Newspaper Simplified: Interview with Sean of The Chairman’s Bao’. Saporedicina.com. December 7, 2015. <https://www.saporedicina.com/english/the-first-chinese-newspaper-simplified-the-chairman-bao/> (accessed November 1, 2019).

generate enough income at least to cover associated costs. What this means is that there is no reliable way of predicting the success and durability of a tool or resource, regardless of its set up costs and whether or not it has received institutional support.

6.2.3 From value creation to value capture: a spectrum of revenue models

A tool will be built and maintained to the extent that it can generate enough returns on investment – in economic form or otherwise – that people would choose to develop it in the first place, and ensure that it continues to exist. However, the method through which designers receive those returns – or capture value – is neither unified nor generally straightforward.

In my fieldwork, I observed a general trend where most tools combine basic ‘free’ and more elaborate ‘paid’ offers. Details reveal a complex picture, with a great variety of revenue models. I will now describe those for the forty tools I listed at the end of Chapter Three, sorting them in line with the categories I proposed in Chapter Five.¹⁸⁷

Tools I called ‘learning advice’ (Chinese Grammar Wiki, Hacking Chinese, Fluent in Three Months, Chinese Forums) all offer both free digital content and paid subscription content. The Chinese Grammar Wiki sells an e-book through its host website for \$0.99.¹⁸⁸ Hacking Chinese sells a book and e-book through Amazon for \$7.97 (kindle) / \$18.88 (paperback). Fluent in Three Months has a number of different books on ‘language hacking’. The main one, ‘Fluent in Three Months’, is on sale through Amazon for \$9.99 (kindle) / \$16.13 (paperback) / \$40.90 (audio CD). Hacking Chinese and Fluent in Three Months also sell ‘courses’ that combine videos, exercises, checklists, written materials (e.g. e-books listed above), and discounts for other tools – for instance, the ‘gold package’ for Fluent in Three months includes access to communities and challenges (which Hacking Chinese offers those for free) as well as a range of personalized coaching sessions and interviews. The Hacking Chinese course is offered for \$97, Fluent in Three Months for \$247 (standard) or \$947 (gold). Allset Learning, which hosts the Chinese Grammar Wiki, also offers courses and coaching

¹⁸⁷ In this section and throughout this chapter, I focus particularly on tools as they relate to users who are individual learners. I will explore the commercial relationships between tools and learning institutions in the following section of this chapter.

¹⁸⁸ All prices listed here are in US\$ unless otherwise specified. Prices were confirmed on November 2019. Major changes in pricing or revenue models over the period are indicated.

for individuals and corporations. Chinese Forums seems to be funded exclusively through sponsored ads, referrals and donations. Hacking Chinese and Fluent in Three Months also feature ads and referrals.¹⁸⁹

In the ‘language accessibility’ category, Pleco and Wenlin offer a freemium model with core features for free and one-off payment for various extensions (extended dictionary and added features, e.g. flashcards/OCR, available individually or as a bundle). The full Wenlin bundle is on sale at \$198. Individual dictionaries and upgrades are available for \$10-\$99, and web subscriptions are offered for \$2.99-\$4.99/month. Pleco has a professional bundle for \$59.99, and about 50 other add-ons individually charged \$4.99-\$49.99, as well as a selection of about 60 e-books and graded readers for \$2.99-29.99 each. Clavis Sinica has a 15-day free trial version, then charges \$19.95 for a download of the software (\$29.95 to ship a CD), or \$10 for an upgrade, \$5 for the core tools. A series of associated apps are on sale for \$0.99-\$2.99.

Three of the tools in the categories I labelled ‘multimedia courses’ and ‘formatted content’ (The Chairman’s Bao, Chinesepod and LingQ) offer a sample of content with limited features for free, while a monthly subscription opens access to full features and the totality of the content. Chinesepod offers a ‘basic’ subscription for \$14/month, and a premium for \$29/month; The Chairman’s Bao charges \$10/month or \$80/year.¹⁹⁰ FluentU originally followed this model, but shifted over the course of my fieldwork and at the time of writing only offers a 14-day free trial, and access for \$30/month or \$240 per year. Yoyo Chinese offers sample content for free, and bundles of coordinated lessons forming a course can be purchased as a package, for \$129-\$149 per course, or \$499 for full access.

When it comes to engagement platforms, models vary further. Italki takes a commission of 15% when a learner books a lesson through its website. The price of classes varies, with professional Chinese teachers charging \$10-25 per hour, and community tutors

¹⁸⁹ I have not been able to find precise information as to how much income designers derive from donations, referrals and sponsored ads.

¹⁹⁰ Discounts on yearly subscriptions commonly range from 20-50% in comparison to the monthly price. I did not list them systematically.

\$5-15 per hour.¹⁹¹ Italki also has a free ‘community’ section for language exchanges. Sexy Mandarin and Hanbridge both offer free videos (on YouTube), and subscription plans. Sexy Mandarin charges \$9.95 to \$74.95 per month, with access to a bundle of videos, virtual classrooms and one-on-one classes. Hanbridge indicates prices of \$8-\$45 per session, on the basis of a personal assessment. MyChineseTeacher offers school principals (particularly in regional Australia) access to classes delivered through video-conference by a China-based teacher, whom MyChineseTeacher trains and monitors. I was not able to identify the price of that service.¹⁹² Chinese Island is university-based and offered non-commercially. Lang-8, at the time of research, did not seem to have any clear revenue model and was freely accessible.

‘Drills and games’ offer the greatest level of variety. Mandarin Madness provides a one-off download for \$2.99. Mandarin Shooter Quest is available for free and sells special ‘weapons’ and ‘cheats’ for \$0.99-\$2.99. Chinese Skills has in-app purchases of added levels, available individually from \$4.29 or \$149 for the bundle. Rosetta Stone offers subscriptions of \$11.99 per month or \$89.50 per year, with a free trial for three days. Chineasy offers a free app with premium features for a \$4.99 monthly subscription, as well as an online offer of videos, activity sheets, or screensavers from \$59 to \$99 per month, and a range of print products, e.g. books, exercise books, games, from \$9.99 to \$89. Hello Chinese was originally entirely free, but changed their model over the course of my fieldwork, and now offers only early levels for free, then charges for in-app purchases, from \$4.99 for individual levels to \$149.99 for the full bundle. Skritter offers a free trial period of seven days, after which access requires a subscription of \$14.99/month or \$99.99/year. Quizlet offers core features for free, with ads, and offers ad-free premium options with offline access and enhanced formatting options for \$1.46-\$2.50 per month. Kahoot is free for basic users, with different plans for schools, companies and individuals, ranging from \$3-\$6 per teacher per month to \$8-\$60 per month for companies, or \$8-\$40 per month for ‘families and friends’. Anki was the only tool in that category developed on an open source model, and offered entirely for free.

¹⁹¹ Italki distinguishes between those two categories, depending on whether tutors hold teaching credentials, which are vetted by Italki. This pricing distinction indicates the ongoing value of formal credentials – or institutional cultural capital to use a concept from Bourdieu’s field theory – even for online tutoring.

¹⁹² MyChineseTeacher is one of the products from a broader umbrella organization called ‘MyChineseEducation’, which also offers individual tutoring services directly to learners, under the name ‘MyChineseTutor’.

Duolingo presented the most complex model in that category. The 2012 launch was accompanied by a popular Ted Talk by Founder Luis Von Ahn explaining the following vision: Duolingo would engage a global community of language learners in a collective effort to ‘translate the Internet’.¹⁹³ Sentences extracted from texts by online media partners are proposed to learners as part of their learning. Those translations are then brought back together, and sent back to the partner for publication as a full text, for a fee, generating revenue for the organization to fund maintenance, upgrades and growth.¹⁹⁴ This model, at the time, was seen as illustrative of a new ‘peer economy’ paradigm, and Duolingo quickly rose to prominence, becoming the world’s leading language learning app for European languages.¹⁹⁵ This model, however, proved unsustainable, as from 2017, Duolingo started to experiment with alternative revenue generation modes from ads, ad-free subscriptions, and in-app purchases allowing learners to continue ‘playing’ after making mistakes, on a model similar to popular games like Candy Crush or Fishdom.¹⁹⁶ In addition, Duolingo generates revenue on the pure basis of its brand, through ‘merch’, with t-shirts and hoodies featuring

¹⁹³ Quora Contributor. ‘The History of Duolingo’. Huffpost.com. January 13, 2016.

https://www.huffpost.com/entry/the-history-of-duolingo_b_8971104 (accessed November 1, 2019).

¹⁹⁴ As a positive side effect, this allows the algorithm to refine the range of acceptable translations, therefore creating ‘lenient rules’ for evaluation, a feature that I identified as important in Chapter Five. The Duolingo model was directly inspired by a successful crowdsourcing venture from founder Luis Von Ahn: reCAPTCHA – a security feature where Internet users need to type a piece of text that they see on an image when signing to a website, to prove they’re human.

¹⁹⁵ Incidentally, either the money that Luis Von Ahn made by selling reCAPTCHA to Google, or the relationships developed with investors through this early venture, provided Duolingo with a large amount of investment from the start: Duolingo raised \$18.3 million, more than any of the tools I reviewed (probably more than all combined). Olson, Parmy. ‘Crowdsourcing Capitalists: How Duolingo’s Founders Offered Free Education to Millions’. January 22, 2014. <https://www.forbes.com/sites/parmyolson/2014/01/22/crowdsourcing-capitalists-how-duolingos-founders-offered-free-education-to-millions/#436f39b9a725> (accessed January 15, 2020).

¹⁹⁶ A post by Duolingo founder Luis Von Ahn in the Duolingo Forums, appearing in 2017, underlines the rising costs of servers and salaries as Duolingo grew, and indicates to users that Duolingo would be experimenting with different forms of revenue generation, including ads (Von Ahn, Luis. ‘State of Monetization at Duolingo’. Forum.duolingo.com. May 23, 2016. <https://forum.duolingo.com/comment/15695026/State-of-Monetization-at-Duolingo> (accessed April 15, 2020)). By 2018, another post by Luis Von Ahn in the Duolingo forums indicated that, after a phase of experimentation, Duolingo would settle on three sources of revenue: ads, subscriptions (eliminating ads), and in-app purchases allowing learners to continue learning or ‘playing’ after making

the iconic owl, sold for \$18 and \$34.95.¹⁹⁷

As a final point regarding the cost of different tools, it is important to note that offers are often bundled. In particular, learners have access to discounted combinations of tools offered by different ‘brands’ that have built ‘alliances’ between them. To give one example, the *Hacking Chinese Practical Guide for Learning Mandarin* package (sold for \$97 in 2019), came with ‘discounts worth more than \$100 from Pleco (25% off one order with any combination of products), Skritter (\$45 off 6-month subscriptions for new users), and ChinesePod (\$50 off annual premium subscriptions)’.¹⁹⁸ It is unclear, however, to what extent such bundling is driven by designers’ commitment to best satisfy learners’ needs by incentivizing the joint usage of the best complementary tools, or by more haphazard opportunism.¹⁹⁹

In summary, digital technology has afforded low cost production of tools. Their maintenance, however, requires that the designer should receive a ‘return on investment’. A variety of revenue models are in place to ensure that this can be achieved, most often through the combination of free and paid offers. However, to understand the commercial viability of

mistakes. The post further indicates that those three revenue sources were anticipated to cover the costs of Duolingo’s operations, listed at \$60,000 per day (for all languages, Chinese being but a small part of Duolingo’s focus) (Von Ahn, Luis. ‘State of Monetization at Duolingo II’. May 2, 2017. <https://forum.duolingo.com/comment/22426779> (accessed April 15 2020)).

¹⁹⁷ Other tools generate some revenue through ‘merch’: Wenlin offers a branded baseball hat for \$25, Sexy Mandarin offers t-shirts for \$21.99 and poker cards for \$8.88. I was unable to evaluate what proportion of the total revenue was acquired through ‘merch’ offers. It is worth noting here that universities, in the same manner, commonly generate revenue from ‘merch’, with branded t-shirts, hoodies, pens, or mugs – that is, trade on the brand and associated sense of identity and community. It is also important to note that though ‘merch’ may seemingly have no pedagogical value in itself, it is very possible that it reinforces a sense of belonging or identity for certain learners, and is therefore conducive to better outcomes. Using Bourdieu’s theoretical framework, I would propose that ‘merch’ constitutes a form of cultural capital. In that respect, ‘merch’ should be understood as continuous with what I called ‘style’ in Chapter Five. Properly researching the role of ‘merch’ and branding in pedagogical success exceeds the scope of this thesis, but the question needs to be raised to properly appreciate the multi-layered complexity of the present object of study.

¹⁹⁸ ‘Hacking Chinese: A Practical Guide to Learning Mandarin’. Hackingchinese.com. <https://www.hackingchinese.com/courses/practical-guide-to-learning-mandarin/> (accessed November 1, 2019).

¹⁹⁹ I will return to the question of technological, social and commercial integration among tools, designers and/or organizations producing tools in Chapter Eight.

digital Chinese language learning tools – as well their disruptive potential – it is critical to understand how they interact with institutions of learning.

6.3 B2B – B2C: working with institutions

6.3.1 Institutions as clients, competitors, collaborators or marketing relays?

6.3.1.1 Playing two games at the same time

Within a given state, there are different types of organizations providing Chinese language education, with different levels of dependence on the state. We can distinguish at least four categories:

- state-sanctioned and state-funded schools and universities²⁰⁰
- classrooms funded at least in part by the PRC, especially through the Confucius Institute program
- independent educational organizations, on a spectrum from commercial language schools (including cram schools for students preparing for exams and business language training organizations) to community-based organizations, particularly those run by and/or for the Chinese diaspora
- individuals offering private tutoring services (as their primary business or as a side business), which I will here consider as a ‘one-person-organization’.

The relationships and balance between those four types of ‘organizations’ vary, as do applicable regulations, levels of public attention and funding available.

²⁰⁰ There is likely to be distinctions in prestige between those, for instance, between private or public schools, or selective entry schools, or different universities. The Chinese language may in fact play a role in defining the level of prestige of an institution, or allow access to it, with different impacts on learners’ choices. For instance, in Australia, there is a common complaint that non-heritage speakers are dissuaded from choosing Chinese in the final years of high school because they are unfairly assessed against heritage speakers, and their score, determining university entry options, is likely to be lower than if they chose another elective subject. In Singapore, special schools called SAP for children of Chinese descent, where the Chinese language is taught more intensely, have been associated to ongoing ‘Chinese elitism’ (Pang, Ethel. ‘As Long As SAP Schools Exist, ‘Chinese Elitism’ in Singapore Will Exist’. Ricemedia.co. June 4, 2019. <https://www.ricemedia.co/current-affairs-opinion-sap-schools-chinese-elitism-singapore/> (accessed November 2, 2019)). Those questions pertain to the broader role of Chinese language education as cultural capital. Studying this question in more detail exceeds the scope of this thesis.

Learners and teachers sometimes belong to or engage with more than one of those organizations. Among the five teachers I interviewed, one taught at both a Confucius Institute and a state-funded primary school, and another mentioned private tutoring in addition to their work at a Confucius Institute.²⁰¹ As for learners, incidental observations and conversations show that it is common to enroll in a class and have a private tutor. Over time, cross-overs are even more common: students ‘return’ to Chinese classes in an independent organization or a Confucius Institute after studying the language at high school or university, while teachers’ careers may include employment at various types of organizations.²⁰²

Where do digital learning tools fit in with this analysis? There are three ways to consider that question:

- Some teachers use digital tools to improve the pedagogical experience of their students. For instance, they use apps such as Kahoot and Quizlet to support interactive classroom activities, or suggest Skritter for homework character practice. In that instance, we may say that digital tools supplement or replace textbooks, and they might offer a competitive advantage to the organization that adopts them effectively.
- Some enrolled students use digital tools to complement institutional learning. For instance, they take lessons on Italki or use other learning tools in addition to classroom attendance and homework, without need for their teachers to recommend those tools. In that case, digital tools can be seen as the digital equivalent of a cram school or a private tutor.²⁰³
- Finally, some learners use digital tools instead of enrolling in an institution. In that case, digital tools are a replacement for institutions. In that respect, digital

²⁰¹ This is particularly important to note in a context of potential disruption of education as a field overall through digital technology, through ephemeralization, digitally-mediated tutoring, artificial intelligence and peer learning, as I described in Chapter Four.

²⁰² In addition, a number of learners will spend time in China in the course of their studies, to study for a degree in a Chinese university, attend a special program for foreigners in a Chinese university, attend a private language school, study with a tutor, or learn through ‘immersion’. Teachers will also sometimes conduct their career across different countries.

²⁰³ In the case of Italki, this is quite literally the case, as the tool simply facilitates the relationship between a learner and a private tutor.

tools also compete with previously existing non-institutional models, such as private tutors and Teach Yourself methods in CD-rom, audio or print format.

From a commercial perspective, this means digital tools can present two distinct business models: B2B (business to business) where institutions are clients, and B2C (business to customer) where learners are clients.²⁰⁴ As described in the previous section, a large number of revenue models exist. Some are targeted at individual learners (e.g. Pleco, Duolingo, Italki), while others are targeted at institutions (such as MyChineseTeacher). My fieldwork, however, showed continuity between those B2B and B2C business models. This was manifested in two ways.

The first is a common model, adopted by four of the nine tools in the central cluster (Skritter, The Chairman's Bao, Chinesepod and FluentU), which combines B2B and B2C offers. On a pedagogical level, those tools are suitable both for enrolled students and individual learning. On a commercial level, they sell to both learners and institutions, as indicated by special pages on the tool's website presenting the tool's benefits for learning institutions, and offering either tiered pricing options for licensing access to groups of students (FluentU, Skritter) or invitations for teachers and/or school administrators to make contact for a quote (Chinesepod, The Chairman's Bao).

The second is the diversity of ways through which a tool 'enters' an institution. DE4 indicated that their tools became adopted because 'students [...] come in and say classmates might benefit,' or even 'teachers who are not native have used it, and take it in when starting to teach.' Another channel mentioned by DE4 was the Appstore: 'you can reach the students much easier. Occasionally, a teacher would get it and would mandate [the tool] to the class.' Those early contacts could then transform in ongoing commercial relationships: 'most of our programs come back every year, and new ones come through word of mouth or conferences.' Mandarin Madness also used the Appstore as a channel, with the offer of a bulk order discount as an incentive for teachers to use the tool in their class. DE1 also reported that: 'we have teachers [...] who use us to help themselves, and we've also found that parents who discover us use that [for extra learning support to their children].'

²⁰⁴ I will explore what 'institutions-as-clients' precisely refers to through this section, as, in different contexts, teachers, administrators, or government bodies play a leading role.

Engagement with institutions is driven by commercial goals. B2B models were described by DE8 as desirable because of their greater stability. When asked about their intended market, they said: ‘what we’re hoping for is to aim for private schools for foreign kids in China – then you have a captive audience, and it could be a B2B China model, that we can then apply to schools offshore. University might also make more sense.’ This commercial goal, however, needs to be measured against a remark from DE4, who said ‘when looking at a revenue stream, schools are a small percentage, mostly because we don’t charge much money. That’s mostly because I hear from Chinese programs that they don’t have any money [...]’. Institutions’ capacity (or willingness) to pay is thus uncertain.

This uncertainty regarding institutions’ capacity to pay was echoed by DE12. When asked about potential tensions between profit and mission, they stated:

I position ourselves being able to do both, to be honest, and part of that is, if for example a school comes along, we have an institutional model and an individual model. Our institutional pricing system, which we calculated, if you input the value, the school comes back and says, look, we’re, our students really love your resource but we don’t have the budget in place, or we have X amount, we’re very flexible, I would say, to make sure that we’re still in schools, because I think it’s a really important thing that we’re trying to do, so we always try to be fair [...] we’re always, we always try to help out where we can.

It is possible to interpret this as personal idealism or generosity. It is also possible that adoption by institutions is desirable because it provides a sort of ‘cachet’, or symbolic capital.²⁰⁵ These two explanations are not mutually exclusive. As a sign of the latter explanation, The Chairman’s Bao prominently advertises on their website that they are ‘used in 200+ of the world’s most prestigious schools and universities’. Working with institutions, indeed, has other purposes and benefits than direct income generation. In Chapter Five, I explored the role played by a ‘digital tissue’ in setting norms and defining the value of different tools, as well as shaping the types of strategies that tool designers tend to adopt in order to attract attention from influencers (or key institutional personnel) in their wares. Language teachers are influencers in that they play an important role in influencing learners’

²⁰⁵ Adoption may also serve as personal validation of this creative vision, as DE14 stated: ‘When big universities decide to adopt it, or request customized versions of the application, that feels to me like a form of professional validation that’s important to me.’

expectations and tool usage, whether they directly embed a tool in their teaching, make recommendations, or create norms and expectations congruent with the learning practice that a tool is optimized for. In a context where the value of tools is uncertain, institutional adoption or teacher recommendation may become a selling point (or a driver of adoption) in the same way that influencers boost the value of the products that they endorse.

6.3.1.2 The challenge of engaging with institutions

Developing a B2B model may lead to more stable income and legitimacy. However, it also presents challenges, because it requires tailoring the offer to organizations with very distinct needs, affecting the potential to scale. This is a well-known challenge of B2B models, discussed, for instance, by Rachel Botsman in *Who can we trust?*²⁰⁶

Pedagogically, tools need to align with or adapt to the pace of instruction and the curriculum structure, be compatible with an institution's technological infrastructure (e.g. LMS), comply with its policies (e.g. on privacy, copyright or student access to technology), and more generally align with the norms and *modus operandi* of the institution. Each of these parameters varies from institution to institution and country to country, making alignment possibly costly, and affecting scalability. More fundamentally, one specific challenge is that the tool needs to work for 'everyone' in the class. As DE3 reported from their interactions with teachers, 'there is no spaced repetition programs that work in a normal classroom,' then explained that it only works as long as the teacher uses all their energy, and only for a few students in the class. A tool designed for learners with a strong level of self-motivation is unlikely to 'work' for a full cohort of students. In addition, the tool needs to align with teachers' expectations and incentives. As TE5 stated: 'if an app has a life of its own and can sometimes overtake your teaching, that's not what teachers want, teachers want to tie [the tool] into their teaching, rather than be taken over by [the tool].'

Another challenge stems from the dynamic nature of technology. 'A technology is not a fixed thing that produces a few variations or updates from time to time. It is a fluid thing, dynamic, alive, highly configurable, and highly changeable over time' (Arthur 2009, p.27).²⁰⁷

²⁰⁶ To give one example, when French car-ride-sharing service Bla-bla-car first tried a B2B model, there were too many requests for specifications. That made scaling impossible, leading to the adoption of a B2C model (Botsman 2018, p.59).

²⁰⁷ This corresponds to the entrepreneurial logic of making things better and cheaper through innovation. 'Attempts to block economic progress invariably fail because new entrepreneurs are continually roaming the

Dynamic evolution is a challenge to large learning institutions where a language curriculum unfolds over multiple years, and where teachers are torn between the need to keep up with the pace of evolution, and the need to rely on existing tools for a longer time-period after going through the effort of embedding them in the curriculum. The concept of ‘lock-in’ applies here: when a certain technology has reached maturity and has been adopted in a certain context, it becomes difficult for a novel tool to be introduced, because adopting this new tool ‘may mean changing surrounding structures and organizations. This is expensive and for that reason may not happen’ (Arthur 2009, p.42).

In addition, tool designers have reported that engaging with teachers proved difficult. DE4 reported that ‘we have done the booth thing at conferences, it never made us money.’ ‘We found it really hard to get into schools’ concurs DE9, adding ‘generally, advertising in teachers’ conferences and magazines didn’t seem to work. I don’t know why.’ In incidental conversations I had with teachers, they regularly reported being overwhelmed by marketing. TE5 expressed this, stating that they hear of numerous apps at professional development sessions, but ‘none of them is easily adaptable into teaching. [...] This is wasting more of my time than helping me to teach’.²⁰⁸ DE1 echoed this, saying ‘teachers are at risk of becoming ‘a marketing piece for other people’s companies. [...] University professors and language departments are under attack by so many start-ups.’

This difficulty can be related to questions raised in the previous section regarding an institution’s capacity (or willingness) to pay. Funding models determine not only how much funding is available to pay for learning technology, but whether the decision to adopt a new tool is made by teachers, departments, school administrators, or a centralized state agency, at what scale and for what timeframe. The absence of a standard funding model is a challenge for tool designers, whose product offer (to be maximally successful) needs to be tailored to each unique set of circumstances and funding silos. Considered overall, budget allocation mechanisms – i.e. not just how much funding is available for Chinese language education, but in what form, for what programs, through what mechanisms, on the basis of what

edges of the system in search of innovations that increase productivity and reduce costs, allowing them to win over consumers with cheaper prices than those of their competitors’ (Rifkin 2014, p.11).

²⁰⁸ They also mentioned most of those apps do not offer free trial for teachers, so that trialing them may be a waste of both time and money.

decision-making processes – will impact whether and which types of digital learning tools will thrive.²⁰⁹

6.3.2 Institutional risk-aversion: the ‘black hole’ of institutional tools

The value of independently developed tools to institution-based learning depends on their capacity to ‘work’ within the existing curriculum. To that extent, designers face their biggest challenge from tools developed within educational institutions (by academics in universities), or tools commissioned by educational institutions. That is because those institutionally developed tools are generally not amenable to being integrated with independently developed tools. This lack of fit presents a significant obstacle with regard to the adaptability of digital language learning tools for the greatest range of public-interest uses.

I have identified three main reasons accounting for this situation.²¹⁰ First, career recognition for academics or teachers developing globally valued teaching tools is uncertain. Two of the designers I interviewed work at a university: both highlighted the lack of structural support, which they communicated in emotional terms.²¹¹ One stated ‘I was terrified I would be made a laughing stock’ adding ‘I would like to do that [develop a tool through the university], but there is no time – it’s not recognized.’ The other spoke about the ‘anxiety that I feel about pursuing this sideline hobby that does not have a whole lot to do with my academic research.’²¹²

²⁰⁹ From a policy perspective, understanding and influencing those budget allocation mechanisms would be a first step towards supporting the potential emergence of a digital ecosystem operating as a global public good. I return to this point in Chapter Seven.

²¹⁰ The argument in this section more generally pertains to a line of reflection typically referred to as ‘open data’ or ‘open government’, which advocates for greater opening of government funded services as continuous with the interests of the public.

²¹¹ I am deliberately leaving those quotes anonymous here.

²¹² One of my supervisors indicated, in the course of discussing the research, that this was not the case in China, where the development of teaching materials, including digital tools, was recognized as a form of academic achievement alongside research publication. This was confirmed by other academic contacts in China. It is all the more surprising, this being the case, that there are not more digital tools from China integrated to a global ecosystem.

Second, universities are in competition with each other (particularly when it comes to attracting public and philanthropic funding, as well as student enrolments), thereby hampering collaboration between them. Du Plessis, in a paper on less commonly taught languages (LCTLs) in American universities, describes this phenomenon.²¹³

For LCTLs to be financially viable, the offering of a language has to transcend the boundaries of the campus. This proves to be a difficult obstacle to overcome.

Objection to this idea is strong for predictable reasons from faculty and administrators. The tradition of an onsite university is to develop everything in house. It is precisely the selection of what the university offers that makes it more or less attractive to prospective students (Du Plessis 2006, p. 5).

Developing curriculum formats where students learn across different institutions would create administrative issues of credit transfer, arrangement to pay for classes, or collaboration, with no clear incentives for teachers and administrators to develop such arrangements (or funding available for it). The onus to work out potential inter-campus study is thus placed on the students. Open courseware could dramatically reduce cost, but would require intercampus partnerships, which administrators tend to resist – out of self-interest, argues Du Plessis, to protect their program. The same reasoning would apply to the development of digital tools for Chinese language learning.

Third, university administrations are typically risk-averse. DE15 indicated that they witnessed a promising tool being banned by university administrators for ‘fear of reputation, that the virtual world was full of perverts and sex’. Another issue, reported by DE15, was the perceived need for the university to hold copyright over all elements of a program. Combined with fear that technology developed externally may have a limited lifespan, this leads to a phenomenon known as ‘not invented here’, whereby tools already in existence are duplicated internally, to avoid relying on an external provider, but leading to cost inflation.²¹⁴

²¹³ Du Plessis further proposes that this has to do with the decreasing proportion of public funding in universities’ income stream (in the US, from 80% in the 1960s to about 20% in the 2010s). Now tuition accounts for a greater proportion, decreasing appetite for niche subjects, and alters the mission of universities, with greater attention to job-focused skill development.

²¹⁴ The expression ‘not-invented-here’ is commonly used in the field of digital technology to describe negative bias towards ‘knowledge (ideas, technologies) derived from a source or contextual background that is considered outside or external [in relation to a group or organization]’ (Antons & Piller, 2015, p.194).

Looking back at the question of how digital Chinese learning might evolve in the years ahead, it is important to note that making a tool public or private is a matter of both social choice and institutional policy (Kaul, Grunberg & Stern 2003, p.3). This may be a simple matter of legal access – for instance, changing the copyright status of a website – or it may involve some technical effort (e.g. to ensure cyber-security or open Application Programming Interfaces (API's)). The Chinese grammar wiki offers a clear counter example to the 'closed-by-default' model of institutional tools. The designer of this tool explained to me that the original goal was to create a spreadsheet for teachers working at Allset learning, to assist them with providing clear and consistent grammatical explanations to their students. The idea came to organize this as a 'private wiki' as a way to simplify version control, but it turned out that password protecting this wiki was difficult. Sharing it freely brought benefits (in terms of boosting the company's image and contributing to the common good of facilitating Chinese language learning) and no clear downsides. Allset learning thus allowed the grammar wiki to be a free public 'resource'. By contrast, when the Language Learning Space launched in Victoria, in 2013, I tried to gain access, but was refused on account of not having a teacher or student email address (although I was running an education focused non-profit that had received government funding at the time). On September 26, 2017, I attended an event organized at the One Roof Coworking space in Melbourne, as part of the 'Educhange' conference organized by a non-profit organization called 'Education Changemakers'. At the event, a director of Education Services Australia – who had worked on the Language Learning Space portal – noted in a talk that the project produced mixed results: despite the millions of dollars invested, the Language Learning Space had limited impact on learning outcomes.²¹⁵

Even when access is granted, a culture of risk aversion typically leads to institutional tools remaining 'hidden', by which I mean that they are not broadly advertised, or that they are buried in the depths of a university website, either through lack of incentives to showcase them, or even as a result of the risk-aversion described above. The result is that language learning tools that may potentially be of high value have been and are being produced, but they remain largely unknown. I have thus been unable to ascertain how many of these institutionally-based tools there are currently. DE3 mentioned one such example, which they

²¹⁵ I took down notes on the day, but omitted to note how many millions. The key point was that the tool had a poor return on investment from the perspective of the speaker.

found by chance: a site called Chinese in 1000 characters, a series of 100 lessons, made by a university in Taiwan, that would soon become inaccessible because it was programmed through Adobe Flash.²¹⁶ DE3 noted that because nobody had heard of this tool, ‘it’s a potentially amazing resource that nobody uses.’ They then described such state sponsored projects whose users are confined to one or two institutions as ‘black holes’.

Should we, then, resign ourselves to this pessimistic statement, and more generally lament the somewhat dysfunctional relationship between digital Chinese language learning tools and institutions of learning? To what extent is the pedagogical approach of institution-based learning incompatible with the learning styles that have developed online through the use of digital tools? In Chapter Seven, I explore emerging patterns of Chinese language learning that may facilitate the further development of digital tools.

²¹⁶ Adobe Flash was formerly a widely-used multimedia platform, but announcements by Adobe that it would no longer be maintained after 2020 caused a fast move away from the platform, which is now incompatible with certain browsers, and anticipated to become obsolete unless software initially written for Flash is adapted for other platforms.

Chapter Seven: Digital Chinese language education and the shifting field of power

7.1 A new learning paradigm

7.1.1 Understanding the market: how many people are learning Chinese?

The goal of this chapter is to track patterns that would indicate whether digital Chinese language learning tools are evolving towards something like an ‘ecosystem’, with disruptive consequences for Chinese language education. To better appreciate the context in which this evolution is taking place, my first step was to try and understand the ‘market’ for Chinese language education.

I began by asking how many people across the world currently learn Chinese, intend to learn Chinese or have previously learned Chinese. In the course of conducting this research, I was surprised to discover how little we know on this matter. Indeed, from my fieldwork, it appears that even the designers of digital Chinese language learning tools cannot agree on the size and structure of the ‘market’ for which they are designing their tools, nor its rate of growth. DE8 optimistically stated ‘Chinese is not a top language yet, but it’s growing fast. [...] At the moment, I read that 50 million people in the world are learning Chinese.’ This went directly against DE6’s observation that: ‘There was a kind of boom in Chinese learning that was largely fueled by Confucius Institutes and claims about everyone in the world learning Chinese, and then eventually it became very clear that the market wasn’t that big and it wasn’t growing very fast.’ DE5 somewhat optimistically stated that ‘the English education market is kind of like the red sea, a lot of big companies there, but compared to that, the Chinese education market is still a very small one, it’s like a blue sea one.’²¹⁷ DE1 described a similar situation, but with a markedly more cautious tone: ‘learning English is the most mature market – there are many people, many companies, and there’s a lot of money involved, and there’s a lot of a history, and there’s a lot of different companies with lots of

²¹⁷ The expressions ‘blue sea’ and ‘red sea’ in this quote should be understood in relation to the concept of ‘blue ocean strategy’, explored in a popular business book of the same title by INSEAD professors Chan Kim and Renée Mauborgne. A ‘blue ocean strategy’ refers to ‘the simultaneous pursuit of differentiation and low cost to open up a new market space and create new demand.’ By contrast, ‘Red oceans are all the industries in existence today – the known market space. In red oceans, industry boundaries are defined and accepted, and the competitive rules of the game are known’. (‘What is Blue Ocean Strategy?’ [Blueoceanstrategy.com](https://www.blueoceanstrategy.com/what-is-blue-ocean-strategy/). <https://www.blueoceanstrategy.com/what-is-blue-ocean-strategy/> (accessed July 27, 2020)).

different perspectives. Learning Chinese, my sense is that for a long time it's been more of a specialist thing. [...] Of course, now it's becoming more mainstream, but it's still far behind.'

This lack of agreement was not limited to tool designers. When I tried to evaluate the total number of people learning Chinese worldwide, in commercial short courses, community classes and/or state-funded institutions, I soon realized that there was no reliable source giving an aggregated total number. Statistics (when they exist) are produced nationally and aggregated at different moments in time, and on the basis of different definitions of what an 'enrolled student' is – for instance, must people regularly attend classes to qualify as learning Chinese? Must the classes be at least of one hour duration per week? And what about students who withdraw midway through a course? Most often, it seems that those statistics simply do not exist, or finding them requires complex research in numerous languages, exceeding the capacity of any single researcher.²¹⁸

As for numbers circulating online, they differed significantly, and rarely if ever came from a reliable source. A September 2016 post on a website called 'Global Exams' (which came up as a top result when I conducted a Google search on 'how many students are learning mandarin') mentioned 40 million learners worldwide in 2016 and a projected 100 million in 2020.²¹⁹ Meanwhile, an article from Hutong School, published in the same month, indicates that the number of learners is expected to surpass 10 million in 2020.²²⁰ Neither

²¹⁸ As a counter example, Jane Orton aggregated Australian data for a 2016 report titled 'Building Chinese language capacity in Australia' (Orton 2016) in which she estimated how many learners there were nationwide. Personal communication from one of Orton's ex-colleague indicated that the figures were not readily available and Orton made a significant contribution in providing them. Such academic diligence on this topic, however, is rare if not unmatched.

²¹⁹ '100 million students learning Mandarin in 2020'. Globalexam.com. September 8, 2016. <https://global-exam.com/blog/en/100-million-students-learning-mandarin-in-2020/> (accessed November 2, 2019).

²²⁰ Speyer, Ida. 'The number of Chinese learners is expected to surpass 10m by 2020'. Blog.hutong-school.com. September 18, 2016. <https://blog.hutong-school.com/number-chinese-learners-expected-surpass-10m-2020/> (accessed November 2, 2019). The difference between those two sources is a factor of ten, and both articles were published in the same month, suggesting that the discrepancy may be attributed to a simple mistranslation of a Chinese source. Chinese has different characters for 100 (百), 1000 (千) and 10,000 (万), and uses the latter as the basis to express high numbers, leading to possible mistakes when, for instance, 1 million is written as '一百万' ('one hundred ten-thousands'). As the Chinese source is not quoted in either article, it is of course uncertain whether this is indeed a matter of mistranslation, or what the 'right' figure is.

provided a source for these figures. A Wikipedia page about Chinese as a foreign language mentioned the figure of 40 million learners of Chinese as a second language by 2008.²²¹ The source for this figure is a 2009 article from the Canadian paper *Globe and Mail*, which itself quotes no source.²²² Turning to Chinese language sources, an article titled ‘Unprecedented Chinese fever’ (‘汉语多热前所未有’) that circulated around multiple digital platforms in late 2017 / early 2018 opens with the grand statement ‘Presently, beyond China (including Hong Kong, Macao and Taiwan), the number of people speaking and studying Chinese in the world exceeds 100 million, which includes 60 million overseas Chinese people, and more than 40 million people from mainstream society in all countries learning and speaking Chinese’.²²³ The article includes a table from Hanban listing the number of learners by region. This table indicates 20.45 million learners globally (Figure 5 below).²²⁴

²²¹ ‘Chinese as a Foreign Language’. Wikipedia.org.

https://en.wikipedia.org/wiki/Chinese_as_a_foreign_language (accessed January 4, 2019).

²²² York, Geoffrey. ‘Papua New Guinea and China’s New Empire’. *Globe and Mail*. January 2, 2009.

<https://web.archive.org/web/20090116080945/https://www.theglobeandmail.com/servlet/story/RTGAM.20081231.nyorkchina0103/BNStory/International/home> (accessed November 10, 2019).

²²³ Chai, Rujin & Wang, Zhongyao. ‘“汉语热” 前所未有全世界都在讲中国话已不仅是歌词’

(Unprecedented ‘Chinese fever’: The whole world speaking Chinese is more than song lyrics). Chinanews.com. October 28, 2017. <http://www.haijiangzx.com/2017/1028/1934330.shtml> (accessed November 10, 2019)).

Translation from the original Chinese is mine. The website indicates the piece was originally published in the *Guangming Daily*. It was also widely republished. I was not able to find the original. It should be noted, in line with an observation I made in Chapter Four, that the text expresses a self-evident distinction between the categories of ‘overseas Chinese’ (海外华人华侨) and ‘mainstream society from all countries’ (各国主流社会). It is not altogether clear what the precise boundaries are between those two groups, for instance, whether second generation heritage speakers, or the members of established Chinese communities, or bilingual children of mixed-marriages, belong to one or other of those categories. This is important to note, as it invites to treat numbers with an added measure of suspicion. This categorical uncertainty reflects, at the level of public statistics, the original position of heritage learners, which I reflected on in Chapter Four in terms of the cultural capital derived from L2 Chinese mastery. Exploring this question in more detail exceeds the scope of this thesis.

²²⁴ I was unable to track the original Hanban source for this table. As the article quotes the figure of 40 million people ‘speaking and learning Chinese’ and the table 20 million people learning the language, this would imply that 20 million people in the world who are not of Chinese background can speak the language.

洲别	汉语教学机构数量		汉语学习人数	
	机构数 (个)	全球占比 (%)	人数 (万)	全球占比 (%)
亚洲	58483	81.4	1734	84.8
欧洲	6483	9.0	103	5
美洲	4957	6.9	135	6.6
大洋洲	1235	1.7	49	2.4
非洲	703	1.0	24	1.2
总计	71861	100	2045	100

Figure 5: Chinese learners - 2017 figures

It is common knowledge that figures cited in Wikipedia entries or otherwise circulating online can be unreliable, unless academic or other bona fide sources are provided. As for Hanban figures, as I had no access to primary sources or the methodology to explain how they were arrived at, and there was so much discrepancy between the various numbers I found online, that I chose to treat them with a measure of suspicion. Since I was unable to access reliable sources, I attempted to produce an independent estimate through desktop research, which is presented in Table 3 below, organizing the ‘market’ of enrolled learners into five main groups. Appendix Four provides extensive details of the methods and sources I used to develop this table, and should be consulted for reference. I made a deliberate choice to present all figures in brackets: this is intended to reflect the high level of uncertainty about these figures, and thus avoid the illusion that precise knowledge is within reach. In fact, the range of the figures within brackets is somewhat reflective of just how uncertain they are.²²⁵

²²⁵ This table does not take into account any private tutoring, nor potential double enrolments. Double counts are therefore likely – though to what precise extent is uncertain. The table also excludes entirely autonomous learners, or learners learning exclusively with a private tutor.

Table 3: Number of enrolled Chinese students, by category

Group	Description	Million learners
1 ²²⁶	Learners enrolled in a Chinese language class at primary school, middle school or high-school, outside of China	3 – 8 ²²⁷
1*	(Of whom Independent Internet Users at K12)	1 – 2.5
2	Children and teenagers of Chinese background, enrolled in independent community schools and Sunday schools	0.5 – 2.5
2*	(Of whom Independent Internet Users at community schools)	0.2 – 0.8
3	Students enrolled in a language course at universities in China	0.2 – 0.4
4	Students enrolled in a Chinese studies degree or other language course at a university outside China	0.75 – 2
5	Adult learners at Confucius Institutes and independent language schools	2 – 4
Total ²²⁸	Enrolled Chinese learners (all ages)	6 – 17
Total*	Enrolled Chinese learners who are independent Internet users	4 – 9

²²⁶ Although this group is highly heterogeneous from a second language acquisition perspective (as it combines widely different ages and levels of competency) I counted it as a single group because the figures I was able to find often merged primary and secondary schools. More details are provided in Appendix Four.

²²⁷ Of those, an estimated 500,000 – 800,000 are learners from English speaking countries outside Asia (UK, US, Canada, Australia, New Zealand), with disproportionately high numbers in Australia and New Zealand, attributable to the economic importance of China for those two countries, and the high proportion of citizens and residents who are of Chinese background.

²²⁸ Total figures are rounded down to the lowest million. This is to avoid the illusion of certainty, and account for likely double counts.

A comparison with the numbers of people learning other languages will help put those figures in perspective. Two recent online publications reported the number of 1.5 billion people learning English across the world, both attributing this figure to a 2014 British Council survey.²²⁹ At the 2016 LanguageCon in Shanghai, Hank Horkoff indicated that, in China alone, hundreds of millions of people are currently looking to learn English. Commenting on this situation, DE6 stated: ‘English, that’s where the money is’. The gap between English and other languages is indeed remarkable.²³⁰ A 2018 report from l’Observatoire de la Francophonie indicates 51.5 million French learners around the world.²³¹ According to a 2017 report from Instituto Cervantes, there are 21.2 million people learning Spanish as a foreign language.²³² By 2015, according to estimates by the Goethe Institute, some 14.5 million people were learning German as a foreign language.²³³ To the extent that we do not know how these figures have been arrived at, we should also treat them as tentative. However, they are sufficient to broadly indicate that Chinese ranks somewhere

²²⁹ Bentley, John. Report from TESOL 2014: 1.5 Billion English Learners Worldwide. International TEFL Academy Blog. February 24, 2020. <https://www.internationalteflacademy.com/blog/bid/205659/report-from-tesol-2014-1-5-billion-english-learners-worldwide> (accessed March 13, 2020).

Beare, Kenneth. ‘How Many People Learn English?’. ThoughtCo.com. November 18, 2019. <https://www.thoughtco.com/ahow-many-people-learn-english-globally-1210367> (accessed March 13, 2020).

²³⁰ An important implication is that many learners of Chinese will have English as a second language, and come to Chinese with previous experience in language acquisition from learning English – though the exact proportion, again, is uncertain.

²³¹ Organisation Internationale de la Francophonie. ‘La Langue française dans le monde : synthèse 2018’. Obvervatoire.francophonie.org. <http://observatoire.francophonie.org/2018/synthese.pdf> (accessed March 13, 2020).

²³² Instituto Cervantes. ‘El Español: Una Lengua Viva. Informe 2017’. Cvc.cervantes.es. https://cvc.cervantes.es/lengua/espanol_lengua_viva/pdf/espanol_lengua_viva_2017.pdf (accessed March 13, 2020).

²³³ Edwards, Matty. ‘German is World’s Fourth Most Popular Language’. Thelocal.de. April 15, 2015. <https://www.thelocal.de/20150415/german-is-fourth-most-learnt-language-globally> (accessed March 13, 2020).

between the third and fifth most widely-learned foreign language in the world – with absolute numbers far below those of English.²³⁴

To understand the disruptive potential of digital Chinese language learning tools, the numbers provided in Table 3 must be contextualized against the number of ‘users’ for those tools. Here again, there are no readily available aggregated figures, and there is no clear definition of who should count as a ‘user’ (i.e. how long and how frequently would a person need to ‘use’ a tool for them to be counted). It is also unclear what proportion of learners use multiple tools, although incidental testimony, personal experience, and comments from designers, indicate that this happens often.²³⁵ In spite of those difficulties, I was able to make rough estimates by looking at app downloads and website visits for tools in the central cluster, and therefore produce estimates indicating an order of magnitude.²³⁶

The Google Appstore indicates an approximate number of downloads for apps listed on it. On November 6, 2019, Pleco, Hello Chinese and Chinese Skills had been installed 1 million+ times, while the Chairman’s Bao app and Skritter had both been installed 50,000+ times. Apple’s iOS Appstore does not provide such estimates, but it is possible to calculate figures by proxy, since over the period considered in the thesis, iOS had approximately 1/4 of the market, against 3/4 for Android. On this basis, we can assume that the worldwide number

²³⁴ As French, Spanish and German (as well as Italian, Portuguese, Romanian, Dutch and Scandinavian languages) have linguistic similarities, the development of digital tools for learning those languages can be undertaken using similar design principles. Conversely, Chinese presents the added challenge of tones, characters, and a very different grammar from Indo-European languages. The consequence is that developing a tool for Chinese learning is likely to represent an added effort for designers, while the prospective number of learners is limited. Therefore, it is particularly likely that the development of a tool to learn Chinese (as opposed to another language) has motivations that exceed pure commercial goals. I return to this point in Chapter Eight.

²³⁵ It should be noted that many digital tools are adopted by L2 English speakers, even though their interface language is English. The extent to which this happens, however, is unclear. Anecdotal evidence indicates that this is a limited issue in countries where the dominant language is a Germanic or Romance language (e.g. most of the EU and Latin America). As for penetration in Asia – where most enrolled Chinese learners are located – it is not something I have been able to trace, beyond a statement by DE9 that their tool, initially developed for an English-speaking learning market, was popular for a while in Korea and Taiwan.

²³⁶ The data was collected at the time of writing the thesis, in 2019. Nothing in my fieldwork indicates a significant rise or drop in numbers overall. More sophisticated analysis would consider the proportion of paying vs non-paying users, returning users, rate of adoption, drop-out rate, and evolution over time in more detail. Doing so exceeds the scope of this thesis.

of downloads for those apps is 1.25 million+ for Pleco, Hello Chinese and Chinese Skills, and 75,000+ for The Chairman's Bao and Skritter.

I used the web traffic estimator SimilarWeb to gather the average number of visits per month on the websites that belong to what I defined as a 'central cluster'.²³⁷ This number was around 50,000 for Skritter, 100,000 for The Chairman's Bao, 150,000 for Hacking Chinese, and 200,000 for ChinesePod. As a point of comparison, I noted 250,000 visits for Yoyo Chinese and, as at October 17, 2019, the Yoyo Chinese channel on YouTube had 266,000 subscribers.²³⁸ The most widely adopted tool was Duolingo: by May 2018, Duolingo had amassed 300 million users across all languages.²³⁹ The Duolingo website, which lists the number of learners by language, indicated 3.97 million for Chinese as at May 9, 2020. Some other tools in the central cluster, as well as those I called 'system shapers', are used for multiple languages: the best I was able to do was to derive an estimate of Chinese learners as a proportion of total users. By 2017, according to an interview with Kevin Chen published on Sina, Italki had more than 4 million users, and SimilarWeb listed 5 million visits / month for Italki over the period June-November 2019.²⁴⁰ In the same period, FluentU had 6 million visits. As a point of comparison, according to an interview, HelloTalk, founded in 2012, had

²³⁷ The free version of Similar Web, which I used to get those measures, offers an estimate over a period of 6 months. Figures are as per mid-November 2019, and are a rounded average (the period was too short for trends to be significant, and 6 month trends did not show significant variations). More sophisticated measures would take into consideration unique visitors in relation to total visits, time spent on site and bounce rates, and interpret those in relation to tool design and the expected duration of learning practices conducted on each tool. They would also consider evolution over time. Doing so exceeds the scope of this thesis. The raw numbers quoted here are intended purely to provide an order of magnitude, and enable a comparison with the estimated numbers of enrolled learners.

²³⁸ 'Yoyo Chinese channel'. YouTube.com. <https://www.youtube.com/channel/UCSJyGe2H0C9q6QH0-hH04zw> (accessed November 13, 2019).

²³⁹ HelloTalk Inc. 'HelloTalk Language Learning App Surpasses 10 Million Users'. PRNewswire.com. May 30, 2018. <https://www.prnewswire.com/news-releases/hellotalk-language-learning-app-surpasses-10-million-users-300656135.html> (accessed November 13, 2019).

²⁴⁰ 'Italki Kevin Chen : 做语言学习的“淘宝” ('create a Taobao for language learning'). Finance.sina.com. July 13, 2017. <http://finance.sina.com.cn/money/lczz/2017-07-13/details-ifyiakwa3999680.shtml> (accessed November 13, 2019).

reached 10 million users in 2018.²⁴¹ Assuming the proportion of Chinese learners to total number of learners on those tools is similar to that of Duolingo, it adds up to 50,000, 60,000 and 100,000 learners for Italki, FluentU and HelloTalk respectively.

Those figures indicate that digital learning tools are relatively significant in terms of user numbers. The total number of people who downloaded the Chinese version of Duolingo approached the estimated lower bracket of the total number of Independent Internet Users enrolled in a Chinese course worldwide in one year (both ~4 million). Those numbers provide some context for assessing if and whether digital Chinese language learning tools can be described as a disruptive innovation, for disruption must affect a sufficiently large number of users in order to make sense. This leads us to the next set of questions: what type of learner uses those tools, or might use them, and how would they perceive the value of those tools?

7.1.2 Who uses digital learning tools? Towards a DIY transmedia experience

As a first step towards answering these questions, I propose to segment the ‘market’ of digital Chinese language learning tools users into three key groups, using ‘enrollment in a course’ as a defining trait. Those groups are thus:

- Learners currently enrolled in a course, who use (or may use) digital tools to supplement their learning, under their teachers’ guidance or autonomously. The potential size of this ‘market’ is 4-9 million people (as per estimates listed in Table 3).
- Learners previously enrolled in a course who use tools in order to apply, maintain or pursue their learning, as so-called ‘lifelong learners’.²⁴² Numbers are uncertain for the same reasons that the numbers of people currently learning Chinese are

²⁴¹ HelloTalk Inc. ‘HelloTalk Language Learning App Surpasses 10 Million Users’. PRNewswire.com. May 30, 2018. <https://www.prnewswire.com/news-releases/hellotalk-language-learning-app-surpasses-10-million-users-300656135.html> (accessed November, 13 2019).

²⁴² When it comes to the definition of this category of ‘lifelong learners’, one point of definitional uncertainty is whether it includes or should include heritage speakers who received their education in a language other than Chinese. If all were included, this group would include a large proportion of the population of Singapore and Malaysia – although perceptions of identity, linguistic competence and self-definition as a ‘Chinese language learner’ are likely to be very different from those of Caucasian learners who studied Chinese in an Australian or US high school.

uncertain. According to the article ‘Unprecedented Chinese Fever’ quoted in the previous section, 20 million people other than overseas Chinese have learned the language and are currently using it.²⁴³ I will use this figure as a tentative benchmark for the size of this ‘market’.

- People with no previous Chinese learning experience who use digital tools instead of enrolling in a course. The size of this ‘beginner’ market may be in the billions or hundreds of millions, though for practical matters, it is entirely indeterminate.²⁴⁴

This segmentation is of little relevance from a pedagogical perspective, as each group gathers learners with widely divergent learning needs: learners with different identities, different previous language learning experience, different linguistic backgrounds, different learning goals, and different levels of communicative competence in Chinese. From what we may call an ‘operational perspective’, however, those three categories can usefully be conceived as forming a ‘pipeline’ with three stages: prospective learners (who ‘try out’ Chinese language learning or learn some ‘basics’), active learners (who commit a focused period of time to increasing their Chinese skills), and lifelong learners (who primarily ‘apply’ or ‘maintain’ their acquired skills).

This analysis complements the typology of digital tools discussed in Chapter Five as it is conceptualized around the interdependence between ‘tools’ and ‘resources’ (outlined in that chapter). In my typology, I was firstly able to establish a continuity between categories of tools that I described as ‘practice environments’ and ‘formatted content’ with what I called ‘resources supporting mediated immersion’ (Chinese social media and digital Chinese content). This continuity is indicative of a porous boundary between ‘language learning’ and ‘language use’ in a digital context – more porous, that is, than in non-digital settings.

²⁴³ A significant proportion of those learners are located in Asia, and are L1 speakers of Korean, Japanese, Thai or Burmese. As I noted in note 235, there is anecdotal evidence that a proportion of those learners are using tools whose interface is in English, although the rate at which this is the case is unknown.

²⁴⁴ In terms of pure numbers, ‘prospective learners’ are by far the largest ‘market’, and therefore offer the largest potential returns on investment. It is therefore unsurprising that a disproportionate number of tools target beginners. This was manifest from personal observation, and directly mentioned with frustration by three of the learners I interviewed, who were themselves more advanced. ‘I’m an advanced learner and I would say just anecdotally that at least 90% of the market is aimed very low and at beginners only,’ stated LE1. LE2 and LE4 made similar statements.

Secondly, this led me to envisage digital tools as offering a halfway step in a learner's journey towards mediated immersion: 'tools' bundle different functionalities in a way intended to guide the learner, making these tools more convenient to use than 'resources' that have been assembled bricolage-style. However, tech-savvy and highly motivated learners could dispense with 'tools' (understood in this narrower sense) altogether – that is, they would be able to directly engage in 'mediated immersion' with the support of existing language accessibility tools. In the same manner, I propose here that digital tools, when used as a set, can replace offline Chinese language courses. However, only tech-savvy and highly motivated learners would be able to make use of the digital tools in this manner, for one needs to have the skills to assemble them in the most optimal way, bricolage fashion, to suit one's unique needs.²⁴⁵

I arrived at this view during my fieldwork, and as a result, was prompted to consider the evolving relationship between institutions and digital tools from a new perspective, focusing on their complementarity from the perspective of learners. Reflecting on the prospect of eliminating institutions of learning, DE3 indicated that this would be hard to imagine, as there is so much inertia in the system. DE1 elaborated on this idea as follows:

I don't think we're killing schools or anything like that [...] just the balance might be different. [...] I don't want to say it's us or Berlitz, it's us or Duolingo, why isn't it us and Berlitz, us and Duolingo. You have a teacher who shows up in person, they can't give individual attention to 20 students. It's not possible. So, you know, I think there is a place for it. Same for Duolingo, it's great fun, you can practice your vocabulary, you can practice a couple of these things, but you can't become fluent by yourself with just Duolingo or Skritter. It's a waste for you to copy characters in front of your teacher. You could do that on an app while you're on the subway and you don't have access to a live stream with a teacher. Why not? It is all a piece of your education. And every language will be different and every language learner will be different, so I feel like, it's a thing, you have to assemble yourself.

What DE1 describes is the kind of DIY transmedia learning experience that has now become quite commonplace among users of digital language learning tools. This vision is in line with the way that Jenkins describes a participatory culture as one where participants 'join in the building and customizing of services and messages rather than [...] expect companies

²⁴⁵ I return to the question of learning outcomes in the next section.

[or in this case, learning institutions] to present complete and fully formed experiences.’ (Jenkins, Ford & Green 2013, p.49).

Instead of the classroom schedule, teacher, and textbook being central to the learner’s experience, digital technology thus opens the possibility for learners to conduct a set of coordinated practices that spans their online and offline experiences, with teachers and/or peers, in bricolage fashion. To the extent that tool designers are collaborating with teachers and institutions of learning, we could describe the value of tools to institutions as facilitating new types of learning experiences in which digital tools play an increasingly important part. In this regard, as digital tools become more widely used, there could be an emerging trend in which institutional learning becomes an adjunct to a learner-centric experience enabled by a combination of digital tools. In this learning paradigm, digital tools, individually and as a set, may be described as enabling a change in the ‘centre of gravity’ of Chinese language education.

7.1.3 Online vs offline: an impossible cost-benefit analysis

A normative question remains: how do digital language learning tools compare with offline alternatives when it comes to developing communicative competence in Chinese? Providing an answer is a serious challenge, for theoretical and practical reasons. Yet the question must be addressed somehow if we are to identify digital Chinese language learning tools as a ‘disruptive innovation’, and more generally attempt to identify their value. So, short of providing a definite answer, I would like to propose alternative ways of framing the question.

As a starting point, it is important to note that the outcomes of a Chinese language learning practice conducted exclusively or primarily through digital tools (to support a DIY transmedia learning practice, as described in the previous section), are unknown for now. This is a clear point of difference with institution-based education with its predetermined and clearly articulated criteria and objectives. To the best of my knowledge, there has been no large-scale, long-term evaluation comparing the language learning outcomes of learners using various combinations of digital tools, and learners using purely offline or institution-based blended models. Such an evaluation would require a robust and holistic framework capable of assessing different types of learning goals. Beyond anecdotal evidence and positive comments about digital tools gathered from learners, teachers or designers, it remains unclear

exactly how the exclusive use of digital tools to develop communicative competence in Chinese compares with institution-based blended models of learning.²⁴⁶

In the course of my research, I did come across learners who achieved Chinese language ‘proficiency’ through digitally mediated autonomous learning practices. I had done so myself. However, like me, those learners were a minority among Chinese language students and they were only able to achieve a limited level of communicative competence through their autonomous online learning practices.²⁴⁷ In fact, LE4 pointed this out as a potential shortcoming of digital tools, stating: ‘if there would be a tool that would push people from an intermediate level to an advanced level in a systematic way, that they could actually really interact in high level discussions, complex themes, at a native level rhythm, not having to slow it down and explain things, that would be kind of a miracle.’ The quote indicates that, for now at least, digital tools may fall short of allowing learners to reach the most advanced levels of communicative competence, that is a CEFR-equivalent C1 or C2.

However, it should be noted that if institution-based education does have a track record of training Chinese learners to ‘interact in high level discussions, complex themes, at a native level rhythm, not having to slow it down and explain things’, it has failed to do so on any large scale. An article by Jane Orton from March 2016 published in the Australian newspaper *The Age* states: ‘It has been estimated that the current number of proficient adult speakers of Chinese in Australia of non-Chinese background is 130 at most; and half of those

²⁴⁶ Practical reasons prevent such research being conducted: the fast rate of technological evolution stands in the way of such a study, as the study may be obsolete by the time of its completion.

²⁴⁷ Including myself – I passed a level 5 of the HSK test, equivalent to a CEFR B1, after learning Chinese autonomously, largely through digital tools. My classroom learning, by then, was limited to about 40 hours, including a few classes in Tianjin (on a scholarship trip), and a term of study at a Confucius Institute in Melbourne. However, I had previously received extensive classroom training in foreign languages through high school and university in France, had learned nine languages (to different levels of proficiency) before learning Chinese, and professionally taught linguistics and grammar in French and English. One of my contacts achieved Chinese proficiency autonomously, but again, was a passionate linguist, L1 speaker of English, and proficient in Japanese, French and Czech, when he started learning Chinese. Benny the Irish Polyglot, who promotes autonomous language learning with support from digital tools, is himself a super-polyglot. I have met no examples of learners who learned Chinese autonomously with support from digital learning tools other than polyglots and language enthusiasts with a similar profile.

are already over 55 years of age.’²⁴⁸ This figure was repeated in another Australian news article in 2019.²⁴⁹ The figure was quoted in a statement on Twitter by Labor MP Chris Bowen on May 3, 2019, and assessed as a valid ‘educated guess’ in a ‘fact check’ piece published by the ABC, in partnership with RMIT University.²⁵⁰ Other academics I spoke with indicate that the number may be somewhat higher on the basis of their experience. Importantly, though, those conversations revealed hesitation as to the definition of ‘proficiency’. Incidental observation and my own experience in the field clearly suggest that far more than 130 adults of non-Chinese background in Australia are ‘proficient’ in Mandarin, in the sense that they can have a dinner party conversation or interact in the language somewhat autonomously, at a level equivalent to a CEFR B1 or B2. As for the small number of non-heritage learners who ever achieve a CEFR C1 or C2 level, enabling them, for instance, to serve as a TV host or conduct advanced professional interactions, it may very well be limited to 130 in Australia, or be even fewer in number.²⁵¹ In all likelihood, a similar situation prevails around the world.

Moreover, the comparative value of different levels of communicative competence is highly field-dependent, and therefore impossible to define at scale. How should one compare the value of 4 million people reaching a CEFR-equivalent A1 level in Chinese as opposed to 130 people reaching a C2 level? From the perspective of a state-body looking to fund alternative programs, even assuming it was possible to make accurate predictions as to the outcomes of those programs, what would be the respective dollar value of those two

²⁴⁸ Orton, Jane. ‘Australians are too lazy to learn Chinese’. www.smh.com.au. March 14, 2016. <https://www.smh.com.au/national/australias-potential-in-china-lost-in-translation-20160314-gni7zt.html> (accessed May 5, 2020). Orton does not cite any sources for this claim.

²⁴⁹ Bolton, Robert. ‘Canberra, Beijing hurt by lack of Australian Mandarin speakers’. *Afr.com*. November 18, 2019. <https://www.afr.com/work-and-careers/education/canberra-beijing-hurt-by-lack-of-australian-mandarin-speakers-20191115-p53b3r> (accessed May 5, 2020).

²⁵⁰ RMIT ABC Fact Check. ‘Are there only 130 Australians of non-Chinese heritage who can speak Mandarin proficiently?’. *Abc.net.au*. June 24, 2019. <https://www.abc.net.au/news/2019-06-24/fact-check-are-there-only-130-people-who-can-speak-mandarin/11235484> (accessed May 5, 2020). Chris Bowen’s Tweet appears in the ABC article.

²⁵¹ Attrition is another matter deserving a mention here. Incidental evidence encountered during my fieldwork shows that it is very high for digital tools: not everybody who downloads Duolingo Chinese finishes the course, or even goes beyond the first lesson. However, attrition also plagues offline education, as was manifest from a number of conversations with academics and secondary school teachers during my fieldwork.

outcomes? The answer is obviously ‘it depends’. This is because the cultural capital value of different levels of communicative competence is intrinsically field dependent. In addition, as discussed in Chapter Four, digital technology has transformed the conditions in which Chinese is used. For instance, predictive typing has arguably made handwriting functionally obsolete. Depending on field structures, this may either result in loss of perceived value for learning practices that involve handwriting, or raise their value, as they become a quaint aristocratic achievement, and therefore a sign of distinction.

If the respective benefits of digital tools and offline courses cannot be readily compared, when it comes to assessing their respective cost – at least their financial cost – things are much clearer. Looking back at the prices I listed in Chapter Six, subscribing to all nine tools in the central cluster for a year, assuming that one buys a premium subscription to all of these tools, and includes fifty one-hour language tutoring sessions on Italki, the total cost would add up to \$1500-\$1750.²⁵² This sum could easily be reduced to \$1000 by eliminating either Chinesepod or FluentU, replacing Hello Chinese with Duolingo (which offers similar features and is available for free), and taking fewer lessons on Italki. The sum could be further reduced, all the way down to \$0: as discussed in Chapter Five, a learner could use the free version or free ‘sample lessons’ of tools like Pleco and Chinesepod, in combination with other free tools, resources and quasi-resources assembled in bricolage fashion.

\$0 is an unbeatable cost. This may be somewhat irrelevant to Chinese language learners who have access to scholarships or other subsidies – and thus rarely pay the full cost of language education as individuals, or may even be financially incentivized to study in a course. From a collective perspective, however, this is highly relevant, as digital technology is scalable, and therefore increasingly cheaper as student numbers grow – enabling the prospect of training large scale Chinese language literacy at a very low cost.²⁵³ To give an

²⁵² Hacking Chinese bundle at \$97, Pleco premium at \$59.99, Chinesepod at \$249, The Chairman’s Bao at \$80, FluentU at \$240, Skritter at \$99.99, and Hello Chinese at \$149.99, to a total of \$975.97. Many of those tools offer mutual discounts and special offers, so that the cost could be lowered to around \$750-850. Adding 50 hours of tutoring with Italki at \$15/h, brings the cost for a year at around \$1500-\$1750.

²⁵³ It is important to remember that some tools focus exclusively on Chinese, while others target multiple languages (for instance, Italki, FluentU or Duolingo), enabling further economies of scale. Even Skritter does this to some extent by enabling the learning of both Chinese and Japanese, which share a common set of characters. It should also be noted that, for now, a tool like Italki relies on tutors, and is therefore of limited

idea of this cost, six of the nine tools I listed in the ‘central cluster’ focus exclusively on Chinese, and one (Skritter) on Chinese and Japanese only. The seven companies making those tools, in total, employ no more than one hundred people (many of whom do not work on a full-time basis), with very limited overheads for servers and office rent.²⁵⁴ The two remaining tools in the ‘central cluster’, FluentU and Italki, offer multiple languages other than Chinese, but even if we were to include the total number of people employed by them, the number of people involved in maintaining the ‘central cluster’ would remain around two hundred or so.²⁵⁵ Even if we added ‘system shapers’ (tools like ‘HelloTalk’, ‘Anki’ or even ‘Duolingo’), the total number of people employed to maintain a core ‘ecosystem’ of tools – facilitating not just the learning of the Chinese language, but a broad range of other languages – would hardly exceed one thousand. Now, looking at costs, assuming a relatively high average salary + overheads cost of US\$100,000 per year for each employee, the yearly cost

scalability. However, anticipated improvements in the capacities of artificial intelligence, and the rise of chatbots, as described in Chapter Four, offer the possibility of yet further scalability.

²⁵⁴ Assessing the precise number of people involved in maintaining those tools is not straightforward. That is in part because data is not readily available, and because beyond the core team, many tools employ freelancers or rely on pro bono work for programming and/or content development. I discuss this further in Chapter Eight. To calculate the number of people employed, I used data from my interviews, ‘team’ pages on the tools’ websites, and LinkedIn company pages indicating the number of people listing the tool as their employer. Hacking Chinese, Pleco and the Chinese Grammar Wiki are all one-person ventures (not counting pro bono contributors who guest-blog on Hacking Chinese or contribute to the Chinese Grammar Wiki, or occasional freelance developers supporting the tool). Hello Chinese employs three people and Skritter eight people (one of whom is Olle Linge, who also runs Hacking Chinese). According to their website, The Chairman’s Bao employs six people in the core team, and an additional thirteen writers in the ‘content team’, while their LinkedIn page indicates 41 employees. The Chinesepod website does not have a team page, but their LinkedIn page indicates 43 employees. It is likely that, as for The Chairman’s Bao, the majority are freelancers or part-timers working on generating content.

²⁵⁵ FluentU has neither a team page nor a LinkedIn company page. Based on its operations, I estimate that it employs around 50 people, although it may well be larger. Italki’s team was approximately 30-40 people when I visited their office in 2016. I was not able to assess the numbers with precision, since there is no team page on the website, and information on LinkedIn is somewhat confusing. Indeed, the LinkedIn company page for Italki indicates that it is in a size-category of ‘50-200 people’, but also indicates 1722 people listing Italki as their employer. Of those, many are actually teachers tutoring through Italki, and listing the platform as their employer on LinkedIn. As a double-sided marketplace facilitating exchanges between learners and tutors, Italki does not in itself teach Chinese, and relies on a larger workforce of tutors. I have touched on this matter in relation to the reorganization of labour in Chapter Four. Studying this in more detail exceeds the scope of this thesis.

of maintaining merely the ‘central cluster’ would hover around US\$20 million per year. Even including ‘system shapers’, it would remain around US\$100 million per year. And this figure would enable not just an ecosystem for Chinese learning, but other languages as well, on Duolingo, HelloTalk, FluentU and Italki. By contrast, the global budget allocated to Confucius Institutes alone has risen steadily since the first of these institutes was established, exceeding US\$300 million globally in 2014, and with the total amount invested from the program’s inception in 2007 to 2015 being close to US\$1.8 billion (Gil 2017, p.37). The figures I quoted for digital tools are extremely tentative, of course; nonetheless, on the basis of this calculation, we can see that Confucius Institute programs exceeds the costs involved in developing and maintaining the ‘central cluster’ of tools I observed by an order of magnitude – not to mention that two of those tools support many more language than just Chinese.²⁵⁶ In other words, for as long as an Internet infrastructure is maintained through platforms such as WeChat, Google Translate, MeetUp, Twitter, Facebook, and YouTube, large-scale Chinese language education can be made available at a relatively low cost compared to offline provision.²⁵⁷

However, again, simply stating that digital tools trump offline education on the basis of a better cost-benefit analysis is somewhat simplistic and disingenuous. Non-pedagogical considerations come into play. For one thing, there are always secondary goals of state and commercial investment in language education to consider. For example, the role of Confucius Institutes is to promote Chinese soft power and the program is evidently propagandistic. These matters have been abundantly written about (for instance, see Gil 2017). Another example of a non-pedagogical consideration would be the second-order consequences of digital technology on the organization of labour.²⁵⁸ In the absence of an efficient (public or commercial) system to optimize Chinese education on a global scale, the disruptive potential

²⁵⁶ Investment in narrowly-focused institutional tools I referred to as ‘black holes’ at the end of Chapter Six is particularly problematic when the above figures are taken into consideration.

²⁵⁷ As I have argued in Chapter 5, the integral role played by these platforms requires us to see them as ‘resources’ for online language learning. I return to the economic conditions enabling the existence of those social media platforms at the end of this chapter.

²⁵⁸ I describe this in Chapter Four when exploring four disruptive possibilities in Chinese language education arising from digital technology: ephemeralization, digitally mediated tutoring, replacement of teachers by AI (e.g. chatbots) for certain functions, and large-scale peer learning.

of digital technology may be seen negatively as a potential threat to individuals seeking Chinese teaching jobs.

Although I did not find clear figures on this matter, second-hand reports indicated a measure of frustration among PRC citizens who trained in teaching Chinese as a Second Language and then found it difficult to secure employment. DE6 described the experience of Confucius Institute teachers sent abroad during their university studies in those terms: they reported meeting some of those teachers after they came back, and how the teachers felt ‘disillusioned and used by that program’, since teaching Chinese presented few opportunities for career advancement. In this regard, digital tools could be considered as further eroding the employment prospect for those Chinese teachers. This is particularly evident when considering the large numbers of potential Chinese language teachers internationally. Based on the figures I collected in the first section of this chapter, the ratio of L1 speakers to learners is about one hundred to one for Chinese. By comparison, for Spanish, it is about twenty to one, for French, about two to one, and for English, about one to three.²⁵⁹ Given that the L1 speaker/learner ratio difference between Chinese and English is a factor of about 300, it is hardly surprising that digital tools for Chinese language learning have not seized the imagination of institutional leaders or CEOs of large tech companies.²⁶⁰

One broader issue to consider is the attraction of digital tools for learners. There is an expectation among many learners of Chinese that digital tools can fast track them to an elementary level at low-cost (i.e. from no Chinese competence whatsoever to a CEFR-equivalent A1 or A2 level). There is thus also the expectation that digital tools can help one exceed the pace of learning at institutions of learning, and perhaps do so in a fun and flexible

²⁵⁹ Estimates of global language learner figures are purely indicative of an order of magnitude. The concept of a ‘first speaker’ is itself problematic, and therefore, the same is true of the ratios proposed here, which are no more than rough rounded estimates.

²⁶⁰ In this regard, I noted a prevailing belief among tool designers, extending to learners and even some teachers I interviewed, that digital Chinese language learning tools developed by ‘Western’ designers were perceived to be ‘superior’ – by which was meant that they were better adapted to Western learners, or more suited to their learning needs. Various arguments were proposed to back this belief, from prevailing ‘bureaucratic tendencies’ among Chinese teachers to the longer tradition of SLA studies in the US somehow seeping through to Chinese teachers of ‘Western’ background. None of those arguments are backed by serious research, making the prevalence of this belief in the field particularly worthy of note. Exploring this question in more detail exceeds the scope of this thesis.

manner. However, the use of digital tools may well have negative consequences, such as the development of ‘bad learning habits’: for instance, by providing automatic translation, tools may hamper the learner from achieving certain levels of competence in the long term, or digital tools might negatively affect motivation over time. Conversely, a well-conducted teacher-led language class can foster the development of a critical attitude to language learning and inventiveness in language use among students, and this is a positive human-centered side-effect which digital tools cannot provide (or only to a much smaller extent). In this regard, value judgements about what constitutes ‘bad learning habits’ or ‘positive side effects’ are open to interpretation and field dependent.²⁶¹ Moreover, the ‘benefits’ of digital tools become visible only when learners have developed the necessary technological skills to make the most effective use of those tools. The cost of developing those skills (and of maintaining the motivation and discipline to improve one’s Chinese by using digital learning tools) should be taken into account as part of any cost-benefit equation.

In short, to conduct a cost-benefit analysis of digital tools brings us back to the field-dependent nature of any discussion about the value of digital tools and the practices they support. What type of Chinese language learning practice will be deemed most valuable, and how will this impact public funding allocation for and symbolic recognition of Chinese language skills such that the ability to speak Chinese becomes a marker of an individual’s success (in the way that English language skills are much sought after)? How will different models of learning Chinese be promoted? To find answers to those questions is not easy. In my view, the value of digital Chinese language learning tools cannot be properly understood without taking into consideration changes in field structures. I find this passage from Bourdieu describing struggles around the ‘conversion rate’ of different types of cultural capital highly relevant in that regard:

The relative strength which the individuals can put into this struggle, or, in other words, the distribution at that moment of the different types of capital, defines the structure of the field; but, equally, the strength which the individuals command depends on the state of the struggle over the definition of the stake of the struggle. The definition of the legitimate means and stakes of struggle is in fact one of the

²⁶¹ The observation made at the end of Chapter Five that educational goals remain culturally dependent applies here as well: the development of critical judgement as a side-effect of a language class, for instance, is more likely to be valued positively in a Western than a Chinese context.

stakes of the struggle, and the relative efficacy of the means of controlling the game (the different sorts of capital) is itself at stake, and therefore subject to variations in the course of the game. [...] The conversion rate between one sort of capital and another is fought over at all times and is therefore subject to endless fluctuations (Bourdieu, 1984, p. 246).

In short, the cost-benefit comparison between digital and non-digital Chinese language learning options is not directly possible, as it brings forth larger cultural, socio-economic, and pedagogical questions, which cannot be properly understood outside of an associated analysis of shifting field structures. This is what I will now turn to.

7.2 Making Chinese language learning free?

7.2.1 Towards a unified digital ecosystem?

Reflecting on the ways that different tools work together, DE1 made explicit reference to there being an ‘ecosystem’ of digital Chinese language learning, as mentioned in Chapter Five. However, later in the same interview, they described that ecosystem as ‘very fragmented’. DE6 also used the word ‘ecosystem’ to refer to the various tools in existence and the people developing them, but with a more cautious assessment of the situation, saying ‘it’s a bunch of different agents doing all kinds of things [...] it’s such a chaotic ecosystem.’ DE3, when describing the same situation, stated: ‘there are pieces that are done well, but we are far from having a complete solution, or even remotely complete, and all attempts are horribly bad.’ This situation, argued DE3, does not apply only to Chinese: ‘I think it’s the same problem for other languages too. [...] I doubt that there are very good pedagogical solutions to English.’

As a first step towards exploring the possible emergence of an ‘ecosystem’ of tools, I would like to reflect on the use of the words ‘problem’ and ‘solution’ by DE3, as characteristic of an influential approach now commonly known as design thinking in the start-up field. This approach frames technology as a ‘solution’ to a ‘problem’, in a dynamic environment where the expected role of technological innovation is to provide ongoing improvement of the status quo. The work of a designer is to identify a ‘problem’ and create a piece of technology – a tool – that offers a ‘solution’ to that ‘problem’.²⁶² This model for

²⁶² This way of conceiving technology has been the object of criticism, notably by Evgeny Morozov, who used the label of ‘solutionism’ to describe (and denounce) its simplistic expression (Morozov 2013).

understanding technology is congruent with the way that I defined tools in contrast with resources in Chapter Five, whereby a tool is designed to provide a solution to a learning problem while a resource serves a broader range of user needs. For a tool to work as anticipated, it is important that the ‘solution’ be related to a problem that the learner and/or teacher effectively recognizes as a problem.

A passage from Brian Arthur’s *The Nature of Technology* is helpful for understanding this point and its implications. Arthur describes two ways of analyzing what he calls technological modularity. Taking the example of an F-35C fighter plane, Arthur writes that it is possible to break it down into component parts – motors, radars, and so on, and at a lower level of analysis, wires, alloys, and so on – articulate their function in relation to the plane as a whole, and identify how to improve each element in order to make a better plane. Taking the same F-35C as a point of departure, one can also proceed in another direction, viewing the plane as part of an air wing, which itself is a functional part of a broader theatre-of-war system, or integrated strategic units consisting of planes, aircraft carriers, and so on (Arthur 2009, p.14). Understanding the theatre-of-war system, as Arthur’s analysis implies, is necessary to assess what makes a plane ‘better’, as this value judgement depends on the plane’s capacity to support different strategic goals, because of its speed, weight, or other characteristics. To that extent, the value of a plane’s components (motors, radars, wires, alloys, and so on) depends on their capacity to enhance certain aspects of the plane’s performance relevant to its function in the theatre-of-war context. Military institutions are in place to coordinate what Brian Arthur calls ‘theater-of-war systems’, and therefore assess the value of different features of a plane or other technology, commission development, and reward the people developing them. When it comes to digital language learning tools, however, there are no clear institutional structures, or central strategic units, to coordinate tools as part of a ‘theatre of war’ system. In other words, there are enormous hurdles preventing the development of an integrated set of digital Chinese language learning tools. These hurdles, in turn, prevent the emergence of a clear set of criteria to assess the comparative value of different kinds of tools, or different functions of the same tool, in relation to accepted strategic goals. These hurdles would have to be overcome in order for an integrated ‘ecosystem’ of tools to become a reality.

In digital environments, the challenges posed by the lack of institutional or systemic cohesion are typically solved de facto by large companies acting as platforms, which ‘reduce the burden of coordination, and create conditions where small independent firms can

innovate, by providing clear modularity and a standardized interface’ (Brusoni & Prencipe 2013, pp.170-171). For Chinese language learning, such clear modularity would take the form of complementary practices – such as the various elements of a curriculum – each constituting the equivalent of a ‘function’ that a tool can be designed to serve. In relation to this set of complementary functions, such a platform would offer a standardized interface for designers to develop different tools supporting those practices, and thereby to provide learners and teachers with the means to compare and adopt the tools that they find most fit for purpose, or offer the best cost-benefit ratio. It would, in addition, enable clearer comparison of different tools, same-for-same – thus enabling what I earlier described as ‘DIY transmedia practices’ on a larger scale. However, there is no such platform currently in existence to facilitate the distributed development of modular elements for digital learning, whether for Chinese or any other language.

Google, Facebook and Twitter, as well as WeChat, have a critical role to play in defining the technolinguistic and commercial environments we inhabit online, as well as setting norms for style, as I noted earlier. However, these digital services or resources have not (yet) created a ‘killer app’ for language learning, nor a standardized modular interface specifically supporting language learning. No global organization has taken on that role either, neither large companies developing digital software for learning institutions (e.g. Navitas) nor language learning companies that produce print methods or CD-ROMs (e.g. Berlitz or Rosetta Stone), nor state-funded institutions of learning such as universities. The HSK – which is currently closest to a global benchmark for Chinese language studies – is unsuitable for defining ‘success’ in communicative competence in Chinese in the broadest sense. In this regard, the HSK has limited bearing on the design of digital Chinese language learning tools, for the tools are intended to facilitate language learning but not according to the stipulations of institution-based Chinese language courses. This is a challenge for designers aiming to gain a ‘return on investment’ for their tools, as different learners will value differently what Chinese language learning tools can provide, let alone the question of what will retain value over time for different learners. In other words, the environment for the development of digital Chinese language learning tools affords low-cost entrepreneurialism, but it also comes with a high measure of risk for the developers, for there is no way of reasonably predicting which tools will succeed.

This is not surprising. New technologies generally appear and develop in an environment designed for earlier technologies, remarked Antonopoulos when talking about

the disruptive potential of Bitcoin: for instance, cars first existed in an environment built for horses (Antonopoulos 2016, p.56). In time, successful technological developments have a structural impact on their environment – for instance, cars led to the expansion of bitumen networks and associated road infrastructure, as well as a set of norms, laws and institutions, from car insurance companies to driving schools. In her study of social media, Jose Van Dijk argues that ‘we can only gain insight into the mutual shaping of platforms and apps if we view them as part of a larger online structure where every single tweak affects another part of the system’ (Van Dijk 2013, p.9). In line with the analysis I conducted in Chapter One, this system should be understood not only in its technological aspect, but also as ‘nourished by social and cultural norms that simultaneously evolve in our everyday world’ (Van Dijk 2013, p.21).

To go one step further, the extent to which digital artefacts are designed to be adapted for other uses than their original function makes them particularly amenable to facilitate the formation of new types of communities. As Van Dijk has argued, their adoption by different users, for this very reason, also brings about a shift in power relationships: ‘new norms for sociality and values of connectivity are not the outcome but the very *stakes* in the battle to conquer the vast new territory of connective media and cultivate its fertile grounds’ (Van Dijk 2013, p.20). This argument calls for further reflection on the economics of the Internet, as they support the emergence of digital learning tools.

7.2.2 Commodifying community: from free tools to perverted profit economics

The rise of the Internet was accompanied by great enthusiasm about the possibility of developing new types of economic relations, eventually leading to a state of abundance. The works of Jeremy Rifkin are representative of this trend. ‘Who owns it?’ asks Rifkin of the Internet, ‘Actually, everyone and no one’, adding, ‘the Internet has already brought 2.7 billion people into the coveted zone where the marginal cost of accessing and sending various forms of communication is nearly zero’ (Rifkin 2014, p.113).’ In the same manner, Van Dijk describes how Web 2.0 services were initially ‘perceived as a new global infrastructure, like water pipes or electricity cables, analogue to the Web itself’ (Van Dijk 2013, p.5). In that regard, ‘Web 2.0 strategies challenged both market and state economies as they enabled the development of a cooperative non-market, peer-production system that served communicative and creative needs through networks of like-minded individuals’ (Van Dijk 2013, p.14).

This way of conceptualizing digital economies is in line with the way Jenkins describes economic incentives in participatory cultures. In the Web 2.0 environment, there is an expectation among participants that they will provide ‘free labour’ – that is, create and share content without monetary rewards (Jenkins 2014, p.54). ‘Understanding the popularity of many Web 2.0 platforms,’ argues Jenkins, ‘means considering what motivates people to contribute their time and energy without expectations of immediate financial compensation – whether these motives are attention, recognition, and identity building; the development of community and social ties; the creation of a useful tool; or myriad other considerations.’ (Jenkins 2014, p. 74).²⁶³ The role of non-monetary rewards as incentives to participation proposed by Jenkins mirrors Sapore di Cina’s observation (quoted in Chapter Six), that the return on investment sought by designers of digital learning tools may take the form of ‘money, career opportunities, fame or other’.²⁶⁴ However, the possibility of gaining such non-monetary rewards depends on there being social media platforms to provide the digital infrastructure for those communities to gather. In that light, Jose Van Dijk reflects that ‘there are no niches of online sociality that are purely nonprofit or public, simply for the reason that they can hardly flourish without support of the infrastructure ‘made social’ by Google, Facebook, Twitter, and other companies’ (Van Dijk 2013, p.153).²⁶⁵

In order to properly understand digital Chinese language learning tools as commercial objects, it is thus essential to understand the revenue models of the platforms enabling their existence.²⁶⁶ First, learning tools (including e-books) depend on the iOS and Google

²⁶³ Using Bourdieu’s theoretical lens, we may consider such participatory cultures as ‘fields-of-sorts’, where various types of contribution or personal attributes are akin to cultural capital, in that they define relative positions. However, unlike ‘fields’ as described by Bourdieu, those communities lack stability and have more porous boundaries.

²⁶⁴ ‘The First Chinese Newspaper Simplified: Interview with Sean of the Chairman’s Bao’. Saporedicina.com. December 7, 2015. <https://www.saporedicina.com/english/the-first-chinese-newspaper-simplified-the-chairman-bao/> (accessed November 1, 2019).

²⁶⁵ Wikipedia is often mentioned and lauded as a counterexample, a globally successful digital community in the service of knowledge operating on a purely non-profit basis. However, argues Van Dijk, Wikipedia largely depends on the goodwill of large companies for its survival.

²⁶⁶ In chapter Three, I also listed ‘MeetUp’ alongside the social media platforms discussed in this section. The revenue model of that platform is more straightforward: the organizer pays a monthly registration fee to host a MeetUp. The commercial aspect of event organization, however, can follow very diverse business models, from purely free community-based events to in-kind and financial sponsorships from local organizations and brands,

Appstore (and to some extent the Amazon store) as key marketplaces. Two of the designers I interviewed mentioned the commercial role of the Appstore in relation to their wares. DE9 indicated that the Appstore takes 30% of revenue – any app sold on the Appstore for \$2.99 thus yields \$0.89 to Google or Apple. Second, in a more diffuse manner, a side effect of any successful social media engagement – for instance, Olle Linge sharing key posts from *Hacking Chinese* through Twitter and Facebook – is that learners are spending more time on a social media platform, sharing personal data and – possibly – clicking on ads, generating revenue for the platform. This directly aligns with the revenue model of large social media platforms: a model that Shoshanna Zuboff describes as ‘surveillance capitalism’ (Zuboff 2019). In exchange for ‘free’ access to social media and search services, Google, Facebook, Twitter and YouTube extract behavioural data which they monetize in the form of advertisement.²⁶⁷ Users, knowingly or otherwise, trade privacy for convenience.

The role of social media platforms, Appstores and search engines as a critical digital infrastructure for distributing digital Chinese language learning tools gives rise to a complex set of dependencies. To give one example, *Hacking Chinese Resources* lists a Twitter account that posts a daily animated Chengyu, @chinaschengyu. Tweets from this account are regularly shared through the *Hacking Chinese* Twitter account. Three tools are embedded here: (i) @chinaschengyu provides and formats primary content; (ii) @hackingchinese curates relevant learning content, including @chinaschengyu. and (iii) Twitter gathers users of the first two tools by providing the infrastructure where both these tools exist. In commercial terms, Twitter benefits (in a diffuse manner), through ad-related revenues and user-data, while the people behind @chinaschengyu and @hackingchinese receive symbolic recognition, in the form of increased follower numbers and follower engagement, or a greater range of followers.²⁶⁸ Those relationships may be described as symbiotic, to the extent that

fundraising, donations, ticketing, or grants. It is relevant to consider this question to the extent that ‘language exchange MeetUps’ are at the margin of the ‘ecosystem’ I am considering in this thesis. Studying this point in more detail exceeds the scope of this thesis.

²⁶⁷ WeChat relies more than Western equivalents on in-app purchases, games and other services, such as banking or payments, but nonetheless generates some revenue through targeted ads. Precise comparison of those business models exceeds the scope of this thesis.

²⁶⁸ It is important to acknowledge the ambivalence of those social media platforms. Twitter and Facebook play a crucial role in what I called the ‘digital tissue’ supporting the unification of norms and discourses around digital tools, as well as supporting marketing – and hence distribution – of digital Chinese language learning tools.

they are mutually beneficial to participants. In this model, social media platforms (like Twitter) are the underlying infrastructure enabling the accumulation of cultural and social capital by various agents in the field. That structure creates a motor for innovation, in that it makes it easy to build and distribute tools at low cost, and incentivizes their creation by enabling a ‘symbolic economy’ (where non-monetary benefits serve as the main currency). However, those very same structures may also hinder designers’ capacity to derive economic benefits from their tools, as so many free tools already exist, and new tools regularly continue to appear. Designers are thus dogged by contradictory incentives, for there is a clear tension between the desire to develop and circulate tools at the lowest possible cost, and the desire to secure returns on investments of time, money and effort.

One point clearly captures this tension: namely, ambivalence on the matter of affordability. The desire to make Chinese language learning cheaper through digital technology was a recurring driver for the designers I observed and interviewed. At LanguageCon 2016, Horkhoff stated ‘we need to continue developing technology so we can make learning affordable for more students’. In the same way, DE4 says: ‘I want more students using the product, being happy with it. An affordable program, that’s what we do for the community.’ This aspiration to making Chinese learning affordable was echoed by DE7, who said ‘existing suppliers are failing to help students reach their learning goals. We need something that is cost-effective. Students can’t afford a one-on-one teacher for over 5 years.’ The story of Duolingo, as articulated by its founder Luis Von Ahn in a 2016 talk at 23Net New York, best echoes this spirit.²⁶⁹ Drawing on his personal experience of growing up in Guatemala, Von Ahn saw education as creating and maintaining class divisions, because wealthy people can afford to buy the best education, and so continue to generate wealth for themselves and their families. His goal, when developing Duolingo, was to increase access equality, with a focus on the hundreds of millions of people from lower socio-economic backgrounds around the world learning English to increase their job prospects.

Their algorithms can even contribute to the discovery of new tools. To give a personal testimony, algorithms must have picked up my interest for learning Chinese and languages, and related ads regularly pop up in my feed. For instance, I became aware of the crowdfunding campaign for the ‘Lily’ AI tool for Chinese learning through a targeted Facebook ad, which I experienced as useful rather than intrusive.

²⁶⁹ ‘TNW NYC 2016. Luis Von Ahn – Founder &CEO, Duolingo’. YouTube.com. December 20, 2016. <https://www.youtube.com/watch?v=SnAg6W9Zr9M> (accessed November 20, 2019).

However, attractive as the prospect of ‘free’ learning tools may be, my interviewees pointed out some of the associated contradictions. DE7 described the structures of the EdTech sector as irrational, in that a lot of actors are there for non-financial reasons. Often, said DE7, the sector attracts people who made money in other ventures before they shifted their attention towards education to ‘give back’ to society. Although DE7 indicated that the intention could be praised, they also pointed at negative side effects, in that those individuals ‘tend to pervert a lot of the profit economics’. What was meant by this statement is that individuals joining or supporting EdTech for idealistic reasons are likely to invest in tools that are structurally unable to generate income. A large initial investment allows those tools to be developed, but they cannot survive and end up being abandoned. Meanwhile, their presence has distorted user expectations, possibly casting suspicion on other tools, or putting fee-based tools at a disadvantage.²⁷⁰

A different rationale for offering ‘free’ learning tools appeared in my fieldwork: the pursuit of a strategy sometimes referred to as ‘blitzscaling’, where a digital company, in its early stages, invests large amounts in gaining market dominance before a business model has been clearly identified. In a highly competitive market driven by short-term returns on capital investment, there is always the risk of a speculative bubble. Founders optimize for fast growth to attract investors, in the hope that they can figure out a business model later on, or that an enterprise’s fast growth will facilitate its purchase by an existing player looking either to eliminate competition or in order to sell the enterprise before it crashes – a logic described by a contact involved in the Shanghai start-up scene as plaguing the Chinese start-up environment. Here, ‘free’ may be more adequately described as a pyramid scheme. DE1 underlined the danger of such a strategy, saying: ‘a lot of start-ups you see out there, they raise a lot of money and they go out like a house on fire, and they hope that down the line they get a business model or get acquired. It’s a very risky proposition’. This was echoed by DE6, saying ‘there is some company with a ton of money, and the idea that they’re gonna make millions in the next years tapping into the Chinese market, and everyone is flocking to that, because they have this shiny product, and they’re giving it away for next to nothing, and then after a year they’re gone. Having players like that is very disruptive.’

²⁷⁰ It is important to note here that the same line of reasoning could be applied to institutional tools that are abandoned after development. I return to this point at the end of Chapter Eight, where I discuss the ‘missionary entrepreneurialism’ that characterizes many designers.

The negative use of ‘disruptive’ is worth reflecting on. Digital technology has made entrepreneurship possible, and thus given rise to large numbers of online tools, available for free or for very cheap: this was the premise of Chapter Six. Yet the simultaneous presence of free and paid tools – in a context where so many are available – makes it more difficult to assess the relative value of a tool (i.e. to comparatively assess to what extent it is able to support the learning goals of different users), as differences in cost, and particularly the presence of \$0 alternatives, can easily become a distraction. This is particularly the case since optimal combinations of free and paid tools have yet to be written about. Thus, the very conditions that enable the low-cost development of digital learning tools, which in turn facilitate non-monetary benefits (or the circulation of cultural and social capital), also make it difficult for tool designers to get monetary returns on their investments. For designers, the question of how they can justify a paid offer when free alternatives are available is a pressing one if they want their products to be commercially successful. Two possible risks are the proliferation of low-quality copycat tools, or differentiation strategies that focus not on pedagogical innovation, but branding. This may be otherwise described as a ‘market failure’, where commercial and pedagogical interests are in fact at odds. What seems to be missing, then, is a set of ‘fair rules’ conducive to the emergence of an ‘ecosystem’ where the most useful (and complementary) digital learning tools can be produced, maintained and circulated, without excessive risk of being lost in the noise, or displaced by other, less pedagogically useful tools backed by ‘irrational’ investment.

7.2.2 Digital Chinese language learning tools as a global commons?

I began Chapter Six by reflecting on the tension around the use of the word ‘market’, which I related to unavoidable tensions between the fields of commerce and education. The risk of ‘perverted profit economics’ exacerbates these tensions.

Learning institutions are a public good, so are functional markets: in the words of Elinor Ostrom, ‘no market can exist for long without underlying public institutions to support it’ (Ostrom 1990, p.15). In fact, creating an international ‘market’ for education is one aspect of globalization, particularly under the mandate of the WTO. At present, however, it has fallen short of creating and regulating a global market for digital Chinese language learning tools. By this, I mean that there is no clear agreement on what market rules should apply to digital Chinese language learning tools – what regulations should be in place to ensure product quality and fair pricing, what positive or negative externalities should be taken into

consideration in pricing mechanisms, what information should be made available to buyers, what regulations should apply to protect users and producers, and what rules of ‘fair’ competition should apply.

This absence of clear market rules has had the effect of hindering a complementary understanding of Chinese language learning as a global good that should be made accessible – or affordable – to as many learners as there are. The fact that there are digital Chinese language learning tools does not mean that these tools automatically become a globally distributed public good. For this to be the case, they would either need to be delivered through publicly funded institutions, or be accessible for free or at low cost in the form of a ‘global commons’; and learners would need to be taught how to make the most effective use of them.²⁷¹

This is currently not the case. Today’s institutions are rarely conducive to producing global public goods as institutional funding tends to be locally constrained. Governments tend not to invest in global but local public goods, and public good provision is nationally silo’ed (Kaul, Grunberg & Stern 2003, p.8).²⁷² A corollary is that the value of digital Chinese

²⁷¹ The Internet, as a global infrastructure, can support the conduct of global transactions to the extent that uniform standards exist across jurisdictions, as well as common norms for online interactions. It is thus available to support the emergence of digital learning tools, fostering what I called ‘low-cost entrepreneurship’ in Chapter Six. Yet the model of ‘surveillance capitalism’ primarily benefits large platforms. Besides, as discussed in Chapter Five, one consequence of the Chinese Firewall is that it has sharpened the separation between ‘global’, internationally accessible social media platforms where English dominates, and Chinese-language platforms that are strictly controlled by the Chinese government. More generally, the political nature of the Chinese one-party system and global suspicions about this regime certainly have a role to play in the lack of ‘ecosystemic integration’ I describe in this thesis. Analyzing this in more detail exceeds the scope of this thesis.

²⁷² This limitation applies to digital Chinese language learning tools, but is far from unique to them: discrepancies between global aims and local policymaking have hampered peace and security initiatives, public health and environmental preservation causes. As it happens, I became professionally involved in initiatives intended to improve the provision of global public goods. From 2016 to 2018, I worked as editor-in-chief with the Global Challenges Foundation, an independent Swedish NGO whose mission is to develop greater awareness of global catastrophic risk (any risk that may kill a billion people or more), and stimulate the development of global governance models which may reduce or mitigate those risks. The question of global public goods was prominent in that environment. Interestingly, in relation to this section, my work developing digital Chinese language education was identified as highly relevant to the concerns of the organization, and prompted my appointment.

language learning tools, whether considered individually or as a set of tools selected by individual users, is likely to be measured differently by designers and (state-based) funding bodies: designers will look for cost-effective education for a global ‘market’ of learners, while state funding bodies will be focused on the local or national benefits of adopting these tools.

In this regard, I should point out that an expectation that digital Chinese language learning tools should serve a public good is implicit in my key research question, *‘How might we map the emerging landscape of digital Chinese language learning in a manner that will yield the most useful common understanding of it for learners, teachers, and designers?’* To answer this question in a purely pragmatic manner is to focus on producing a typology of tools that might help learners, teachers and designers make better or more productive use of the existing technology. A second, public good-oriented response would require us to construct the typology in a way that would provide the most ‘useful’ common understanding among all Chinese language learners – meaning, a common understanding that would result in teachers, learners and designers working collaboratively to produce new and more effective ways of learning Chinese aided by digital tools that form part of a well-functioning digital ecosystem. However, for this ecosystem to develop, there needs to be significant changes in both educational policy and institutional power structures, to facilitate a more open-ended and egalitarian approach to language learning.

In this regard, digital Chinese language learning tools may be usefully understood as evolving towards what Boyle calls a ‘commons of the mind’ (Boyle 2003).²⁷³ The concept, argues Boyle, allows a range of individuals with a shared interest in the continued existence of a certain common good to focus on this shared goal, and effectively advocate for conditions conducive to the goal’s achievement. I propose that this applies to digital Chinese language learning tools as an ‘ecosystem’ in the making: by identifying the tools as promising a ‘commons of the mind’ in relation to Chinese language learning may make us pay more attention to the kind of infrastructure that would be conducive to greater integration of existing digital tools. This tool integration would be aligned with and reflect the interests

²⁷³ Boyle uses this expression for the Internet as an infrastructure supporting new forms of cultural and social organization. Unlike physical commons like fisheries, forests or river systems, commons of the mind are non-rival, meaning that the threat of overuse is not a problem. They pose a different type of collective action problem, however: defining the right incentives to create the good in the first place (Boyle 2003, p.41).

of the broadest range of stakeholders. This infrastructure would need to include some form of well-regulated market competition which would enable optimal combinations of tools to emerge through the preferences of users. Funding from existing institutions would also be needed if digital Chinese language learning tools are to be further developed and distributed.²⁷⁴

At present, however, all one can say is that, while language learning has been significantly transformed by digital tools, there has yet to be a systematic, user-friendly guide as to how different kinds of learners can make effective use of these tools to suit their individual needs (beyond the present state of bricolage-like usage by tech-savvy and motivated learners).²⁷⁵ For this guide to exist, the tools must also become more amenable to integration, and thus acquire ‘ecosystemic’ characteristics. The opportunities for this to happen, and the hurdles put in the path of those opportunities, are what I have outlined in this chapter. In the next and final chapter, I will focus on the efforts made by individual designers to contribute to such an ‘ecosystem’, as well as the social structures that guide and enable those efforts.

²⁷⁴ One possible source of inspiration to organize this ‘ecosystem in the making’ would be the ‘Global Solution Networks’ (GSN) framework developed under leadership of Don Tapscott, Joan Bigham and Anthony D. Williams, and inspired by their research on digital and blockchain ecosystems (‘Home’. gsnetworks.org. <http://gsnetworks.org> (accessed August 26, 2020)). GSN’s are multi-stakeholder, self-governing, organizations that use digital technology to solve global problems. Also relevant in this regard are the various practical experiences and policy proposals shared by the Foundation for Peer to Peer Alternatives, under leadership of Michel Bauwens, as part of a proposed ‘commons transition’ (‘About’. [Commonstransition.org](http://commonstransition.org). <https://commonstransition.org/> (accessed July 30, 2020)). Exploring the potential practical application of those frameworks to the present object of study exceeds the scope of this research.

²⁷⁵ The website ‘Hacking Chinese’ is probably the closest thing at present to such a guide. However, in spite of the depth, breadth and quality of its articles, it is not quite systematic enough to properly qualify as a user-friendly guide for anyone but tech-savvy and highly motivated learners.

Chapter Eight: A digital ‘ecosystem’ of Chinese language learning in the making?

8.1 ‘A close but welcoming community’

8.1.1 From tools to people: patterns of integration

This last chapter of Part Three explores the capacity of digital Chinese language learning to develop into a borderless ‘ecosystem’ through the actions of tool designers. In Chapter One, I described an ‘ecosystem’, *inter alia*, as an assemblage of individuals, organizations, events, spaces, institutions and funding sources, holding together over the long term to constitute a unified field of activity, whether commercial or non-commercial, in a particular location. For instance, digital start-ups and green energy technology in Melbourne can be considered as two such fields of activity with ecosystemic properties.

It is tempting to describe the patterns of integration between different tools (discussed in Chapter Five and Chapter Seven) as the beginnings of a digital ‘ecosystem’. However, for such an ecosystem to be viable, there needs to be sustainable professional relationships between the designers of language learning tools, as well as patterns of commercial and pedagogical interdependence between their tools.

In that regard, as I discussed at the end of Chapter Three, there are two possible ways of envisaging an emergent ‘ecosystem’ of digital Chinese language learning. The first relates to a ‘central cluster’ of nine highly integrated tools. The second relates to a broader group of 31 tools, which includes those nine tools, as well as a set of 22 that I called ‘system shapers’, such as flashcard tool Kahoot, language learning app Duolingo, or Google Translate, all of which play a central role in the experience of learners and teachers, and have a strong influence on the work of the designers behind the nine tools in the central cluster. As the findings and analysis I presented in Chapter Six and Chapter Seven indicate, institutions of learning that collaborate with language-learning-tool-producing companies and the various bodies funding and regulating Chinese language learning, public or private, are also important as part of a learner’s ‘transmedia experience’, and should therefore be more broadly considered as part of that possible ‘ecosystem’.

In line with this analysis, in this chapter, I focus primarily on the designers who make and maintain digital learning tools, tracing their personal and professional trajectories, relationships and motivations. My primary focus is on the group of approximately 15

designers who led the development and maintenance of the nine tools in the ‘central cluster’. Reference will also be made to the designers of tools I studied for contrastive purposes (as illustrative of general patterns of social and professional interaction among tool designers), as well as system shapers, institutions and other ‘bodies’ as part of the physical and virtual ‘fields’ that have sustained the development of this particular digital learning phenomenon.

In my fieldwork, I was able to identify four phenomena that were both indicative of, and conducive to, tool integration among a core group of tool designers. In fact, those phenomena served as a primary source of data to identify nine tools as forming a ‘central cluster’, as well as identifying a further set of tools as ‘system shapers’, as I described in the final section of Chapter Three.

First, I observed deliberate efforts at technological integration, in the form of plugins allowing data transfer from one tool to another and/or making the experience of using different tools in combination smoother. I particularly noted mutual connections between Skritter, Pleco, Chinesepod and The Chairman’s Bao. The Chairman’s Bao has a feature on their website that allows export of vocabulary to Pleco, Skritter and Anki for flashcard revisions, and integrates a plugin to embed the Wenlin dictionary. Pleco has a number of ‘graded readers’ as add-ons, with some offering texts from The Chairman’s Bao. Such technological efforts were clearest for Skritter which, at the time of my research, had developed data sharing protocols with Chinesepod, Pleco, MDBG, and The Chairman’s Bao, as well as a goal setting app called BMinder.²⁷⁶

Second, there was a degree of commercial integration among the central cluster of nine tools. For instance, there were ‘bundle offers’ where subscribing to one tool leads to discounts on the purchase of another, as I described in Chapter Six when detailing the revenue models of different tools.

²⁷⁶ Bminder is a goal-setting tool where you pledge a sum of money against a goal, and lose that amount if you fail. Although not a language learning tool per se, it nonetheless serves a function in relation to language learning as a process. The integration between Skritter and Bminder is a reminder that considering a potential ‘ecosystem’ of digital Chinese language learning tools as a possible disruptive innovation requires looking beyond tools narrowly focused on language learning. Exploring in more detail the role of generic goal setting or productivity tools as part of a potential digital Chinese language learning ecosystem in the making exceeds the scope of this thesis.

Third, there were traceable interactions between the designers of tools in the central cluster. Those interactions took the form of joint appearances on panels at conferences and events, or public conversations on social media. One particularly noticeable form was designers endorsing each other's tools. For example, there is a testimonial from Olle Linge on The Chairman's Bao website, and Skritter is recommended on the FluentU blog.

Finally, interactions took the form of 'gigs' (i.e. casual employment of a designer by another for a one-off project).²⁷⁷ An example is Olle Linge who runs Hacking Chinese, is on the Skritter team, and who also co-founded WordSwing, an online application for creating learning games – not to mention a role at Uppsala University. Someone like Linge enjoys a 'portfolio career' in which they combine multiple professional identities. Two of the 15 designers I interviewed showed similar levels of 'fluidity' (with multiple 'professional business cards' and sources of income), while an additional eight played an active role in multiple organizations (though their income and professional identity were more narrowly associated to one role).²⁷⁸

Social media plays an essential role in those interactions. Three of my interviewees highlighted the ease with which they were able to forge strong relationships through social media. This was exemplified by DE4 saying 'because a lot of [tools] are founded by non-native speakers, it's easy to run into their Twitter feed, then before you know it, we say we should go get dinner, then drinks, then have a chat'.²⁷⁹ This directly echoes my personal experience of making contact with other designers through social media in 2013, as I was working on the Marco Polo Project. This phase of social media engagement led, among other things, to a feature post on the Skritter Blog about the Marco Polo Project, and collaborations

²⁷⁷ In addition, designers can also choose to work together on the creation of new tools: for instance, I collaborated with David Porter (founder of Clavis Sinica) on the development of an app for advanced learners.

²⁷⁸ An associated phenomenon was that the same freelancers or back-end development team would work across different companies. I was informed, for instance, that Skritter's connection to BMinder was based on a personal connection between the founders and a team of freelance designers who worked for both companies. I was not informed of the exact nature of the arrangement, i.e. whether a team of consultants is habitually working for both companies, or whether a different arrangement is in place, for instance both organizations hiring the same people as permanent part-time employees. In the context of a 'fluid' professional environment, that difference is somewhat irrelevant.

²⁷⁹ This quote also confirms how the Great Firewall is an obstacle to potential integration between tools built in the PRC by PRC citizens, and tools built by international designers – as Twitter is blocked in China.

with Hacking Chinese. Interactions can also lead from or to offline social activities: for instance, speaking about a designer they identified as a potential partner, DE8 said ‘I played football against him – he was Beijing, I was Shanghai’.

It is noticeable that the examples of integration outlined above often occurred serendipitously and without subsequently developing a clear central point of coordination. Indeed, when looking for any potential hierarchy between tools in the central cluster, I noted that no tool or organization clearly dominated, although some of the designers I interviewed referred to three of these tools as playing a ‘leading’ role. The first was Hacking Chinese, described by DE3 as playing a particularly important role in that regard as ‘the structure that makes the other things accessible or [...] gives the larger picture.’ The second was Chinesepod, which was described by DE7 as having played ‘a leadership role’ for a while. This role was confirmed by the fact that both John Pasden (who manages the Chinese Grammar Wiki) and Vera Zhang (co-founder of Hello Chinese) worked there before developing tools independently, whereby Chinesepod may be described as having been an informal ‘incubator’, and having played the role of an informal ‘Shanghai hub’ for digital Chinese language education.²⁸⁰ Italki, from my observations, seemed to be taking over the role previously played by Chinesepod as of 2015. This was evident from their efforts at raising sponsorships and organizing or supporting both academic and community events focusing on language learning. For instance, Italki organized the 2016 LanguageCon conference in partnership with NYU Shanghai, supported academic events such as the 2017 LCNAU conference in Adelaide (where I noted an Italki banner), as well as community events such as polyglot MeetUps.

8.1.2 The geography of digital Chinese language learning tools

The importance of personal connections in prompting collaboration between designers invites reflection on where those designers were physically located when they developed their tools. To ‘map the landscape’ of digital Chinese language learning tools requires us to first consider the geography of those tools. As I analyzed in Chapter Seven,

²⁸⁰ Italki founder Kevin Chen is also connected to Shanghai-based designers through other networks: for instance, during my period of study, he was listed on the website of a start-up accelerator called ‘Chinaccelerator’ alongside Hank Horkhoff, founder of Chinesepod, and had appeared on a podcast with John Pasden (both of whom were keynote speakers at the 2016 LanguageCon conference organized by Italki). I return to the role of Shanghai as a central hub in the next section.

tools are typically designed for (and used by) globally distributed learners. Importantly, many tools also have globally distributed teams. A striking example was given by DE12, who described the growth of their operations in the following manner: ‘we then recruited a web and app firm from Birmingham in the UK – and again, through a friend of a friend who redesigned our website really quickly. [...] Now we have a web team – an Australian company actually – they outsource the work but they kind of quality check it.’ In the case of organizations headquartered in China, this global nature extends to legal registration: indeed, a typical pattern for foreign-owned companies based in China is that they exist as a legal entity registered in Hong Kong which controls a wholly foreign-owned enterprise in China, while servers are located around the world.

Among both the central cluster of nine tools and the twenty-two ‘system shaper’ tools considered in this chapter, at least one did not have a clearly defined location (Chinese Forums, whose ‘designer’ and headquarters are unknown). Two more could not easily be associated with one central location. ‘Benny the Irish polyglot’, who runs ‘Fluent in Three Months’, highlights his Irish origin in his moniker, but lives a nomadic lifestyle, as indicated by his self-presentation as a ‘full-time globe-trotter’ on his website.²⁸¹ At the time of my data gathering (2015-2017), Skritter had a distributed team and no clear headquarters, though the CEO has since moved to the Bay Area (‘Greater San Francisco’ where ‘Silicon Valley’ is located) where the founders are also located. Other tools could more easily be associated with a given location. To the extent that the tools have been developed by embodied individuals, I propose that the location of a tool can also be defined as the place where those individuals are habitually based.

Whereas the nine tools listed in my extended canon were produced across many different locations, the thirty-one tools that make up the central cluster and ‘system shapers’ reveal a handful of locations, most of which were predominantly in the US and China.²⁸² Locations are captured in Table 4 (by country) and Table 5 (by city). The nine central cluster tools are highlighted.

²⁸¹ ‘Home’. *Fluentin3months.com*. <https://www.fluentin3months.com/> (accessed August 17, 2020).

²⁸² Among the nine tools I observed for contrastive purposes, four are based in Australia. This most likely reflects a data collection bias: being based in Australia myself, I found Australian designers easiest to approach. Of the others, *Clavis Sinica* is based in Ann Harbor (USA), while three discontinued tools were based in the USA (*Slowmersion*, *Fourtones*, *Tea Story*), and one in Taipei/Singapore (*Duable*).

Table 4: Location of key tools (by country)

Country	Tools	Total
USA	<i>Pleco</i> , <i>FluentU</i> , <i>Skritter</i> , Wenlin, Yoyo Chinese, Duolingo, Rosetta Stone, Google, Facebook, Twitter, Youtube, MeetUp, Quizlet, Anki	14
China (incl. HK)	<i>Chinesepod</i> , <i>Italki</i> , <i>Chinese Grammar Wiki</i> , <i>Hello Chinese</i> , <i>The Chairman's Bao</i> , Hanbridge, Sexy Mandarin, Chinese Skills, HelloTalk, WeChat	10
UK	<i>The Chairman's Bao</i> ²⁸³ , Chineasy	2
Canada	LingQ	1
Sweden	<i>Hacking Chinese</i>	1
Norway	Kahoot	1
Japan	Lang-8	1

Table 5: Location of tools (by city)

City	Tools	Total
Bay Area	<i>Skritter</i> , Google, Facebook, Twitter, Youtube, Quizlet, Anki	7
Shanghai	<i>Chinesepod</i> , <i>Italki</i> , <i>Chinese Grammar Wiki</i> , <i>Hello Chinese</i> , <i>The Chairman's Bao</i>	5
New York	<i>Pleco</i> , <i>FluentU</i> , MeetUp	3
Shenzhen	Hanbridge, WeChat, HelloTalk	3

²⁸³ At the time of conducting the data gathering part of the research, the Chairman's Bao team was split across Leeds and Shanghai. I therefore listed the tool twice.

Hong Kong	Sexy Mandarin, HelloTalk ²⁸⁴	2
Arlington/DC	Rosetta Stone	1
Beijing	Chinese Skills	1
Los Angeles	Yoyo Chinese	1
Leeds	<i>The Chairman's Bao</i>	1
London	Chineasy	1
Oslo	Kahoot	1
Pittsburgh	Duolingo	1
San Diego	Wenlin	1
Stockholm	<i>Hacking Chinese</i>	1
Tokyo	Lang-8	1
Vancouver	LingQ	1

Table 4 shows a clear dominance of China and the US, which together host the locations of twenty-four out of the twenty-nine tools that can be traced to a location.²⁸⁵ On average, tools in the US are more ‘generic’. Among the fourteen tools listed there, four focus narrowly on Chinese (Pleco, Skritter, Yoyo Chinese, Wenlin), three offer general language learning (FluentU, Duolingo, Rosetta Stone), and seven are flashcards (Anki, Quizlet) or more general system shapers (Google, Facebook, Twitter, Youtube, MeetUp). Of the ten tools based in China, seven focus on Chinese learning (Chinesepod, Grammar Wiki, Hello

²⁸⁴ The HelloTalk website indicates that the company is based in Hong Kong and Shenzhen. I therefore listed it under both cities in Table 5.

²⁸⁵ Among those twenty-four, I counted The Chairman's Bao, which was located between Leeds and Shanghai at the time of data collection.

Chinese, The Chairman's Bao, Hanbridge, Sexy Mandarin, Chinese Skills), two focus on language learning in general (Italki, HelloTalk) and one is a 'system shaper' (WeChat).²⁸⁶

Table 5, which presents the location by city, offers different insights. A striking element is the dominance of the Bay Area when it comes to global 'system shapers', but the absence of tools from the central cluster (with the exception of Skritter, which, as I noted earlier, is in fact very distributed and was nomadic for a while) is also striking.²⁸⁷

By contrast, Shanghai appears to play a critical role in the development of digital Chinese language learning tools, with five of the nine tools in the central cluster being produced by companies located there. These included Italki and Chinesepod, which I identified as leaders within the nine central cluster tools. Of these five Shanghai-based tools, four were founded by 'expats', who created their tools after relocating to Shanghai for personal motives that combine curiosity, adventure and opportunity.²⁸⁸ Taipei, which is not mentioned in Table 5, played a role in the genesis of Pleco and Hacking Chinese: Michael Love and Olle Linge were both students in Taipei, as was Jacob Gill. Skritter itself was first

²⁸⁶ Table 4 also reveals noticeable absences. I noted in chapter Three that I did not pay specific attention to tools based in South Korea and Japan. It is also noticeable that there are no tools developed from continental Europe, Africa, Latin America, India, the Middle East, or South-East Asia, despite China's growing importance for these regions. Among my 'extended canon' of 190 tools, two are based in France. Of those, one, Nulinu.li, has been discontinued. The other, Ninchanese, received positive reviews, and stands out as the only tool that I am aware of which is reasonably prominent, and was founded by a Caucasian female designer. The fact that none of the most widely used digital Chinese language learning tools were developed in Singapore, a wealthy city-state with a large English-Chinese bilingual population and a leading international centre of institution-based Chinese language learning, is particularly noteworthy.

²⁸⁷ The fact that FluentU was developed in New York most likely owes to the fact that it is the hometown of Alan Park, the tool's founder and designer. In the same way, the fact that Pleco is headquartered in New York can be attributed to the fact that Michael Love grew up in New England, making New York the closest tech hub to his hometown. In both cases, tools reached prominence without moving to Silicon Valley (close to Google, Twitter, Facebook). The fact that Duolingo is based in Pittsburgh rather than the Bay Area would further confirm that there is no clear need to move to Silicon Valley for a tool to be successful.

²⁸⁸ Shanghai-based designers described the city as both a pleasant and relevant location: 'Shanghai it's an extremely multicultural city, so it's a great place for a language education company to be based. It's in the centre of Asia, but at the same time very western – so a big clash of cultures,' as DE7 stated. Presence in Shanghai, in fact, was described as having a positive impact on content development by DE7 who said 'you can see, touch, feel the local culture on a daily basis'. Other designers positively commented on the comparatively low cost of living (by international standards) and the presence of talent.

imagined when its cofounders were studying in China, and FluentU originally started with an exclusive focus on the Chinese language, when founder Alan Park worked as a management consultant in East Asia (FluentU later evolved to include other languages).

Tools in the central cluster, thus, present one of two foundation stories. Either the designer imagines / begins the tool during studies in China (Chinese mainland or Taiwan), then continues the venture from home; or a designer moves to Shanghai for study, work, and/or work opportunities, and subsequently designs and launches a tool from Shanghai. That tool then becomes their primary source of income and/or a major element of their social identity in Shanghai.²⁸⁹

The central role of Shanghai by comparison with other major Chinese cities is interesting. For instance, only one tool in the list of thirty-one tools represented in Tables 4 and 5 is located in Beijing, despite Beijing's status as the PRC's capital and an emerging global EdTech hub. None of my interviewees commented on this point, but informal conversations and observation indicate that Shanghai is more 'foreigner friendly': it has twice as many expats as Beijing, and particularly attracts entrepreneurial individuals going to China for motives which, as I described earlier, combine curiosity, opportunity and adventure.²⁹⁰

Shanghai-based expats also play a crucial role in what I called 'the China Space', as mediators between Chinese venture capital funds and the Chinese tech-scene, as well as the global tech field. The development of a Chinese language learning tool, from that perspective, becomes one way to gain a position in 'the China space', and from that position to then develop valuable social capital in the global tech field. Hank Horkhoff (Chinesepod), Kevin Chen (Italki) and John Pasden (Chinese Grammar Wiki) may thus be described as forming part of a 'Shanghai expat entrepreneurial scene'. At the time of data gathering, Horkhoff and Chen were part of a start-up incubator, Chinaccelerator, while Pasden offered language learning advice for expatriate staff at international companies located in Shanghai.

²⁸⁹ The only exception is Hello Chinese, developed by two Chinese co-founders, one of whom, Vera Zhang, interacted closely with English-speaking expats in Shanghai through her job at Chinesepod.

²⁹⁰ The role of Shanghai is more generally continuous with the city's historical role as a point of contact between China and the Western world, relatable to the presence of international settlements or 'concessions'. As a matter of fact, most of my interactions with tool designers in Shanghai took place in the location of the former 'French concession'.

8.1.3 The limits of integration: fair players vs copycats

The complementarity in tool functions described in section 8.1.1 is evidence of some degree of integration among several of the tools in my central cluster of nine tools. This integration was important for my development of a ‘typology’ of tools, based on both their distinctive features and their capacity to complement the features of other tools (as discussed in Chapter Five). DE12 described the relationship of their tools with the tools of other organizations in the following manner: ‘We don’t directly compete with any of them [...]. I mean we have exactly the same user base, but it’s nice to have slightly different products’. In the same way, DE12 stated: ‘we’re all trying to attract the same customers, as long as we’re not directly competing, we’re quite willing to help each other around, and I think that’s quite important really.’ DE4 shared a similar perspective: ‘All of us have played nice for so long. We do the characters, they do the sound. It’s easy partnerships because we’re not really competing.’

Reflecting on this situation, DE4 stated ‘I feel like all of those people that give us money are giving money to other companies as well’. This may be interpreted positively, as meaning that the more tools are available (and well-integrated), the more value learners will see in digital learning, and the more they will be willing to pay overall. DE5 presented this from a different angle, stating: ‘they are competitors, but meanwhile we are friends’, highlighting with the pronouns ‘they’ and ‘we’ the ambivalence among tool designers as both business rivals and personal friends. DE5 proposed that this friendly competition was beneficial because ‘we make each other work harder, and then we get the whole market expanded.’ This more generally echoes DE1’s remarks quoted at the end of Chapter Seven, which I analyzed as indicative of the possible evolution of digital Chinese language learning towards a ‘DIY transmedia experience’. The presence of distinctive yet complementary tools, in this regard, was generally presented by designers as conducive to a better overall experience for learners (and teachers), increasing the value of digital learning, and benefiting all players.

Reflecting on integration among tool designers, DE12 commented ‘I think it’s quite a close, close but welcoming community’. This relatively small size, in fact, is particularly beneficial to social capital formation: as Coleman (1988, p. 106) notes, ‘reputation cannot arise in an open structure, and collective sanctions that would ensure trustworthiness cannot be applied. Thus, we may say that closure creates trustworthiness in a social structure’. Going one step further, the relationships I observed between tool designers in the ‘central cluster’

evoke the way that Coleman describes the Al Khalili market in Cairo. ‘The whole market is so infused with relations of the sort I have described [i.e. merchants direct customers to other stalls selling goods the customer wants] that it can be seen as an organization, no less so than a department store. Alternatively, one can see the market as consisting of a set of individual merchants, each having an extensive body of social capital on which to draw, through the relationships of the market’ (Coleman 1988 p.100).²⁹¹

Designers who focus on developing Chinese language learning tools, according to DE6, ‘are the ones that are passionately interested’. This passion serves as a basis for a sense of unity, proposed DE6 who, reflecting on the relative difficulty and relatively low profitability of the work, stated: ‘we’re not exactly in it for the money.’ A shared sense of ‘mission’ to mediate Chinese language learning to the world, therefore, may be one of the bases for belonging to the ‘central cluster’.

However, DE6 also indicated a measure of tension. Indeed, they indicated a certain unease when discussing current work with former colleagues, wondering ‘are we cooperating, or might we be competitors? [...]’ To illustrate their point, they presented the following story: somebody was trained to work in a certain organization, then moved on to another organization that provides an equivalent service. This led to a breakdown of trust: ‘somebody copying somebody else’s product, it can inhibit communication,’ they commented.

This underlines an important challenge when it comes to digital innovation, particularly in a context which, as I described, may be characterized as a participatory culture: how to acknowledge, incentivize and reward original authorship (or innovation)?

²⁹¹ The analogy with the market is particularly relevant in relation to the presence of ‘bundled offers’ as described in Chapter Six – for example, the *Hacking Chinese Practical Guide for Learning Mandarin* package comes with discounts to Pleco, Skritter and ChinesePod. However, it is unclear if those bundling offers are commercially, socially or pedagogically driven. Also, there is no system in place that would allow those tools to properly operate together in the manner of a ‘department store’, with effective cross-subsidies. For instance, there is nothing like a platform or search-engine enabling learners to purchase a bundled subscription to a set of compatible tools, based on an assessment of goals and needs; nor is there a service that would recommend an optimal balance between tools, provide access to those tools, and redistribute income – somewhat like a ‘Spotify for Chinese language learning’. Nor is there a system in place to redistribute revenue across complementary tools. Each designer must therefore ensure that the tool they develop can independently generate an income source, even as they look after the interest of the collective.

Rifkin, when discussing cultural production on the Internet, proposes that, by contrast with print-based cultural production, ‘the Internet [...] dissolves boundaries, making authorship a collaborative, open-ended process over time rather than an autonomous, closed process secured by copyright through time’ (Rifkin 2014 p.143). This, more generally, corresponds to the way that authorship is understood in what Jenkins calls participatory cultures.

In that regard, large tech companies were perceived as a threat by at least one of my interviewees, a learner with an aspiration to develop a tool of their own. Talking about Pleco, LE6 said:

I foresee this guy’s gonna get robbed out soon, like, real soon, by, just giants, like, Google, WeChat, Line [...] they’re just gonna swallow the market up. [...] I mean, they can, they just got so much power, they got everyone’s information, they know what you like, they know where you go, they know who your friends are, think of all the possibilities of personalization that they could take advantage of, and are taking advantage of, already, so to me, Pleco’s gonna be, nothing, in a few years.²⁹²

This concern is particularly strong in a context where norms and social capital play an important role in regulating individual behaviour. Indeed, although I noted a high level of interaction between the designers of the tools I listed in the ‘central cluster’, I did not notice interactions conducive to social capital formation between the designers I observed and the founders or CEOs of large platforms like Google, Facebook or Twitter – nor, interestingly, with Duolingo.

In that regard, the lack of collaboration between Duolingo and Chinese Skills illustrates the problem outlined above. From as early as 2014, dedicated learners had started expressing their impatience to see a Chinese language course on the Duolingo website.²⁹³ In 2016, a group of learners even launched a petition on Change.org to support this endeavour:

²⁹² I encountered this concern during my studies when attending conferences or presentations about start-up development. For instance, it was voiced at an event as part of the China Australia Millennial Project in 2015, where Rick Chen, co-founder of crowd-funding platform Pozible, commenting on the Chinese market, spoke of the risk to the ecosystem when large players (e.g. Tencent) copy innovation rather than purchasing it.

²⁹³ On March 24, 2014, a user called ‘Jrspence’ wrote in a thread suggesting collaboration between Duolingo and Chinese Skills, ‘I just really want Chinese on Duolingo and like many others will then become an avid user.’ Jrspence. ‘Duolingo & ChineseSkill = ???’. Forum.duolingo.com. March 24, 2014. <https://forum.duolingo.com/comment/2326448> (accessed November 19, 2019).

the petition had received 175 signatories by July 2016.²⁹⁴ Since its launch in 2011, Duolingo had always made clear, on its website and in public communications, that it sought to add more languages beside its original Indo-European language courses. Members of the public were invited to collaborate in the development of those additional courses – including a course for Chinese – in line with Duolingo’s crowd-sourcing model. However, by the time I started my fieldwork, in early 2015, no apparent progress had been made. Meanwhile, a tool with very similar features to Duolingo called ‘Chinese Skills’ had been developed in China (though Chinese Skills’ business model is a more straightforward pay-for-access type than Duolingo’s crowd-sourcing model).²⁹⁵

A comment thread on the Duolingo website, started in March 2014, explored the comparison between Chinese Skills and Duolingo, with eager Chinese learners encouraging the two companies to work together.²⁹⁶ Although this request seemed aligned with the spirit of digital collaboration and the mission to make Chinese language learning free, which is at the core of Duolingo’s public message, this partnership never came to fruition. User suggestions to that end were met by silence. Instead, by the end of 2017, a Chinese version of Duolingo was launched. A possible reason why Duolingo did not partner with Chinese Skills is that Duolingo’s business model relies on large numbers of learners coming together on the app. Duolingo, therefore, has no incentive to partner with an organization whose tool largely

²⁹⁴ Muellenmeister, Hannah. ‘Create a Mandarin Duolingo Course. Change.org. <https://www.change.org/p/duolingo-create-a-mandarin-duolingo-course/c> (accessed 18 July 2016). When checking this link in May 8, 2020, I noted that the total number of signatories had gone up to 382. The website does not list the exact date at which the petition was created, but indicates how long since a comment was posted. On August 17, 2020, the earliest comments were listed as ‘four years ago’, indicating that the petition was probably started around June-July 2016, shortly before I first became aware of it.

²⁹⁵ Hello Chinese was later developed on the same model.

²⁹⁶ The main thread I identified is the following: Jrspence. ‘Duolingo & ChineseSkill = ???’. Forum.duolingo.com. March 24, 2014. <https://forum.duolingo.com/comment/2326448> (accessed November 19, 2019). According to the first post in the thread, ‘ChineseSkill [Sic.] states on their website that there was interest in working with the incubator when originally released. They say that they were halfway through the development of ChineseSkill at this point and never received a reply.’ Another thread mentions Chinese Skills and Hello Chinese, and states ‘Could something like that be used to make a Mandarin course here?’ (aku42. ‘Chinese Skills App’. Forum.duolingo.com. <https://forum.duolingo.com/comment/11865965> (accessed May 8, 2020)). It should be noted that, although they did not establish a partnership, neither did Duolingo censor posts on their forum that recommended those ‘alternatives’ while the Chinese course was in development.

replicates the functions of Duolingo's own, and that – if they were to partner – would deprive Duolingo of both user data and user attention.²⁹⁷ This indicates the kind of market failure I described in Chapter Seven, whereby the commercial needs of a business model can stand in the way of public pedagogy.

8.2 Career continuity across shifting fields

8.2.1 Designer archetypes

Throughout this thesis, I have noted that the people developing new technology for the teaching of the Chinese language are globally distributed and, though they share an experience of life in China and what we may call an 'entrepreneurial drive', they have different academic training and career paths. In Chapter Seven, I indicated how this highlights a convergence of the fields of education and technology. I am using 'convergence' here to describe a situation where those two fields become increasingly interconnected. In addition, the professional trajectories of the learners, teachers and designers I interviewed intersect and converge in ways that indicate an identifiable 'China space' that has developed on- and offline, consisting of non-Chinese citizens actively engaged in building connections with people and organizations in China.

Designers' career paths are a manifestation of these intersections and convergences. Some conduct most of their activities within a single country, others develop a life as expats or a nomadic lifestyle. Some build a career within the digital technology sector after launching a digital learning tool, others build up a practice focused on language learning, and at least one taught at a university on a part-time basis.

This diversity of career paths can be related to the polyvalent role played by designers in the development of digital tools. They lead the creative process and determine the concept, style and structure of the tool. They produce the software interface and learning content (or

²⁹⁷ Although Duolingo did not partner with any of the other digital Chinese learning tools I observed, they did more recently begin partnering with offline groups. In early 2019, I was contacted by Duolingo through the Chinese-English collaborative translation MeetUp I organize in Melbourne, and this MeetUp is now listed as a partner event on the Duolingo app, directing learners of Chinese in Melbourne to the event. In August 2019, I received an invitation to the 2020 'Duocon conference', which I could attend as a global ambassador. This indicates the possibility that Duolingo is looking to build on its size, as the largest language learning app currently on the market, to play a leadership role in autonomous language learning. Whether this indicates a potential change of strategy when it comes to collaboration with other digital tools is uncertain for now.

coordinate its production, which they outsource). They publicize the tool on social media and look after its marketing and sales. They act as project managers, gather the needed resources, develop business models, and ensure compliance with legal and administrative regulations.²⁹⁸ In an entrepreneurial environment, digital tool designers often play a variety of roles. However, in my observation of the individuals involved in developing digital tools for Chinese language learning and their career trajectories, I was able to discern broad differences in their approaches which I capture below in the form of four distinct archetypes: entrepreneurs, engineers, gurus and digital academics.

People like Kevin Chen (Italki), Alan Park (FluentU), or Hank Horkoff (ChinesePod) represent what I will call the ‘*entrepreneur*’ archetype. They have a background in business (e.g. an MBA and experience in finance or consulting) and/or a personal story of serial entrepreneurship. They identify a certain type of tool as having commercial potential, gather resources (i.e. funds and a team to execute the vision) and develop it, with the goal of making it a commercially viable, scalable source of income. I have seen this archetype linked to tools in the four central ‘macro-categories’ I distinguished in Chapter Five (drills and games, multimedia courses, practice environments and formatted content). Overall, they seem to develop more ambitious tools, by which I mean, tools targeting a comparatively broader number of learners, and/or more aspects of the language learning process than simpler tools such as a character learning game, or a learning advice blog.

Michael Love (Pleco) and Sam Gilman (Fourtones) represent a model I call the ‘*engineer*’. Trained in IT, they have the technical skills to develop a tool on their own. Driven by personal interest to learn Chinese, they identify a ‘gap’, and create a tool to fill this gap. Early success encourages them to improve their product and – eventually, in the case of Pleco – generate revenue from it. I observed a stronger focus on ‘language accessibility tools’ and ‘drills and games’ from this archetype, as those language-learning aspects require the most technical skills. Alternatively, engineers may be ‘tech co-founders’ (e.g. Li Chong from

²⁹⁸ This includes compliance with obligations such as income reporting and tax, but extends to other forms of administrative compliance, particularly related to privacy. This can represent a significant burden. In 2018, the European Union introduced the ‘General Data Protection Regulations’ (GDPR), requiring that businesses collecting personal data in digital form would keep track of that data, and develop systems to delete it when required or when that data was no longer necessary: in a personal communication, one designer indicated that making their tool compliant involved a considerable amount of work.

Hello Chinese), or join a team at a later stage of development (e.g. Joshua McFarland, who was lead developer for Skritter at the time of research).

Designers such as Olle Linge (Hacking Chinese), John Pasden (Chinese grammar Wiki) or Yangyang Cheng (Yoyo Chinese) correspond to an archetype I call the ‘***guru***’.²⁹⁹ They develop a blog and/or social media persona, and use this as a basis to reach out directly to an audience of learners. Knowledge of the Chinese language and an evident determination to pursue their digital projects, coupled with a strong understanding of digital media dynamics, appear to be characteristics they share in common, and that have enabled them to develop a reputation as online tool designers.³⁰⁰ This reputation is achieved through each individual developing an independent ‘portfolio’ practice, through which they acquire an online presence and become known for reliable delivery of private tutoring, providing services to corporate clients, performing at media gigs, earning revenue from a digital tool, or establishing collaborative ventures with other digital companies or institutions of learning. The ‘guru’ archetype is the least versatile in terms of tool development: their focus is mostly on developing graded lessons and language learning advice. However, their role is critical in shaping the ‘digital tissue’ (comprised of a host of tools, resources and social media networks) that help to secure the viability of their digital work.

In addition to those three archetypes, I noted the presence of academics such as Scott Grant (Monash University/Chinese Island) and David Porter (University of Michigan/Clavis Sinica) who represent what I call the ***digital academic***. While teaching at a university, they

²⁹⁹ ‘Guru’ is the actual job title of Steve Kaufman, co-founder of LingQ, as listed on the team page of their website (as seen in November 2019). The word ‘guru’ is more generally used in various business contexts to describe a certain type of professional practitioner who combines consulting, speaking and writing, and ‘package [...] business ideas as aspects of themselves. [...] They do not only tell managers how to manage their organizations, they also tell them what kind of people they should become in order to be happy and morally conscious citizens with fulfilling lives’ (Thrift 2007, p.87).

³⁰⁰ Reputation is more important than formal credentials for digital ‘gurus’, in contrast with ‘academic’ figures, for whom degrees and peer-reviewed papers constitute an essential form of cultural capital. As a sign of this, the first line of Steven Kaufman’s biography reads: ‘Steve has had a passion for languages most of his life and is a well-known polyglot on the web.’ Kaufman, meanwhile, is also a former Canadian diplomat, and holds a diploma in international relations from Sciences Po – as appears on his LinkedIn page. Those qualification, however, are not listed on the short biography on the LingQ website. The language used in this biography evokes the way I described influencers in Chapter Five, as individuals who are ‘famous for being famous’ and derive their authority from this status.

develop an interest in digital technology. They build a tool targeted at students in their university, which is then extended to similar settings and institutions. Digital education becomes a key area of personal interest and professional distinction – a sort of academic business card. Their academic position confers social and financial stability, allowing them to work on a tool for free, even yielding a competitive advantage as well as a captive audience of students, privileged access to academic funding and students for testing the tool and ad hoc support. However, they also face the difficulty of not being able to devote substantial time to developing their digital tools as this work is not often fully recognized as part of the research or teaching requirements they must fulfil (such as meeting research targets through grant applications and publications in academic journals or teaching language classes). The people I interviewed noted that though they received informal encouragement for their work in developing digital tools, this encouragement did not translate into formal institutional recognition.³⁰¹

8.2.2 The challenges of career continuity

The identification of archetypes calls for reflection on two related matters. First, it indicates a merging of personal and professional attributes in the careers of people who have designed the best-known digital tools for Chinese language learning. Second, it reflects the fact that the people centrally involved in the development, maintenance and distribution of digital tools for Chinese language learning do not pursue traditional careers, with a sequence of well-defined roles within an established organization. Rather, they play multiple functions across a range of organizations, some founded by them and others in which they play a supporting role. Consequently, their professional identity is not defined by the possession of a defined set of skills connected to institutionalized cultural capital. Instead, they have developed this identity in the ‘habitus’ of a fluid professional environment involving a large degree of online activity. It is this environment that has facilitated the coming together of the fields of education and technology in relation to a hybrid range of China-related interests (what I referred to in earlier chapters as ‘the China space’). This mostly online environment

³⁰¹ In my fieldwork, I encountered a ‘variation’ on this archetype, whom I will call the ‘tech-savvy teacher’. I met at least three high school teachers with a particular interest in digital technology, who did not create a tool, but were involved in the ‘digital tissue’, and/or had a side-practice giving training sessions for peers on digital technology for language learning.

does not quite have the stability of a ‘field’, and is highly conducive to the emergence of new initiatives with a high failure rate.³⁰²

In this fluid environment, entrepreneurial experience (such as that of individuals who have designed a digital tool and attempt to generate revenue from it) represents a form of valuable embodied cultural capital as well as a source of social capital.³⁰³ Designing a tool, therefore, has three possible outcomes from the perspective of its designer. It can simply serve to meet an existing language learning need; it can lead to further entrepreneurial ventures; it can also open up career opportunities for the designer in adjoining fields: Chinese language education, technology start-ups, or the China Space.

To give an example of such a trajectory, one of the designers I interviewed, working in a team of two people, created a Chinese learning tool that was popular for a while.³⁰⁴ It yielded some passive income, but not enough to fully support its two designers. Therefore, they pivoted to an agency model to develop apps for other people. At the time of our interview, the designer had started working for a large technology start-up. They indicated that the experience of developing a Chinese language learning tool had helped them get their present position. In the same way, Sam Gilman, who founded Fourtones, used his success in developing a digital Chinese language learning tool by moving into a different digital field,

³⁰² On this point, it is notable that the offices of digital tools seem to be located alongside tech companies rather than universities or schools. Italki, when I visited their office, was located in a ‘creative industry’ cluster in Shanghai, alongside Australian crowdfunding start-up Pozible. Mandarin Shooter Quest was developed from a co-working space in central Shanghai. Meanwhile, DE12 indicated that their organization would soon move in small free/cheap offices in a tech-focused coworking space, saying: ‘we’ll get sort of an opportunity to meet sort of like-minded people.’ This environment is also likely to impact the type of habitus developed by people working on the development of those tools. In that regard, while I saw strong interactions between entrepreneurs, engineers and gurus – including a measure of cross-over, whereby the same person adopted those different roles – ‘digital academics’ stood somewhat apart. This may reflect the difficulties of alignment between learning institutions and digital tools that I described in Chapter Seven, or more generally the fact that the dynamic environment where the people I identified as ‘entrepreneurs’, ‘engineers’ and ‘gurus’ evolve is very different from that of traditional institutions of learning where ‘digital academics’ evolve. It is this fluid environment that I am provisionally referring to as an ‘ecosystem’ in the making.

³⁰³ Accumulation of cultural and social capital may more generally be identified as an important purpose of ‘free’ labour in open source communities. I reflected on this point in the final section of Chapter Seven.

³⁰⁴ I am leaving this story deliberately anonymous, and therefore omitting the code for this designer.

and founded a Bitcoin start-up called Coindega in 2013.³⁰⁵ Since 2017, FluentU founder Alan Park has worked on a digital marketing start-up called ‘Monitor Backlinks’. As for the founders of Skritter, DE3 said about them: ‘They are now working on something called code combat, a game to learn how to code. One of them has left and now works for Salesforce. Others are in this venture. It is hard to keep them in when they see they can make so much more money elsewhere.’

This last observation shows one key challenge for digital Chinese language education. By developing a tool, designers acquire valued and valuable skills, experience, and social capital. In many cases, this leads to lucrative and attractive careers. This is particularly true of the engineer archetype as these individuals have the skills needed to be recruited as early staff in larger tech companies. For the entrepreneur archetype, there are abundant opportunities to become founders or cofounders of new digital ventures. For the guru archetype, consulting, media or coaching opportunities abound online. The result is the ongoing leaking of talent from digital Chinese language education towards a range of other pursuits. Indeed, the lack of a consistent market structure and the lack of effective public funding for digital Chinese language learning has meant that work on those tools is, economically speaking, relatively unattractive. The future of these tools is thus rather uncertain. This is, in fact, in line with DE6’s description of tool designers as a community whose members are ‘not exactly in it for the money.’ If digital tools for Chinese language learning are to have a future, they require the altruistic contributions of technologically gifted designers.

8.3 Entrepreneurial tool design: hero’s journey or quixotic pursuit?

When I asked designers what motivated them to develop a learning tool, they commonly reported pro-social goals.³⁰⁶ ‘I felt like if I died at my desk, I would not make the world a better place’ said DE1, who described their work as driven by the sense of something missing: ‘you know you just had this feeling that, wow, the world needs this.’ In the same vein, DE6 stated ‘once I was finally convinced that I was right and all those websites were

³⁰⁵ ‘Interview with Sam Gilman, Founder of Coindega’. Btcgeek.com. August 18, 2013.
<https://btcgeek.com/interview-sam-gilman-founder-coindega/> (accessed November 20 2019).

³⁰⁶ It is important to note a bias in the data collection here: I focused my research on tools that showed a high level of integration, and more generally analyzed how this integration was accompanied by the development of social capital. It is therefore unsurprising that designers, particularly when interviewed by someone who might be perceived as a ‘peer’ (as I might be) would report pro-social goals.

wrong, and that was confirmed by multiple teachers, I just wanted to share it with people’. This sense of a ‘mission’, which I underlined at the end of Chapter Seven, was echoed by several of my interviewees who shared commitment to make Chinese language both more ‘fun’ and affordable, hence accessible to a larger number of learners. Overall, pro-social motivations may be described as a form of ‘missionary entrepreneurialism’ expressed by DE6 in the following terms: ‘I became a believer in the idea that entrepreneurs are a great force for change [...] entrepreneurs can test out their hypothesis a lot faster, communicate with people to solve their needs a lot faster on a smaller scale and grow organically.’³⁰⁷

When it comes to more personal sources of motivation, three of my interviewees mentioned the satisfaction of a creative impulse. ‘They say start-ups are manifestations of an idea, and that’s absolutely the case’ said DE1, echoed by DE15 who said about their tool: ‘I imagined it, I had a vision in my head’. DE14 expressed the joy of ‘making’ something: ‘just having an idea, and being able to put it into practice in a tangible, useful form [...] there is a delight and intricacy and precision and utility as well as craftsmanship in these pursuits.’³⁰⁸

A second personal motivation, broadly connected to creative satisfaction, was independence. In an interview with *Tech in Asia*, exploring why he was not looking for a role at a company like Microsoft, Michael Love, founder of Pleco, said: ‘Even if you’re working at a big company with career security and free soda, you are really just a tiny little piece of something. I wanted to run the whole thing, even if it was just a small thing’.³⁰⁹ This desire to remain independent was echoed by three of my interviewees, two of whom indicated that they had rejected external investment in order to retain control. They justified this by stating that it would avoid the risk of the organization optimizing for short-term commercial goals on

³⁰⁷ This statement more generally echoes the principles of ‘social entrepreneurship’, a concept that came to prominence during the period of this research.

³⁰⁸ This echoes the way that Levi-Strauss describes the work of the bricoleur, who ‘derives his poetry from the fact that he does not confine himself to accomplishment and execution: he ‘speaks’ not only with things, as we have already seen, but also through the medium of things: giving an account of his personality and life by the choices he makes between the limited possibilities. The ‘bricoleur’ may not ever complete his purpose but he always puts something of himself into it’ (Levi-Strauss, 1966, p.18).

³⁰⁹ Horwitz, Josh. ‘Meet the man behind Pleco, the revolutionary Chinese language learning app that’s older than the iPhone.’ *Techinasia.com*. June 25, 2014. <https://www.techinasia.com/mike-love-pleco-interview-chinese-language-mandarin-language-learning-iphone-dictionary-app/> (accessed November 1, 2019).

behalf of an investor. However, they also acknowledged that it limited the extent of user growth, and therefore impact.

One recurring feature in online interviews and foundation stories published on the blogs of individual designers was their shared interest in video games.³¹⁰ This was because these tool designers belonged to what DE8 called ‘the video games generation’. Games inspired the design of at least two tools: ‘I found myself playing an addictive stupid game and feeling I should learn Chinese instead’ said DE8 when asked about what prompted their desire to build a tool. The Skritter blog, in the same way, indicates that video games were an original inspiration. Good gamified learning, however, is hard to achieve: in the words of Thorne, Fischer and Lu (2012, p.280), ‘while games are being studied as a locus of learning, games designed for learning tend not to achieve their purpose as play is replaced by repetitive tasks’. In that regard, DE8 described their goal as ‘the holy grail of that intersection between the addictive quality of video games and learning’.

The metaphor ‘holy grail’ invites reflection. It hints at a certain chivalric quality shared by the designers I interviewed – at least in their self-presentation. It is continuous with the non-monetary nature of the goals pursued, and with the overall difficulty of the pursuit, manifested by the numerous ‘challenges’ to overcome, which I have explored throughout the thesis. It is more generally continuous with what I called ‘missionary entrepreneurialism’ at the beginning of this section. In fact, the term missionary would be apt for one of the tools I observed. One of my interviewees expressed a rather unexpected motive for developing a learning tool: ‘teaching Chinese people about the Bible’ as ‘one of Jehovah’s witnesses’. Although seemingly marginal, this motivation directly harks back to the critical work of early Jesuits in China, or more recently, to the connection between the first Chinese typewriter developed by Sheffield and missionary efforts to circulate the Bible in China (Mullaney 2017, p.129).³¹¹

³¹⁰ Another recurring element that most designers had in common was gender: of the 15 designers I interviewed, 14 were male, and one was female – a ratio that somehow reflects what I observed not only for digital Chinese language learning tools, but in the tech field more broadly. This gender profile is in striking contrast with Chinese language education, which is predominantly female. Exploring this question in more detail exceeds the scope of this thesis.

³¹¹ As pointed out by one of my supervisors, this is also reminiscent of the establishment of Tongwen Guan (or the School of Combined Learning), teaching Western languages (and later Western ‘science’ subjects) in China

Another designer proposed a different angle on this idealism. Reflecting on whether undergraduates who study Chinese will actually succeed in ‘getting a job’, when there are so many native Chinese speakers with perfect English, DE14 described their creation of a digital Chinese language learning tool as reflecting ‘curiously impractical and irresponsible ways of conducting my own business, which have clearly violated all sorts of instrumental purposes.’ They added, ‘That then makes me more sympathetic towards those crazy quixotic characters who take up learning Chinese for no good reason in the world.’ This description of language learners as ‘quixotic’ is in stark contrast with Luis Von Ahn’s presentation of Duolingo, which I quoted in Chapter Seven, as driven by a desire to help people get a job or more generally rise up socially by learning English.

In one sense, a quixotic individual is someone who can afford to think quixotically. Bourdieu writes in *The Rules of Art* that ‘in a general manner, it is the people who are richest in economic capital, cultural capital and social capital who are the first to head for new positions’ (Bourdieu 1996, p.262). These people have acquired the dispositions and practices that allow them to recognize the symbolic capital to be gained from early occupation of the freshly created field positions. In fact, the designers I described in this chapter may be considered from this perspective as ‘smart adventurers’, who identified an opportunity at the intersection of technological development, language education, and engagement with China, and occupied a desirable position in this emerging field by developing a learning tool.³¹²

in 1862 during the late-Qing dynasty. When it was first started, with ten students, the only English instructor was a British missionary, John S. Burdon.

³¹² One unexpected success story illustrates this and offers a fitting vignette for reflection. In 2002, Richard Sears, a programmer from the US, started a website on Chinese etymology – an object of his personal passion – called ‘Hanziyuan’. After nine years of low hum, it received attention from China in 2011, resulting in thousands of emails, millions of visitors, and he was soon nicknamed ‘Uncle Hanzi’ (汉字叔叔). Chinese netizens on Weibo took interest in Sears’ project and helped him meet well-connected supporters through which, in 2012, Sears even secured a teaching role at Beijing Normal University. Sears eventually settled in China, stating that this allowed him to live as ‘Uncle Hanzi’ while outside China he was ‘just an old man’. Yan, Alice. ‘Meet US expatriate ‘Uncle Hanzi’, devoted custodian of Chinese characters’. Scmp.com. October 8, 2017. <https://www.scmp.com/news/china/society/article/2114053/meet-us-expatriate-uncle-hanzi-devoted-custodian-chinese/> (accessed May 15, 2020). This may be the best illustration of cultural capital’s irreducibly field dependent nature – and the unexpected benefits that can arise from designing a digital Chinese language learning tool.

In line with this analysis, the best catalyst for an ‘ecosystem’ of digital Chinese language learning tools to take solid shape is likely to be a shared narrative – or shared quixotic delusion – nurturing a sense of common purpose among a committed core group of designers. An idea floated in 2013 by a group of designers with whom I was in conversation at the time offers great potential: to set up a digital Chinese language learning guild. This proposal was inspired by Massive Multiplayer Online Games, where players with different skills and levels of expertise assemble as ‘guilds’ to conduct large-scale missions together in a virtual world. A digital Chinese language learning guild could take at least two different forms. It could bring together a group of designers exploring the digital realms to seek and test the best existing tools, then use this knowledge to improve the design of their own tools, gather forces to create new tools that would make a significant improvement to the ‘treasure’ already available – and create ‘maps’ to guide learners and teachers in the digital worlds. A guild could also gather learners, possibly supported by teachers and designers: those learners would receive a ‘map’ guiding them through the dark forest of the web, gather a treasure of learning tools, and use those to ‘tame the Chinese dragon’, or whichever metaphor would encourage their participation.³¹³

In both cases, two elements would be critical for guilds of this sort to serve as a basis for a more solid digital Chinese language learning ecosystem. The first would be collaboration among different ‘designer archetypes’, ensuring that the tools used and recommended are varied, and the map proposed exhaustive and maximally useful to diverse learners. The second would be some form of recognition from adjoining fields, particularly language education, tech innovation and what I called ‘the China Space’, that participating in a ‘guild’ of this sort represents a valuable form of cultural capital, in order to encourage both designers’ and learners’ efforts. For best results, this recognition should be more than symbolic, and take economic forms, from public funding directed to mapping and maintenance of the landscape of tools to micro-scholarships for digital immersion, or recognition of ‘guild’ membership for career prospects. For now, whether this will happen is anybody’s guess.

³¹³ A potential model for such a guild would be ‘Mobile Learning Communities’. Those are communities of practice gathering learners and teachers, who share, use and review digital learning tools and resources to stimulate and enhance learner-centric practices conducted on mobile devices (Wang, L. & Ma 2017; Wang, L. 2019).

Conclusion

This thesis has sought to argue that digital tools for learning Chinese can play an important part in spreading literacy and improving communicative competence in Chinese, as the world's second most-commonly spoken language and the national language of the world's most populous nation. However, the challenges that hinder the emergence of an 'ecosystem' enabling this goal in an effective manner have proven insurmountable – and the disappointment that prompted me to undertake this PhD research in 2015 has not dissipated five years on. For now, the tools that form my object of study remain, at best, an eclectic set of language learning aids maintained by a distributed group of a few dozen people, loosely coordinating their efforts in a chaotic and highly fragmented environment.

As I complete this thesis during the first and second waves of the COVID-19 pandemic, the question 'what's next?' remains open-ended. Lockdowns have fast-tracked the adoption of digital technology for learning purposes, and the expected economic downturn may offer an opportunity for cost-effective (and pedagogically sound) distributed digital learning models. However, the pandemic has also increased national fragmentation – as well as geopolitical tensions between China and the rest of the world – raising doubts as to the possibility that global coordination efforts on Chinese language learning are on the immediate horizon. This points to the limits of open source utopianism: it depends on the premise of a tech-literate population, global stability, and distributed goodwill – none of which is currently a given.

Bourdieu's field theory was critical to understand the practices of learners, teachers and designers – from design choices to adoption of and value judgements on different tools – as forms of struggles for social dominance among different agents, operating according to the logics of different fields. Bourdieu's field theory more generally allowed me to highlight the elusiveness of digital Chinese language learning as a 'field'. The very low levels of unity that I was able to observe among the people developing digital tools, and the absence of a cohesive network of teachers, learners, and designers would not warrant digital Chinese language learning being regarded as a field (let alone an ecosystem). Instead, learners, teachers and designers actively using (or contributing to) digital tools can expect misalignment between their habitus and the fields where their practice takes place. For teachers and learners, this comes with important questions about the type of habitus that is most valuable to develop, and how to develop it. For designers, this means engaging with a complex set of constraints: in particular, their tools must be designed both to support Chinese

learning in a way that other parties will recognize as valid, and to generate revenue in a way that other parties will recognize as ethical, within a fast-changing economic and technological environment. For all tool designers, this is a daunting task.

In using Christensen's concept of disruptive innovation, I have drawn particular attention to the economic conditions in which those tools are developed and circulated. The theory, however, has shown its limits when it comes to understanding the evolution of services that are provided not by one organization, but a distributed network of organizations operating mostly online. Moreover, since digital language learning tools are largely dependent on crowd funding or public funding, they do not accord with the commercial aspects of disruptive innovation that Christensen studied. Finally, Jenkins' account of convergence culture in the digital age has enabled me to conceive of the new learning practices conducted in this emerging digital environment as 'DIY transmedia practices', or forms of digitally mediated bricolage. The theory, however, has shown its limits in light of persistent cultural differences when it comes to defining the value of different learning outcomes, and the fragmentation of the global Internet, especially due to the 'Great Firewall of China'.

The typology of digital Chinese language learning tools presented in Chapter Five is my response to the obstacles outlined in the previous paragraph. My hope is that this typology may enable users (learners, teachers and designers) to better assess the pedagogical value of different tools. Additionally, I hope that the typology will also encourage these users to think of the existing range of tools as having complementary features, and therefore to approach them 'ecosystemically'. However, it is important to emphasize here that the typology of tools I produced in Chapter Five captures the situation of the last decade, up to the moment of writing. Whether the typology will be relevant in five years' time is anyone's guess. This is because the sustainability of the digital tools I described is unpredictable, given the absence of a well-established and internationally recognized system of institutional accreditation for Chinese language studies.

In Part Three, I highlighted how the current state of this emerging and elusive 'field' has depended largely on individual tool designers working mostly altruistically to develop tools and integrate them – creating not only the tools themselves, but also a community of sorts, with shared norms and a common discourse. On the basis of my observation, those efforts resemble a quixotic attempt to establish a new model against all odds. This was in fact one of the surprising findings from this research: where I had expected to find grand visions

for large scale technological transformations, I encountered instead a bunch of altruistic nerds building digital communities of practice centered on Chinese language education.

In that regard, one important area of reflection opened by this research has to do with the generational nature of the ventures I followed. The early 2010s, when I worked on the Marco Polo Project and built many of the contacts that allowed me to conduct this research, were the boom-years of collaborative digital projects, led by a new generation of tech-savvy and globally-minded university graduates. The disappointment I described at the beginning of this thesis may thus well reflect a general change of mood that occurred in the second decade of the twenty-first century, from the dream of abundance-by-design to the nightmare of exploitative peer-economy models based on surveillance capitalism; from the dream of harmonious cosmopolitanism to the nightmare of rising populist nationalism; from enthusiasm to suspicion. Whether COVID-19 will shift the course or increase the trend is, for now, anybody's guess. It is my hope at least that this research will contribute, in some way, to foster more effective collaborative models in digital education.

Appendix One: A list of reviewed tools

This appendix lists 190 items to form what I call an ‘extended canon’ of digital Chinese language learning tools. This list was gathered on the basis of the ‘resources’ section of Hacking Chinese, as of July 2, 2017, with additions from personal research and suggestions from interviews. The set of protocols applied for gathering those tools is described in Chapter Three.

I reviewed the list in November 2019. Over this period, nine of the tools in my original ‘extended canon’ had become defunct, in the sense that the URL no longer redirected to them, or I was no longer able to find them on the Appstore. I have greyed those obsolete tools in the list below.

This list does not propose to be exhaustive. Not only does the constantly changing nature of the Internet preclude this but, as I noted in Chapter One, the ontology of digital artefacts is such that there is basically no clear-cut basic way to distinguish between tools that can be described as either ‘the same tool’ or as ‘different tools’. The classifications I made were based on observation of formal elements, or what I called ‘core functional units’ in Chapter One. However, I also listed the tools under their ‘brands’, and consequently, there may be multiple entries of the same ‘brand’, corresponding to different functional units. The rationale and criteria that I used to structure this list, where entries are sorted into 6 macro-categories and 35 types, are detailed in Chapter Five.

Macro Category 1: Language accessibility tools

1.1 Chinese language processing and analysis

1.1.1 Chinese text processing³¹⁴

1. Chinese Text Project font test page: a tool to check the presence of appropriate Chinese font on your computer, and install new fonts if needed.
<http://ctext.org/font-test-page>
2. Free Chinese fonts: a set of free Chinese fonts for setup.
<http://www.freechinesefont.com/category/calligraphy/>
3. Pinyin Joe’s Chinese computing help desk: advice for Chinese language setup on a range of hardware and operating systems. <http://pinyinjoe.com/>

³¹⁴ All software to process Chinese characters falls into that category, including software now available as part of basic operating systems such as iOS or Android. I did not specifically review those.

1.1.2 Input converters

I came across four websites (or ‘brands’) proposing a series of such tools:

1. Chinese tools: this website proposes a series of tools to convert input, including simplified to traditional, Chinese to Unicode, Chinese text to pinyin, pinyin with number to pinyin with tone mark, Chinese text to calligraphy, and Chinese text to ‘seal’ writing. <https://www.chinese-tools.com/tools>
2. Arch-Chinese: generate various learning tools using Chinese characters, including customized handwriting work sheets, snakes and ladders games, crossword puzzles, Sudoku sheets, Dice, or ‘scrambled character’ puzzles. <http://www.archchinese.com>
3. Chinese converter: a set of converting tools, including zhuyin/pinyin, Chinese/Unicode, traditional/simplified, Chinese/Arabic numbers. Characters/pinyin, text/image format. Also allows to count the characters in a text, create practice grids, reorder a text, and convert to other writing systems including Hangul, Katakana, Cyrillic, or create stroke order images. <https://www.chineseconverter.com/en>
4. Purple culture: a set of converting tools, including zhuyin/pinyin, traditional/simplified, Characters/pinyin. Also allows to create customized practice grids, vocabulary lists, or colour code a text for tones. <https://www.purpleculture.net/>

The following websites offer only one functionality:

1. Ziti88: converts Chinese text to cursive writing. <http://www.ziti88.com/>
2. New Tong Wen Tang: converts Chinese text from simplified to traditional and vice versa. <http://simplified-traditional.blogspot.com.au/2011/02/new-tong-wen-tang.html>
3. Chinese Pinyin Translator: converts a Chinese text to pinyin or IPA, with different tone mark options. <https://easypronunciation.com/en/chinese-pinyin-phonetic-transcription-converter/>
4. Toshuo Pinyin Tone Tool: converts a text from Pinyin with numbers to pinyin with tone marks. <http://toshuo.com/chinese-tools/pinyin-tone-tool/>
5. Lexilogos Pinyin conversion: converts a text from Pinyin with numbers to pinyin with tone marks. http://www.lexilogos.com/keyboard/pinyin_conversion.htm
6. Pinyininput: converts a text from Pinyin with numbers to pinyin with tone marks. <https://www.pinyininput.net/>
7. Chinese annotator: automatically adds tone marks, or zhuyin, or pinyin, to Chinese characters in a word document. <https://twighk.github.io/tghz-word-tone-annotator/>
8. Toshuo Chinese number converter: converts Chinese numbers to Arabic numbers. <http://toshuo.com/chinese-tools/chinese-number-tool>
9. Hanzigrids: creates custom Chinese worksheets for handwriting practice. <https://www.hanzigrids.com/>

1.1.3 Analytical tools

1. Analyse your Hanzi: extracts the characters from a text in a customized format, including by frequency and with diverse annotations. <http://hskhsk.pythonanywhere.com/hanzi>
2. Chinese word extractor: extracts the words from a text in the form of a matrix. http://www.zhtoolkit.com/apps/chinese_word_extractor/
3. Chinese text analyser: extracts words from a Chinese text and sorts them by frequency. The tool also allows the user to mark words as ‘known’ or ‘unknown’, and indicate expected comprehension of a text on that basis. <https://www.chinesetextanalyser.com/>
4. Chinese Text computing: gives the frequency of various two-character word compounds in two corpora. <http://lingua.mtsu.edu/chinese-computing/statistics/bigram/form.php>
5. Chinese corpora and frequency lists: a website from Leeds University to search the frequency of different characters in different contexts, with different corpora available. <http://corpus.leeds.ac.uk/query-zh.html>
6. Online corpus of the Chinese language from Peking University: a full corpus of the Chinese language (website in Chinese, for advanced learners or teachers). http://ccl.pku.edu.cn:8080/ccl_corpus/

1.2 Dictionaries and text readers

1.2.1 Dictionaries

1. Pleco: dictionary for phone / tablet (includes OCR, flashcards, text reader). <https://www.pleco.com/>
2. MDBG: dictionary for web browser (includes flashcards, text reader, flashcards, or new vocabulary through a feed). <https://www.mdbg.net/chinese/dictionary>
3. KTDict: dictionary for iPhone. <http://www.ktdict.com/>
4. Zhongwen: Chinese/English + Chinese etymological dictionary. <http://www.zhongwen.com/>
5. Yellowbridge dictionary: dictionary from Yellowbridge – Chinese tools online. <http://www.yellowbridge.com/chinese/chinese-dictionary.php/>
6. Taiwan ministry of education online dictionary. <https://www.moedict.tw/>
7. Hanzicraft: an online dictionary with detailed analysis of characters (also exists as an app). <https://hanzicraft.com/>
8. Line Dict: dictionary with integrated character tracer and automatic translator. <http://ce.linedict.com/dict.html#/cnen/home/>
9. Word in the hand Chinese Phrasebook: an app with 15,000 common words and sentences in 250 categories for travelers. <http://word-in-the-hand.com/chinese-phrasebook/>
10. Iciba dictionary: online dictionary and automatic translator. <http://www.iciba.com/>
11. Mini moe dictionary: Taiwan elementary school dictionary. <http://dict.mini.moe.edu.tw/cgi-bin/gdic/gswweb.cgi?o=ddictionary>

1.2.2 Pop-up dictionaries

1. Perapera pop up dictionary: a Chinese pop up dictionary for Google chrome. <https://www.perapera.org/plugins/>
2. Zhongwen pop up dictionary: a Chinese pop up dictionary for Google chrome. <https://chrome.google.com/webstore/detail/zhongwen-chinese-english/kkmlkkjojmombglmlpbpamhcaljjkde/>
3. Hanping Chinese pop up screen OCR: an app for phone that uses optical character recognition for a screen capture. <https://play.google.com/store/apps/details?id=com.embermitre.hanping.app.popup>
4. Frill: a Chinese pop up dictionary for safari. <https://frill.miknight.com/>

1.2.3 Text readers

1. Clavis Sinica: a text reader, allowing you to show the definition of words in a text pasted in the reading window. Includes a set of texts and flashcards. <http://clavisinica.com/>
2. Wenlin: a text reader, allowing you to show the definition of words in a text pasted in the reading window. Includes flashcards. <http://www.wenlin.com/>
3. Dim Sum: a text reader, allowing you to show the definition of words in a text pasted in the reading window, or do this for a website. <http://www.mandarin-tools.com/dimsum.html>
4. Chinese annotation tool: automatically marks up words in a text with translation and pinyin. <https://www.chinese-tools.com/tools/annotation.html>
5. Hanzi Reader: Chinese text reader showing pop up translations of a word (for smartphone use). <https://apps.apple.com/us/app/hanzi-reader-chinese-dictionary-definitions-displayed/id383433187>
6. Mandarin Spot: text annotator that automatically shows pinyin or other pronunciation of characters. <http://mandarinspot.com/annotate>

Macro-category 2: Learning advice and support

2.1 Learning tips

2.1.1 Language learning advice websites & blogs

1. Hacking Chinese: a blog providing an extensive series of tips on how to learn Chinese, by Olle Linge. <http://hackingchinese.com/>
2. Sinosplice – learn Chinese: a series of tips and resources from John Pasden (lead author of the Chinese Grammar wiki) on learning Chinese, including pronunciation, grammar, and practical learning advice. <https://www.sinosplice.com/learn-chinese>
3. Laowai Chinese: tips and strategies to learn Mandarin. <http://laowaichinese.net>
4. Carl Gene Fordham blog: tips for Chinese learners, translators and interpreters, from a Chinese translator. <http://carlgene.com/blog/>
5. Go East blog: a series of tips on language learning from a Shanghai-based language learning centre. <https://www.goeastmandarin.com/blog/>

6. Chinese Hacks: tips for learning Chinese, vocabulary and grammar points, and reviews of tools and resources. <http://chinesehacks.com/>
7. Mandarin Weekly: a weekly newsletter with tips on learning Chinese (the newsletter stopped in 2018, but an archive is available). <http://mandarinweekly.com/>
8. East Asia Student: a blog on East Asia, with extensive content on Chinese learning tips, grammar, vocabulary, and reviews of resources. <https://eastasiastudent.net/>
9. Language log: a series of learning tips, grammar points and resources from U-Penn lecturers. <http://languagelog ldc.upenn.edu/nll/>
10. DigMandarin: a site with tips on learning Chinese. Includes grammar, pronunciation and vocabulary, and links to a range of tools and resources. <http://www.digmandarin.com/>
11. LTL Learn Chinese Ebook: a complete set of tips on learning Chinese, as well as grammar, pronunciation and basic vocabulary, from the ‘Live the Language’ Mandarin school. <http://www.livethelanguage.cn/how-to-learn-chinese/>
12. Chinese podcasts: a review of available Chinese podcasts to support learning, including Chinese learning podcasts and native podcasts. <http://chinesepodcasts.com>
13. The Mandarin Corner: language learning blog. <https://themandarincornerblog.com/>

2.1.2 Self-learning e-books

1. Master Mandarin: a step by step guide to learning Mandarin autonomously, sold as an e-book alone, or together with worksheets, extra discounts for recommended resources and interviews with 11 ‘experts’. <http://l2mastery.com/language-guides/master-mandarin/>
2. Hacking Chinese, a practical guide to learning Mandarin: an e-book offering a complete method to learn Chinese autonomously, based on the Hacking Chinese blog. Also exists in video + text version. <http://www.hackingchinese.com/about/practical-guide-to-learning-mandarin/>

2.2 Grammatical explanations

1. Chinese grammar wiki: a comprehensive online resource, with entries ordered by level of difficulty. https://resources.allsetlearning.com/chinese/grammar/Main_Page
2. Online Chinese Grammar notes: grammar points, with entries ordered by communicative goal (e.g. asking for someone’s age), grammatical function (e.g. aspect, reflecting the completion of actions) and words (e.g. use of 有), from the University of Oxford. http://www.ctcfl.ox.ac.uk/Lang%20work/Grammar%20database/Grammar_database_content.htm
3. Chinese Grammar Channel: grammar lessons for beginner, intermediate and advanced learners, from the ‘ichineselearning’ tutoring platform (see below). <http://www.chinese-grammar.com/>
4. Mandarin friend: a blog exploring Chinese grammar and vocabulary. <https://mandarinfriend.wordpress.com/>

- Chinese Notes Grammar: overview of Chinese grammar. <http://chinesenotes.com/grammar.php>

2.3 Vocabulary lists

- LanguageLog name of the chemical elements in Chinese: a blog post on the topic. <http://languagelog ldc.upenn.edu/nll/?p=18877>
- Gym vocabulary: a list of words for gym enthusiasts from a Chinese BBS. (<http://www.takesport.idv.tw/bbs/discuss/join.asp?db=articles&ID=178&fid=1&sort=lastdate>)
- ChinaSmack glossary: a list of memes, slang and contemporary edgy vocabulary. <https://www.chinasmack.com/glossary>
- DigChinese measure words: a list of idiomatic count measure words. <https://digchinese.com/measure-words>
- Grass Mud Horse lexicon: a list of words used to avoid censorship. http://chinadigitaltimes.net/space/Grass-Mud_Horse_Lexicon
- IICM Computer related terms: a list on the topic from the Taiwan Institute of Information and Computing Machinery. http://www.iicm.org.tw/term/termb_1.htm
- List of foreign company names in Chinese: a blog post from FluentU on the topic. <http://www.fluentu.com/blog/chinese/2013/01/21/business-chinese-vocabulary-list-foreign-companies-in-chinese/>
- Zein 3000 most common characters: a list of characters by frequency, from a website by a Swedish linguist. <http://www.zein.se/patrick/3000char.html/>
- Chinese-tools Chengyu: a chengyu dictionary and chengyu stories. <https://www.chinese-tools.com/chinese/chengyu>
- Carl Gene Fordham's blog – special lists: on this blog from an Australian translator-interpreter, there is, for instance, a list of 40 commonly used academic terms, (<http://carlgene.com/blog/2014/11/40-terms-commonly-used-in-chinese-academic-writing/>), or a list of 250 physical verbs in Chinese (<http://carlgene.com/blog/2014/08/250-physical-verbs-in-english-and-chinese/>).
- Practice Chinese Common conjunctions in Chinese. <http://practice-chinese.com/post/3657298450/the-conjunction-in-mandarin-chinese>

2.4 Multimedia Chinese pinyin and phonetics

2.4.1 Introduction to phonetics (text only)

- Patrick Zein Chinese phonetics: an introduction to Chinese phonetics from a website by a Swedish linguist. <http://www.zein.se/patrick/chinen8p.html>
- Pinyin Info: a guide to writing Mandarin Chinese in Romanization. <http://pinyin.info/readings/index.html>

2.4.2 Pinyin charts

- Yabla pinyin chart: a complete pinyin chart with audio. <https://chinese.yabla.com/chinese-pinyin-chart.php>
- Ocrat Mandarin Chinese phonetics table: a table with all Chinese syllables and audio. <http://lost-theory.org/chinese/phonetics/>

3. Mandarin class Hong Kong pinyin chart: a table with pinyin syllables and audio from a Hong-Kong based e-learning site.
<http://hkchinesemandarintutor.com/wp-content/Chart/index.html>
4. ChinesePod pinyin chart: a table with all pinyin syllables and audio (sectioned by level of difficulty for English speakers).
<http://chinesePod.com/tools/pronunciation>
5. AllSetLearning pinyin chart: a complete pinyin chart by the authors of the Chinese grammar wiki. Includes zhuyin equivalent.
https://resources.allsetlearning.com/chinese/pronunciation/Pinyin_chart

2.4.3 Videos on pronunciation

1. Hutong School - what are Chinese tones: a YouTube video on Chinese tones.
<https://www.youtube.com/watch?v=u-Cl-gyfWTM>
2. Better Chinese pinyin pronunciation: a YouTube video showing the pronunciation of all syllables (with big focus on mouth articulation).
https://www.youtube.com/watch?v=VwyQK62tO_U

2.5 Character memorization tools

2.5.1 Based on visualization

1. HSK 东西 graphs: HSK vocabulary lists presented as infographics.
<http://www.hskhsk.com/graphs.html/>
2. Chineasy: a character acquisition method that makes characters memorable by associating them with an image. <https://www.chineasy.com>
3. GotCharacters - a radical view: an interactive chart showing relationships between 194 character radicals, accompanied by stories. Also available as a poster. <https://www.gotcharacters.com/wp/a-radical-view-guest/>
4. Hanping Chengyu: a twitter feed presenting one animated chengyu per day.
<https://twitter.com/HanpingChengyu>
5. Tasty Mantou: a website presenting a daily character and a daily word, with colours and animations. <https://www.tastymantou.com/>
6. Wikimedia Commons Stroke order project: a wiki aiming to develop a complete set of illustrations representing stroke order of Han characters.
https://commons.wikimedia.org/wiki/Commons:Stroke_Order_Project/
7. Character pop: a website aiming to help character memorization by ‘exploding’ them into their components, and adding a story.
<https://characterpop.com/>
8. MandarinBanana: a method to remember Chinese characters by associating them with visual mnemonics. <http://www.mandarinbanana.com/>
9. Fluent in Mandarin: a blog entry listing often confused characters (e.g. 没 设 般 船 投). <http://www.fluentinmandarin.com/content/those-chinese-characters-that-are-really-easy-to-get-mixed-up/>
10. Horizontal Hanzi: a website showing similar Chinese characters to help learners distinguish between them (from a Sydney-based programmer explicitly inspired by Hacking Chinese). <http://horizontalhanzi.com/>
11. Chinese character stroke order rules: a video on YouTube explaining rules for writing characters. <https://www.youtube.com/watch?v=8MCnjfws0XQ>

12. ABC of Chinese: a series of videos introducing Chinese characters through live drawing. <https://www.youtube.com/watch?v=s0h18Rd44#t=544>
13. Fanjian: a tool from Berkeley university to learn both simplified and traditional characters, with lessons and exercises. <http://www.language.berkeley.edu/fanjian/start.html>
14. Sayjack conversion table: a chart showing the equivalence between traditional and simplified characters. <http://www.sayjack.com/chinese/traditional-to-simplified-chinese-conversion-table/>
15. Learn Chinese in 3D: an iPhone/iPad app that shows the 1200 most common characters, organized by radical, in a 3D landscape. <https://apps.apple.com/sa/app/learn-chinese-in-3d/id543841434>

2.5.2 Based on etymology

1. Chinese Characters: a website to help memorize characters by showing etymology. Became partly defunct due to malware infection. <http://chinese-characters.org/>
2. Hanziyuan: a website on Chinese etymology, with extensive scans of old characters, by 'Uncle Hanzi'. <https://hanziyuan.net>
3. Outlier Linguistics: a dictionary extension for Pleco explaining the logic of Chinese characters, together with a masterclass for character acquisition. <https://www.outlier-linguistics.com/>

Marco category 3: Multimedia courses

3.1 Video courses

1. Yoyo Chinese: a structured Chinese learning course, with a series of videos by level, audio revisions, and interactive games for pronunciation and vocabulary testing. <https://www.yoyochinese.com>
2. MandarinMadeEZ: a series of fun videos from Fiona Tan, who then joined ChinesePod. (original website at <https://mandarinmadeez.com/> is defunct, malware infected, but the videos are available as a Youtube channel). <https://www.youtube.com/channel/UCwmAanlyOQ2Liuu70DLskHA>
3. Mandarin HQ: 150 video lessons focusing on 'real spoken Chinese', with a variety of accents and fast speech. Transcripts and a built-in functionality to repeat a sentence are present to help learners. <https://mandarinhq.com/>
4. Peggy Teaches Chinese: 150+ videos on Chinese learning, since 2009, and associated tutoring services, from a Chinese teacher / tutor in Taiwan. <https://www.peggyteacheschinese.com/>
5. Learn a Chinese phrase: a YouTube video series from the Confucius Institute at Wayne State university, explaining common Chinese expressions. <https://www.youtube.com/channel/UCL6C66s10Xirrh1wX1ymtjA>
6. CNTV Learning Chinese: a series of video classes. Includes 'growing up with Chinese', 100 videos from China Network Television teaching the first 300 characters to teenagers, travel Chinese, and 'sports Chinese' to learn with celebrity DaShan. <http://www.cctv.com/program/learnchinese/01/index.shtml>
7. Coursera Chinese for beginners: a beginner Chinese course from Peking University. <https://www.coursera.org/learn/learn-chinese>
8. Oplang: learn Chinese one character at a time. <http://www.oplang.org/lesson/level1-english-chinese/?source=206>

3.2 Audio courses

1. Chinesepod: a selection of 4000+ Chinese learning podcasts organized by level. Also includes videos, exercises and flashcards. <https://chinesepod.com/>
2. Pop Up Chinese: a broad selection of podcasts for Chinese learning. <http://popupchinese.com/>
3. Chinese Learn Online: 100 audio lessons to go from beginner to intermediate. <https://www.chineselearnonline.com/>
4. Melnyks: progressive audio lessons with full pdf transcripts. <https://www.melnyks.com/>
5. Learn in your Car Mandarin: a podcast series presented as a spotify playlist. https://play.spotify.com/album/26RqqLW2ztsGh1WZG1q5FN?play=true&utm_source=open.spotify.com&utm_medium=open
6. Pimsleur Chinese: an audio method for Chinese learning based on the Pimsleur audio-lingual approach. <https://www.pimsleur.com/learn-chinese-mandarin>
7. Clavis Sinica Stepping Stones: a series of lessons in written Chinese for adult beginners, consisting of texts and associated audio, to learn the first 300 characters. <http://clavisinica.com/SS/intro.html>
8. DuChinese: graded lessons in text format with audio, translation and integrated dictionary. <https://www.duchinese.net/>³¹⁵
9. Learn NC: complete Coursebook from University of North Carolina. <http://www.learnnc.org/lp/editions/mandarin1/contents> (archived on the ‘wayback machine’)

Macro-category 4: Formatted content

4.1 Curated & adapted written content

4.1.1 Graded readers

1. Chinese Breeze: graded readers. <http://www.chinesebreeze.net/>
2. Mandarin Companion: graded readers offering ‘easy-to-read’ Chinese novels (by John Pasden). <http://mandarincompanion.com/>
3. Just learn Chinese: short stories in Chinese, written or edited for learners by the author of the blog. <http://justlearnchinese.com/mini-novels/>
4. Chinese Reading Practice: graded texts with optional translations. <http://chinesereadingpractice.com/>

4.1.2 News-based learning

1. The Chairman’s Bao: a news-based graded readers for Mandarin learners. <https://www.thechairmansbao.com/>
2. Decipher Chinese: an app proposing ‘daily bite-sized Chinese news’ in simplified language, graded according to HSK levels. <http://www.decipherchinese.com/>

³¹⁵ This tool is focused more specifically on learning to read, as the name suggests, but similar to the others in the list in form.

3. Amanda: an app proposing a daily selection of news stories about China, in Chinese and English. Texts can be read entirely in Chinese, or in English with a few Chinese words dropped in. Partnered with China Smacks.
<http://www.amandapp.com/>

4.1.3 Curated & scaffolded multimedia content

1. FluentU: a database of YouTube videos, subtitled and translated, with a customizable interface, flashcards, and a predictive algorithm to match videos to your level and interest. Includes some ‘courses’ made in house.
<https://www.fluentu.com/>
2. Foreigncy: learn with authentic content for intermediate & advanced learners.
<http://foreigncy.us/language-sets/?lang=zh>
3. LingQ: a very versatile and immersive tool that proposes a large number of text, audio and video ‘lessons’ organized by difficulty. Many of those are authentic native content, together with tools to mark known vocabulary, flashcards for revision, and gamified elements to track progress. You can also upload other selected content on your own. <http://lingq.com>
4. Yabla: an immersive course, offering a combination of instructional videos and native content, with customizable subtitle functions, slow down functions, and revision flashcards. <https://chinese.yabla.com/>
5. Culturelab CC: watch Chinese film, TV and music with subtitles and a pop up dictionary. <http://culturelab.cc/>

4.1.4 Adapted audio content

1. Slow Chinese: Chinese podcasts for learners, like a native podcast, but in slower speech to support understanding. <https://www.slow-chinese.com/>
2. Little Fox Chinese: songs & children stories for Chinese learners.
https://www.youtube.com/channel/UCipQJmg3yqouy6MRtPv_0Bg/videos/
3. Mandarin Chinese Listening Training: recordings of various Chinese accents for listening practice. <http://hanyu123.weebly.com/>
4. Phonemica: a collection of stories about various parts of China in the local dialect. <http://phonemica.net/>
5. Ting – the Chinese listening experience: a list of simple phrases read by different voices, from the University of Maine.
<http://hua.umf.maine.edu/Chinese/topics/topics.html/>
6. Sing Chinese Songs: videos of songs to learn Chinese (with translation).
<http://www.singchinesesongs.com/>

Macro category 5: Games & Drills

5.1 Character tests

1. Zhongwen Toolkit Word test: estimates the number of characters you know through a test based on a random sample of characters at various levels of difficulty. <http://www.zhtoolkit.com/apps/wordtest/>
2. Clavis Sinica character test: estimates the number of characters you know through a test based on a random sample of characters at various levels of difficulty. <http://www.clavisinica.com/character-test-applet.html>

3. Bliubliu: a tool that gives you reading material based on evaluation of Chinese level. <https://bliubliu.com/en/>

5.2 Input conversion games

5.2.1 Flashcards

1. Skritter: flashcards and spaced repetition software. <https://skritter.com/>
2. Shanka: flashcard system for browser. <http://shanka.hskhsk.com/beta1/>
3. Chinese tutor: flashcards and spaced repetition. <https://www.fastchinese.org/>
4. Nulinu.li: flashcard system for vocabulary revision. <http://nulinu.li>
5. Word Tracer – Learn Chinese: a flashcard-style app optimized to learn ‘tracing’ Chinese characters. <https://apps.apple.com/us/app/word-tracer-learn-chinese/id430413408>
6. Glossika: language learning through spaced repetition training: the software presents you with sentences of increasing difficulty to listen to and repeat. <http://glossika.com/>

5.2.2 Listening practice – pinyin / tone drills

1. Laokang tone trainer: an app to distinguish tones, working through 20 tone combinations on the pinyin ‘mama’. <https://xn-laokang-tone-test-c7an-ios.soft112.com/>
2. Laokang pinyin trainer: from the same programmer as above, an app to distinguish all pinyin combinations. <https://xn-laokang-pinyin-trainer-webs-ios.soft112.com/download.html>
3. Pinyin trainer: listen to sounds and identify the right word. Can focus on pinyin sounds or tones. <https://apps.apple.com/us/app/pinyin-trainer-by-trainchinese/id376797304>
4. Sinosplice tone pair drills: systematic drills to distinguish tone pairs, by John Pasden. <http://www.sinosplice.com/learn-chinese/tone-pair-drills>
5. Listening Practice: the software plays an audio sentence, and the learner is invited to type it in a box. <http://www.listeningpractice.org/>
6. Wordswing / Hacking Chinese tone training course: a 2-5 hour test and course on recognition of individual tones. <http://www.hackingchinese.com/the-tone-training-course-is-now-open/>

5.2.3 Speaking practice

1. Speak Good Chinese: an application based on Praat voice recognition software to improve speaking practice, by visualizing a users’ tone execution in relation to a model. <http://www.speakgoodchinese.org/>
2. Fast Chinese Speaking practice: hear words, repeat them, and let the machine grade your speech – focused on tones. <https://www.fastchinese.org/speaking>

5.2.4 Character learning arcade-style games

1. Alpha Team: a Chinese character learning game where the player is a Chinese hero hitting on characters to save a princess. Available as an app. https://play.google.com/store/apps/details?id=com.overpass.chineseheroes&hl=en_US

2. Mandarin Madness: an arcade game for smart phone and tablet that doubles as a character learning game. <https://www.amazon.com/Native-Tongue-Mandarin-Madness-Chinese/dp/B006TKI0LQ>
3. Mandarin Shooter Quest: a game to learn Chinese characters, exploring China and shooting at characters. <https://apps.apple.com/au/app/mandarin-shooter-quest/id963026318>

5.2.5 Character learning mnemonic-based games

1. Art of Chinese Characters: an app to help memorise Chinese characters by category by associating them with images. <https://apps.apple.com/us/app/art-of-chinese-characters/id504262446>
2. Zizzle: a flashcard system including mnemonics for the most frequent 1000 characters. <http://www.zizzle.io/>
3. Fun with Chinese characters: a game where you ‘play’ with Chinese characters (e.g. tap on weeds that appear on the character for ‘field’). <https://www.youtube.com/watch?v=ExzD8Lt7Kc>

5.3 Gamified courses

1. Hello Chinese: gamified beginner app. <http://www.hellochinese.cc/>
2. Duolingo Chinese: gamified beginner app. <https://www.duolingo.com/course/zh/en/Learn-Chinese>
3. Chinese Skill: gamified beginner app. <http://www.chinese-skill.com/cs.html>
4. Rosetta Stone Chinese: gamified learning method matching words with images, then gradually including sentences of higher levels of difficulty. Includes a speech analyser to perfect pronunciation. <https://www.rosettastone.com/learn-chinese/>
5. NinChanese: a complete course to learn Chinese, with an overarching narrative and a series of gamified units to acquire vocabulary, pronunciation and grammar. <https://ninchanese.com/>

5.4 Exploration/adventure games

1. Tea Story: an adventure game based in a Chinatown setting. <http://www.teastoryapp.com/>
2. WordSwing Text Adventures: choose your own adventure text games in Chinese. <https://wordswing.com/>
3. Wordswing asking directions: an adventure game to learn how to ask for directions in Chinese from WordSwing. <https://wordswing.com/cards/asking-directions-intro>

Macro category 6: Engagement platforms

6.1 Online tutoring

1. Italki: a two-sided marketplace of 1-on-1 language lessons through video-call (e.g. Skype). <http://italki.com>
2. Native Monks: 1-on-1 language tutors. <http://nativemonks.com>
3. Vivaling: a platform offering 1-on-1 language coaching services for children. <https://vivaling.com/>

4. iChineselearning: 1-on-1 Chinese lessons through video-call (e.g. Skype). <http://www.ichineselearning.com/>
5. eChineselearning: 1-on-1 Chinese lessons through video-call (e.g. Skype).³¹⁶ <http://www.echineselearning.com/>
6. MyChineseTutor: 1-on-1 Chinese lessons through video-call (e.g. Skype), one of the services of 'MyEducationGroup' which also provides teachers for remote schools. <https://mychinesetutor.org/>

6.2 Virtual classrooms

1. Hanbridge: virtual classrooms, 1-on-1 tutoring, and videos. <http://www.hanbridgemandarin.com/>
2. Sexy Mandarin: virtual classrooms, 1-on-1 tutoring, and videos, with a controversial, eroticized style. <https://www.sexymandarin.com/>
3. NewConcept Mandarin: virtual classrooms, 1-on-1 tutoring, and videos. <https://www.newconceptmandarin.com/learn-chinese-online/>
4. MyChineseTeacher: a video-call (e.g. Skype) teacher for schools (from MyEducationGroup, which also runs MyChineseTutor listed under 6.1). <https://mychineseteacher.org/product-description/school-program/>

6.3 Online language exchange communities

6.3.1 Written language

1. Lang-8: a language exchange community where learners write blogs in their target language and receive feedback. <http://lang-8.com/>
2. Hi Native: a spin off from Lang-8, a Q&A forum to ask language-related questions to native speakers. <https://hinative.com/>
3. Idiomatic Forest: describe a picture & receive feedback. <https://www.idiomaticforest.com/>
4. Tatoeba: a global crowdsourced collection of sentences translated in multiple languages. <https://tatoeba.org/eng/>

6.3.2 Oral language

1. HelloTalk: learn a language by chatting with natives, through voice and text. <https://hellotalk.com/>
2. Tandem: an app for language exchange through voice and chats. <http://tandemapp.me>
3. Speaky: an app for language exchange through voice and chats. <https://apps.apple.com/us/app/speaky-language-exchange/id1118877445>
4. LingBe: learn through phone calls with native speakers. <https://lingbe.com/>

6.4 Learner support communities

1. Chinese-forums: a discussion board for Chinese language learning matters. <https://www.chinese-forums.com/>
2. Hacking Chinese challenges: a monthly 'challenge', to set a learning goal and work towards it in company. <https://challenges.hackingchinese.com/>

³¹⁶ There are, indeed, two websites offering the same services, called 'iChineselearning' and 'eChineselearning'.

6.5 Immersive environments

1. Chinese Island: a virtual Chinese language learning environment developed by Monash University's Chinese Studies program in using the 3D virtual reality environment of Second Life. <https://www.virtualhanyu.com/>
2. Influent: a language learning 3D environment. <http://playinfluent.com/>
3. Zon: a multiplayer exploration game that became defunct over the course of my research and is no longer available.

Appendix Two: Interview questions

For my interviews with designers, I used a question template based on the Venture Design framework developed by the THNK School of Creative Leadership in Amsterdam. THNK is a privately-funded institution, which I attended in 2015, and that supports founders of start-up organizations planning for long-term growth (as well as innovators in large corporate organizations). My interview questionnaire appears below.

- **Original impetus:** What inspired you to develop [Name of tool]?
- **Team:** Who was part of the early team? Who is in the team now?
- **Target users:** What user group(s) or market segment(s) is your product or service primarily designed for? Who are early adopters?
- **Value proposition:** What is the main value that you propose to your users? What aspects of user experience did you prioritize when developing your product?
- **Competition:** Who do you identify as your main competitor(s)? How is your service distinct from theirs?
- **Partnerships:** What is your relationship with other language learning platforms and institutions of learning? What partnerships, if any, do you think have been or will be crucial to your success?
- **Investment and income:** Have you received investment for your venture? If so, from what source? How do you currently or how do you plan to monetize your product or services? How will you achieve a cost advantage, i.e. lower costs than alternative offerings?
- **Structure:** What is the legal / business structure of your organization? Where are the physical headquarters of the organization?
- **Mission and values:** What are the core values from which the organization operates and that guide the actions of the people involved? As an educational venture, what is the relative importance of income generation and social impact for your venture?
- **Changes and pivots:** What have been key success milestones so far? What have been changes and adaptations from your initial design?
- **Additional information:** Is there any additional information that you would like to share with me?

Appendix Three: Stakeholders mapping

Digital Chinese language learning tools are developed against the background of a vast network that extends to the entire education sector, itself largely impacted by government policy, as well as international affairs, and digital technology loosely defined (telecommunications, information technology and digital media), all of which are affected by disruption, given the volatility of online developments. In 2020, as online activity has intensified because of physical restrictions caused by COVID-19, these tools may see a greater shift towards integration. This appendix provides a list of the key stakeholders impacting digital Chinese language education on the local/national and global levels, organized in two main categories. The list was derived from first-order observations, personal insights from auto-ethnographic reflections, and interviews with learners, teachers and designers.

Some of those stakeholders have exclusive or primary local/national influence, while others have global influence. The structures and identities of locally / nationally influential stakeholders vary across jurisdictions – for instance, the institutions or public bodies in charge of defining language curriculums differ from state to state, and the respective roles of private and public institutions also vary across contexts. The list below is primarily derived from my observation of the Australian context, from which the examples provided below originate, but presented at a level of abstraction intended to make it relatively context-independent. One assumption leading this mapping exercise is that the overall shape of the system is generally similar at least in other developed English-speaking countries and the EU.

Key stakeholders involved in Chinese language teaching and learning on a local/national level.

- organizations and individuals teaching Chinese and/or administering organizations that teach Chinese
 - accredited learning institutions teaching languages (e.g., primary schools, high schools and universities teaching Chinese as part of the curriculum)
 - independent, non-accredited language schools (e.g. community-led schools, commercial language schools)
 - community groups promoting peer-based language education (e.g. language exchange groups)

- independent language tutors
- regulatory institutions impacting Chinese language education
 - government departments that determine the curriculum and regulations for schools and universities (e.g. Victorian department of education, Australian department of education)
 - bodies for training and certifying teachers for schools and universities (e.g. Schools of Education at universities, VAT registration body)
- public institutions funding or supporting Chinese language education
 - departments of education, as a key funding source for schools and universities
 - other departments promoting Chinese language education in line with their mission, through specialized funding (e.g. Victorian Department of Business and Innovation offering ‘Hamer’ scholarships for language studies in China, Department of Foreign Affairs through grants on China-focused projects or scholarships for studies in China under the ‘New Colombo Plan’, Department of Defence through language schools for military personnel)
 - local government bodies promoting e.g. community language initiatives (e.g. City of Melbourne, City of Yarra offering grants for community programs)
 - diaspora organizations and/or wealthy individuals funding or supporting independent language schools or other initiatives
 - non-profit and community organizations supporting Chinese language education as part of a mission to e.g. prepare young people for the future, create social harmony, etc. (e.g. churches, Foundation for Young Australians), or as part of a mission to better ‘engage with China’ (e.g. Australia China Youth Association)
- organizations that develop print resources for language education
 - textbook publishers
 - publishers of ‘Teach yourself’ methods and non-digital autonomous learning tools (e.g. Berlitz, Rosetta Stone)
 - printers, bookshops, libraries or education resource providers that circulate those books and methods (e.g. Champion Education)
- organizations impacting norms and discourses on language education
 - conferences & academic journals on language education and Chinese language education

- media publications influencing public understanding of language education and public intellectuals writing / speaking on the topic
- diaspora organizations and community groups advocating for different types of language education
- peak bodies, unions, associations and other peer-groups for language teachers and/or Chinese studies (e.g. Language and Culture Network of Australian Universities, Chinese Language Teachers Association of Victoria)
- Chinese institutions
 - Hanban, through the Confucius Institute network, the HSK exam as a global benchmark, and grants and scholarships³¹⁷
 - other Chinese public organizations, i.e. government bodies that impact Hanban policy, strategy or funding
 - Chinese universities delivering language teaching to foreigners, and/or conducting academic research on Chinese language education
 - local and provincial governments that directly or indirectly fund or support language education for foreigners, e.g. through grants or youth programs as part of ‘sister city’ partnerships
 - Taiwanese institutions, through academic research, education partnerships, and/or scholarships and exchange programs.

Organizations that play a key role in digital technology on a global scale

- organizations and individuals developing digital language learning tools
 - large media / tech companies developing language learning tools
 - as an independent project (e.g. Google Translate)
 - as a government commission (e.g. Navitas)
 - start-up companies developing a tool or a set of tools
 - individuals developing tools e.g. blog or video series outside any formal structure
- organizations developing and maintaining technological infrastructure:

³¹⁷ This observation was valid over the period covered by this research. In late June 2020, however, the Confucius Institute Headquarters (Hanban) was renamed ‘Center for Language Education and Cooperation’, and is no longer involved with Confucius Institute program funding.

- large tech & media companies that provide the underlying infrastructure
 - companies that provide hardware and core operating software (e.g. Apple, Microsoft, Dell, Cisco)
 - telecommunications companies (e.g. Telstra, Optus)
 - dominant tech-players acting as ‘keystone’ in the digital world (e.g. Facebook, Google, Tencent), companies offering key channels for distribution of content (e.g. YouTube, Wordpress)
 - large media organizations (TV, radio, and production companies)
- global State & non-State regulators influencing standards & systems for digital technology (e.g. Unicode consortium, W3C)
- organizations that support a digital technology ecosystem
 - independent or State-run organizations to support innovation, esp. in digital technology (e.g. tech incubators & accelerators)
 - private & state-run funding bodies for tech innovation, or organizations (Venture capital funds)
 - crowd-funding platforms (e.g. Kickstarter)
 - co-working spaces & other innovation spaces
 - peak bodies, non-profit organizations and associations supporting digital technology entrepreneurship on a local / global scale (e.g. G20 Young Entrepreneurs Alliance)
 - organizations that influence the discourse on tech innovation (e.g. Wired magazine, Tech in Asia & tech conferences, consulting groups)
- structures and organizations that help individuals and schools advertise learning services – e.g. Craigslist, tutoring platforms.
- groups & individuals that operate the interface between digital technology and previous organizations (e.g. IT departments, consulting groups, teaching & learning departments)

Appendix Four: How many people are learning Chinese?

The size and structure of the ‘market’ for digital Chinese language learning tools remains unclear in 2020. There is no recent academic study that presents an informed estimate of Chinese language learners around the world, whether of enrolled or autonomous learners, or both. Throughout my candidature, in interviews with tool designers and through desktop research, I was similarly unsuccessful in my attempts to obtain accurate information about the number of people learning Chinese, whether by using digital Chinese language learning tools, or by enrolling in a course at a bricks and mortar institution. Published figures on media sources, blogs or Wikipedia, vary considerably. Given this situation, I attempted to derive an estimate based on the different sources that I was able to access. The purpose of this appendix is to detail the three-step method of investigation that I followed in generating this estimate.

I first segmented enrolled Chinese language learners based on the types of institution where they were enrolled. I thus distinguished five groups:

- students at K12 institutions³¹⁸
- students at community language schools (esp. children of the Chinese diaspora)
- international students at Chinese universities³¹⁹
- students of the Chinese language at universities outside China
- students at Confucius institutes and private language schools.

This segmentation has two clear limitations. The first is that the categories mix heterogeneous learners in terms of level and learning intensity – for instance, L1 and L2 learners in high schools, or university students enrolled in a Chinese major and students taking Chinese as an option. The second is the risk of double-counting – for instance, it is possible that many students at community schools are also enrolled in K12 schools, and it is possible that students at a university are, in fact, attending the affiliated Confucius Institute –

³¹⁸ This category is problematic in relation to my research, which focuses on Independent Internet Users – i.e. excludes students in primary schools and (arguably) early years of middle school. Most of the sources I was able to access grouped all students across K12. I therefore had to resort to further extrapolations to propose estimates of the proportion of Independent Internet Users among that group.

³¹⁹ I took into consideration both students at universities in the Chinese mainland and in Taiwan.

or are enrolled in both. In the absence of better alternatives, I chose to accept those limitations.

The second step was to look for reliable sources in each category. I was able to obtain consistent published figures for the number of foreign students enrolled at mainland Chinese universities and at Confucius Institutes. For other categories, I was unable to find accurate global figures, and therefore proceeded on a country by country basis.

I conducted Google searches using the question ‘how many people are learning Chinese in [name of country/region]’, and variations on this search.³²⁰ I conducted those searches in English, and conducted some additional searches in French. I favoured academic and government sources when those were available (which was rare). For instance, for Australia, I was able to rely on a report by Jane Orton on ‘Building Chinese language Capacity in Australia’ (Orton 2016). More often, I had to rely on media sources – some from reputable newspapers, some from less reliable media sources or blogs.

During this second step, I encountered five main difficulties.

First, information obtained from online sources is often not verifiable, and figures vary greatly between sources. The most striking example, quoted in Chapter Six, is a September 2016 post on a website called ‘global exams’ (which came up as a top result when I conducted a Google search on ‘how many students are learning mandarin’) mentioning 40 million learners in 2016 and 100 million in 2020.³²¹ By contrast, an article from Hutong School, published in the same month, indicates that the number of learners is expected to surpass 10 million in 2020.³²² Although this was the biggest discrepancy, in other cases,

³²⁰ I did so for forty countries: Australia, New Zealand, USA, UK, Canada, Ireland, India, Pakistan, Bangladesh, Japan, Korea, Singapore, Malaysia, Thailand, Vietnam, Indonesia, Cambodia, Philippines, Brazil, Argentina, Mexico, Ghana, Nigeria, Kenya, Uganda, Algeria, South Africa, Egypt, Saudi Arabia, Russia, France, Italy, Spain, Germany, Sweden, Netherlands, Ukraine, Kazakhstan, Uzbekistan, Mongolia. I limited the search to those countries for practical reasons. I selected those countries as representative for their respective regions, and used figures from those countries to extrapolate to others in the same region. I also conducted Google searches using ‘Latin America’, ‘Africa’, ‘Europe’ and ‘Asia’ as keywords.

³²¹ 100 million students learning Mandarin in 2020’. Globalexam.com. September 8, 2016. <https://global-exam.com/blog/en/100-million-students-learning-mandarin-in-2020/> (accessed November 2, 2019).

³²² Speyer, Ida. ‘The number of Chinese learners is expected to surpass 10m by 2020’. Blog.hutong-school.com. September 18, 2016. <https://blog.hutong-school.com/number-chinese-learners-expected-surpass-10m-2020/> (accessed November 2, 2019).

different sources separated by only a few years quote figures for the same country that vary by tens or hundreds of thousands.³²³ Even figures mentioned in academic sources are not reliable. One striking example was a 2017 academic paper titled ‘Is English being challenged by Mandarin in South Korea? A report on recent educational and social trends involving the two languages’ by Professor Hyeon-Seok Kang, that I found through a Google Search on ‘how many people are learning Chinese in Korea’. In this paper, Kang writes ‘Inminwang [Renmin Wang] (2014), the online version of China’s Inmin Daily [Renmin Ribao], reported that the number of Mandarin learners in foreign countries exceeded 100 million in 2013, up from 40 million in 2010 (Lei & Cheng, 2010)’ (Kang 2017, p. 42). The reference to Lei & Cheng appears as an academic reference or bona fide source: it is in fact a 2010 article from *China Daily* reporting 40 million learners of Chinese around the world in 2010. The source for the 40 million figure is Hanban (but the actual published source is not given).³²⁴ This figure is particularly surprising as it is inconsistent with other Hanban sources from later years. As for the 100 million figure, the source is the Korean-language version of 人民网 [Renmin Wang], which I was able to read using Google Translate. No source was given for this figure. Hence, the information cited by Kang is unverifiable.

Third, the sources that provide enrolment figures do so mainly on a national basis. I thus conducted the searches country by country, which was time consuming. This national focus also means that some sources are available only in the national language, greatly limiting access. I was able to conduct searches in English, French and to some extent in Spanish and Mandarin. With the help of contacts and Google Translate, I was able to identify and read three sources in Japanese and one in Indonesian which, though not providing a full breakdown, assisted in the production of an educated estimate of Chinese language learners for those countries.

³²³ One example is the United Kingdom, where a 2013 British Council report indicates the figure of 3425 A-levels in Chinese in 2012 (British Council 2013), while a 2017 article (in French) quotes the number of 120,000 students in primary and secondary schools (‘Le chinois s’accélère vers une “langue mondiale”’.

French.hanban.org. October 2, 2017. http://french.hanban.org/article/2017-10/02/content_700512.htm/ (accessed May 8, 2020)). It is unclear whether those figures indicate that most students stop learning Chinese after primary or after middle school, whether there has been a considerable increase in Chinese learning, or whether the second figure is simply erroneous.

³²⁴ Lei, Xiaoxun and Chen, Guangjin. ‘Demand for Mandarin on the rise. Chinadaily.com. http://www.chinadaily.com.cn/cndy/2010-01/06/content_9270471.htm (accessed May 8, 2020).

Moreover, data segmentation in the available sources is rudimentary and inconsistent. Sources commonly merge students enrolled at Confucius Institutes, high schools and universities, or mention just one of those groups. The dates or years for which any data is available also vary from country to country, whether in line with the frequency of national surveys, or for other, seemingly arbitrary reasons (for instance, the opening of a Confucius Institute in a certain country prompted the publication of a media article on Chinese learning in that country). In the absence of consistent data, I conducted my evaluation based on data for the years of this research (2015-2017), and used earlier figures when more recent ones were not available. In the absence of evidence to the contrary, the estimates proposed in this thesis assume that the numbers of Chinese learners were relatively stable over the period 2012-2017.³²⁵

Fourth, one cannot establish via a search engine whether sources are available for the question: how many people are learning Chinese? When a Google search yields no relevant result for this question in the first two or three pages, it is unclear whether this warrants a different way of searching (for example, by using different keywords or using a different language) – or whether it indicates that there simply isn't any relevant data for this question.

Finally, I noted that articles claiming a rapid rise in the number of people learning Chinese globally (most of those published by Chinese media organizations) often present underwhelming evidence for this claim. One striking example is a 2018 *Xinhua* article about Chinese language in Pakistan which stated that 'since 2012, Chinese language teaching institutions in Pakistan have blossomed like mushrooms after rain. In just a few years, the number of Confucius Institutes grew from only one to four.'³²⁶ Many sources, both Chinese and international, combine actual and projected figures. One example is the 2016 post from Global Exams, quoted above, which indicates 40 million learners, and an expected 100 million, merging the number of enrolled learners at the time of publication with a projected

³²⁵ I generally rounded up estimates when sources only provided figures for the earlier years of the 2010s, to account for a likely increase over the decade. The lack of reliable sources to properly measure this increase further reduces the accuracy of any estimate I could produce.

³²⁶ 'Language leading to a better future – Chinese language gains popularity in Pakistan. Youlinmagazine.com. August 01, 2018. <https://www.youlinmagazine.com/story/language-leading-to-a-better-future-chinese-language-gains-popularity-in-pakistan/MTE5Mg==> (accessed November 2, 2018).

future number that is significantly higher.³²⁷ Since comparative data typically does not exist (e.g. for 2010 and 2015 or 2018), whether the figures for the later years have been or are ever to be reached is anyone's guess.

The final and third step was to review sources and figures for consistency. For instance, if different sources gave different figures for the same category of learners, I looked for double counts or potential discrepancies between two countries with seemingly similar populations. Often, I resorted to extrapolations on the basis of analogies and proxy measures. Where I did so, I recounted the method that I followed. To further triangulate the data, I looked at figures for HSK tests, which are presented at the end of this appendix.

Since sources are highly inconsistent, and double counting is likely, I have provided only rounded figures (except in those rare cases where I was able to obtain precise figures from a reliable source). Otherwise, all aggregated figures are rounded to the closest ten thousand or hundred thousand, depending on the order of magnitude. I chose to round figures in that manner for the sake of simplicity, but also to avoid presenting the reader with an illusion of accuracy. I also used brackets to indicate a range rather than a single estimate, offering a high and low estimate.

A breakdown by category follows.

Category 1: enrolled students in K12 (estimated total numbers: 3 – 8 million, of whom 1 – 2.5 million Independent Internet Users)

I grouped countries for this first category into eight groups, by geographical region. The only exception is developed countries where English is a first language, grouped by language rather than region.

The first group consists of six developed English-speaking countries (US, UK, Ireland, Canada, Australia, New Zealand). Reliable sources were available for most of those. In 2015, according to a paper by Jane Orton, there were 172,832 students enrolled in Chinese across Australian schools (primary and secondary), representing 4.7% of all students (Orton 2016 p. 42). In 2017, according to the national K12 survey, as reported in an article by

³²⁷ 100 million students learning Mandarin in 2020'. Globalexam.com. September 8, 2016. <https://global-exam.com/blog/en/100-million-students-learning-mandarin-in-2020/> (accessed November 2, 2019).

Xinhua, there were 227,086 students enrolled in Chinese in the US, representing 2.14% of the 10.6 million US students studying a language (and therefore, based on my calculation, 0.42% of all students in the US).³²⁸ An article from Hanban, dated from the same year, gives the number of 400,000 learners for the US.³²⁹ In the UK, according to a 2013 report from the British Council titled *Languages for the future*, there were 3425 A-levels in English in 2012, and 2500 GCSE (British council 2013). From those figures, I extrapolated that there were around 50,000 students enrolled in total. The number may be much higher, as a 2017 article from Hanban (in French) indicates 120,000 students of Chinese language in primary and secondary schools for the UK.³³⁰ I was not able to find figures for Canada, but indications from a 2014 report quoting 3000 students in K12 in Edmonton as an ‘achievement’ seems to indicate low enrolments numbers overall (Asia Pacific Foundation of Canada 2014). Using this report in combination with other sources, I derived a rounded estimate of 20,000 for Canada. I did not find numbers for Ireland, but one source indicated trials and programs.³³¹ In light of the small population of Ireland, I considered figures to be marginal. Finally, one source stated 65,000 students learning Chinese in New Zealand in 2018.³³² Aggregating those figures, I estimated 500,000-800,000 students for this group in total.

As a second group, I considered EU countries other than the UK, to which I added Switzerland and Norway. A 2018 blog post from the EU Mercator Institute for China Studies stated 5000 Chinese language learners in Germany.³³³ Sweden and the Netherlands were quoted in the same source as having a higher proportion but lower numbers than Germany. On the basis of their respective populations, I estimated the total for both countries at 2000.

³²⁸ ‘Popularity of Chinese language learning soaring within U.S. education system: survey’. Xinhuanet.com. June 03, 2016. http://www.xinhuanet.com/english/2017-06/03/c_136336004.htm (accessed November 3, 2019).

³²⁹ ‘Le chinois s’accélère vers une “langue mondiale”’. French.hanban.org. October 2, 2017. http://french.hanban.org/article/2017-10/02/content_700512.htm/ (accessed May 8, 2020).

³³⁰ ‘Le chinois s’accélère vers une “langue mondiale”’. French.hanban.org. October 2, 2017. http://french.hanban.org/article/2017-10/02/content_700512.htm/ (accessed May 8, 2020).

³³¹ ‘How hard is it to learn Chinese’. Rte.ie. October 26, 2018. <https://www.rte.ie/brainstorm/2018/1025/1006672-how-hard-is-it-to-learn-chinese/> (accessed November 3, 2019).

³³² Chiang, Jessie. ‘Mandarin Chinese Lessons in Hot Demand’. Rnz.co.nz. September 24, 2018. <https://www.rnz.co.nz/news/national/367146/mandarin-chinese-lessons-in-hot-demand> (accessed November 3, 2019).

³³³ ‘Europe needs a Mandarin Excellence Strategy’. Merics.org. May 07, 2018. <https://www.merics.org/en/blog/europe-needs-mandarin-excellence-strategy> (accessed November 3, 2019).

France, with 38,850 enrolled students learning Chinese, is presented as having a strikingly high number in that same source. The number is consistent with a figure in an article from *Le Monde* from April 2013, quoting 33,000 students in middle and high school, and an additional 4200 in primary school.³³⁴ This would also indicate stability over the period. A 2017 article from Hanban, published in French, indicates 52,000 students in primary and secondary school learning Chinese in France, which, though higher, is in the same order of magnitude.³³⁵ I did not find enrolment figures for other EU countries. Their absence from the EU Mercator blog post may indicate that those figures are difficult to find or low, and I did not conduct further searches, but proposed an estimate based on the population of those countries, assuming the same or lower proportions of learners than Germany (i.e. 0.006% of the total population). This assumption would yield a total of 60,000-70,000 Chinese learners in K12 institutions for the EU (excluding the UK and Ireland).

The third group I considered consists of Russia, Ukraine, Belarus and Moldova. A 2017 news article indicated that there were 17,000 Chinese language learners in Russia.³³⁶ I found no sources for Ukraine, Belarus or Moldova. On the basis of the EU Mercator blog post, I estimated that there would be a figure of around 20,000 for this group.

The fourth group consists of Chinese language learners in ASEAN countries, which is the region likely to have the largest numbers of learners, as it has the large proportion of people of Chinese origin in its population. The highest proportion overall is found in Singapore, where primary and secondary schools offer language education in the heritage language of students. Singapore had 510,714 students enrolled in 2010 according to official statistics (Ministry of Education Singapore 2011). Approximately 76% are of Chinese ethnicity, offering an estimate of approximately 385,000 students learning Chinese in Singapore. In the case of Malaysia, a 2002 paper by Ellen Palanca, commissioned by the Toyota Foundation, states that ‘Malaysia is the only country outside of Greater China today

³³⁴ ‘L’enseignement du chinois en plein boom en France’. *Lemonde.fr*. April 23, 2013. https://www.lemonde.fr/education/article/2013/04/23/l-enseignement-du-chinois-en-plein-boom-en-france_3164677_1473685.html (accessed November 3, 2019).

³³⁵ ‘Le chinois s’accélère vers une “langue mondiale”’. *French.hanban.org*. October 2, 2017. http://french.hanban.org/article/2017-10/02/content_700512.htm/ (accessed May 8, 2020).

³³⁶ Ling, Kwan. ‘Mandarin Will Become A Mandatory Subjects For Russians to Pass By 2020.’ *Worldofbuzz.com*. February 3, 2017. <https://www.worldofbuzz.com/mandarin-will-become-mandatory-subject-russians-pass-2020/> (accessed November 3, 2019).

where education using Chinese Mandarin as the medium of instruction is available' (Palanca 2002, p.29). This source indicated the figures of 600,000 learners in Chinese primary schools and 99,000 in secondary schools in Malaysia (ibid. p.30). Extrapolating from those figures in relation to the current population, and assuming that Chinese language education has continued in the same proportions, I propose a tentative number of 0.75 – 1.5 million learners in Malaysia. The same source indicated 92,760 students in the Philippines in 2002 (ibid. p.30). This number is incongruent with a Xinhua source from 2019, which states that there are 11,000 students in public junior and senior high school in the Philippines learning Chinese.³³⁷ This uncertainty led me to propose a very wide range of 10,000 – 200,000 learners for the Philippines. For Thailand, one news source from 2012 indicated 300,000 students, which, in the absence of other sources, I chose to adopt for the period.³³⁸ I was unable to find figures for learning in Vietnam, Cambodia, Lao, Indonesia, Brunei and Myanmar. It thus seemed reasonable to assume that for these six countries, together with Thailand and the Philippines, there would likely be 0.5 – 1 million Chinese language learners in total. If we then add the numbers from Singapore and Malaysia, we would have an estimated range of 2 – 3.5 million K12 learners of Chinese for ASEAN countries. It goes without saying that a very large proportion of those students would be L1 or heritage learners.

The fifth group consists of students from East Asia (Japan, South Korea, North Korea). For this group, I was unable to find a reliable English- or French-language source providing figures for Chinese language learners.³³⁹ A Tokyo-based contact who speaks fluent Japanese was able to find Japanese language sources which I reviewed using Google Translate. I identified one 2016 article indicating 2 million people learning Chinese. It is unclear whether this number includes only K12 students or learners of all ages.³⁴⁰ Another

³³⁷ 'China, Philippines to jointly train 300 Filipino Chinese-language teachers in next 5 years'. Xinhuanet.com. December 03, 2019. http://www.xinhuanet.com/english/2019-12/03/c_138603259.htm (accessed May 3, 2020).

³³⁸ 'Chinese most popular foreign language for Thai students'. Nationthailand.com. April 23, 2012. <https://www.nationthailand.com/national/30180543> (accessed November 3, 2019).

³³⁹ On my request, Olle Linge circulated a post on Twitter asking for help sourcing data for those countries, but the Tweet did not attract any response. My personal requests on Twitter and Facebook also did not yield results.

³⁴⁰ '中国語学習の必要性を考える—中検受験者数と訪日外国人数から' [Considering the necessity of learning Chinese-From the number of mid-screen examination examinees and foreign visitors to Japan]. Recordchina.co.jp. 14 May 2020. <https://www.recordchina.co.jp/b132442-s0-c30-d0046.html> (accessed May 20, 2020).

source indicated yearly figures for the ‘national test’ in Chinese dropping from a peak of almost 30,000 in 2011 to 15,000 in 2015.³⁴¹ For South Korea, the aforementioned paper by Hyeon-Seok Kang provided useful information but the figures he quoted could not be verified.³⁴² Kang nonetheless indicated an increase in the percentage of South Korean high schools offering Mandarin, from 8.8% in 2000, 25.5% in 2005, and 36.8% in 2012. He cited a Korean-language news source that appeared to be providing official figures.³⁴³ However, the link for this news article is broken. Kang also indicated that 81 of 92 schools in Daegu district would offer Chinese language in 2017. The source was another Korean-language news article, which I read using Google Translate.³⁴⁴ The article indicated that only 32 schools were effectively providing Chinese language classes at the time of writing, and the figure of 81 for the year 2017 was only prospective. According to Orton (2016, p. 33) there has been some government effort in Japan and South Korea to promote Chinese language education in those countries but Orton does not cite a source for this statement. What is evident is that there are large numbers of South Korean and Japanese expatriates in China.³⁴⁵ As for Chinese language learning in North Korea, I was unable to find any information. Taking the population of Japan and South and North Korea into consideration, it seemed

³⁴¹ ‘どんな日本人が中国語を学んでいる？日本人の学習能力に中国人も驚き—中国メディア’ [What Japanese are learning Chinese? Chinese are surprised at Japanese learning ability-Chinese media]. Ameblo.jp. 20 August, 2016. <https://ameblo.jp/acoyaco/entry-12142546125.html> (accessed May 20, 2020).

³⁴² In the case of Korea, one point to raise is that Chinese characters are used in traditional Korea (they are known as ‘hanja’), and Korean students commonly learn those in middle schools. If those students were to be counted as ‘learning Chinese’, the total number would grow considerably. On Hanja, see for instance Alper, Tim. ‘What Korea’s Chinese characters mean to modern Koreans’. Koreat.net. May 08, 2017. <http://www.korea.net/NewsFocus/Column/view?articleId=145751> (accessed November 4, 2019).

³⁴³ The source is listed in Kang’s paper as ‘Choi, S–B. 2015. ‘Chinese and HSK study fever spread to toddlers and high school students.’ Seoul Gyeongje, February 6. Online at <http://economy.hankooki.com/lpage/society/201502/e2015020611064293820.htm>>’.

³⁴⁴ The source is listed in Kang’s paper as ‘Kim, K–S. 2015. ‘Second foreign language is Mandarin.’ Hankook Ilbo, March 5. Online at <http://www.hankookilbo.com/v/71aec074899c47d59c11fc538c3fa454>>’

³⁴⁵ ‘Expats in China: nationalities and in which cities they settle’. Beijingrelocation.com. September 19, 2015. <http://www.beijingrelocation.com/blog/expats-in-china-nationalities-and-in-which-cities-they-settle/> (accessed November 3, 2019). According to this source, South Koreans represent 21% of the 600,000 expats in China, and Japanese 11%, being the first and third most represented nationality respectively.

reasonable to assume a range of 0.5 - 3 million Chinese language learners for these three countries.

Beyond the countries and regions outlined thus far, data on Chinese language learning was even more scarce.

The fifth group I considered brings together Latin American countries (i.e. South America + Central America + Caribbean + Mexico). For this group, I was unable to find any data, and relied on extrapolations. The population is equivalent to the European continent (including Belarus, Ukraine and Russia) or about 750 million. On the assumption that budgets for language education are lower than in the European Union, the total number of K12 Chinese students would be situated in a bracket, with the higher figure equal to that of Europe (or ~0.01% of the total population), and the lower figure a quarter of that of Europe (or ~0.0025% of the total population), yielding a tentative estimate of 20,000 - 80,000 Chinese language learners for Latin America.

The sixth group I considered was Africa. Some sources were available here, though details were limited. One source indicated that 53 schools offered Mandarin in South Africa in 2017.³⁴⁶ This number is consistent with a 2019 article from Xinhua indicating the figure of 45 schools in South Africa in 2015.³⁴⁷ Neither source mentioned the number of students per school: with an assumption that there were 100 students per school, I estimated the total number of learners for South Africa at about 5000. The same 2019 source from Xinhua quoted above indicated an extensive program in Cameroun since 2012 to teach Chinese in K12 schools, with 17,000 students enrolled since that date. I estimate that this figure entails an average of 5,000 students per year.³⁴⁸ In other countries, many 'plans' for Chinese language education were announced, but I was not able to find actual enrolment figures. Using the same assumption as I used for Latin America, with a lower estimate to account for a less developed language education system, and with a population of 1.2 billion across

³⁴⁶ Chutel Lynsey. 'Mandarin is putting in extra work to catch up with European languages in South African classrooms'. Qz.com. February 6, 2019. [https://qz.com/africa/1538828/south-africa-schools-now-taking-mandarin-chinese-language-lessons/\[100,000?\]\[50,000?\]\(accessed November 2, 2019\).](https://qz.com/africa/1538828/south-africa-schools-now-taking-mandarin-chinese-language-lessons/[100,000?][50,000?](accessed%20November%202,%202019).)

³⁴⁷ 'Chinese language gains appeal in Africa as benefits grow'. Globaltimes.cn. October 28, 2019. <http://www.globaltimes.cn/content/1168173.shtml> (accessed November 3, 2019).

³⁴⁸ 'Chinese language gains appeal in Africa as benefits grow'. Globaltimes.cn. October 28, 2019. <http://www.globaltimes.cn/content/1168173.shtml> (accessed November 3, 2019).

Africa, I proposed a tentative estimate of 20,000-100,000 Chinese language learners for Africa.

The seventh group included countries in Central Asia and the Middle East, to which I added Mongolia. China's increasing influence in Central Asia, particularly through the Belt and Road Initiative, would suggest the possibility of comparatively large enrolments in that region, though I was unable to find any figures. The total aggregate population for countries in this group is about 400 million in total (3 million for Mongolia, 72 million for Central Asia, and 330 million for the Middle East excluding Egypt, which I counted as part of Africa). In the absence of data, I used the same model as I did with Latin America and Africa, and assumed that there would be 10,000 – 50,000 learners in that group of countries.

The eighth group was South Asia. I was unable to find verifiable numbers. As proxy, a 2015 note on a YouTube video indicated that 4000 young people were learning Chinese in India.³⁴⁹ A 2006 source indicated that there were 350 students learning conversational Chinese at the Chinese language Institute in New Delhi.³⁵⁰ Another source reported 460 students learning Mandarin at the National University of Modern Languages in Pakistan in 2017.³⁵¹ Finally, in one interaction with a teacher of Chinese based in India, on a Facebook group called 'Network capital' gathering entrepreneurs from India, that person indicated the figure of 20,000 people currently learning Chinese in India (but offered no verifiable source). Those figures seemed to indicate a level of adoption similar to or lower than that of Africa and Latin America. With a population of 1.9 billion (for India, Pakistan, Bangladesh, Nepal, Afghanistan), I therefore estimated that the number of Chinese language learners in South Asia would range from 20,000 to 200,000.

Finally, there are bilingual schools in China for the children of expatriates or returnees who are ethnically Chinese and L1 speakers of Chinese, but may have adopted other nationalities. Those schools are certainly significant to the extent that they are likely to train the most adept bilingual learners, but the numbers of enrolled students are likely to remain small. Two different sources provided the figure of 600,000 expats in China, one

³⁴⁹ 'Chinese language is more popular than ever in India'. YouTube. February 20, 2015.

<https://www.youtube.com/watch?v=UJQAdbw8DX0> (accessed November 3, 2019).

³⁵⁰ Sharma, Ravi Teja. 'Why Indians are learning Chinese'. Rediff.com. August 16, 2006.

<https://www.rediff.com/money/2006/aug/16china.htm> (accessed November 3, 2019).

³⁵¹ Bacha, Umar. 'More students in Pakistan are learning Chinese today than ever before'. Dawn.com. May 22, 2017. <https://www.dawn.com/news/1333509> (accessed November 3, 2019).

additionally indicating that 63% of them are in relationships.³⁵² If we assume that around 20%-30% of expats in China in a relationship have school age children, and all of those learn the Chinese language at school, then we could also assume that students learning Chinese at these expat schools would range from 75,000 to 150,000.³⁵³

On the basis of the calculations provided above, I have thus estimated the total number of K12 enrolments in Chinese language studies to range between 3.2 – 7.9 million. Given this is no more than a very loose estimate, these figures can be rounded to the nearest million, or 3 to 8 million.

In providing this estimated range, I have combined primary school and high school students, on the assumption that students become ‘Independent Internet Users’ around grade 7 or 8. I did not find data that would enable a solid estimate of the respective percentages of primary and high school students enrolled in Chinese language classes. If we assume that enrolments remain relatively stable through the K12 years, with a slight drop in the senior years of high school, we can place the number of K12 Independent Internet Users (who are likely to use digital Chinese language tools) at about one-third of the total number of K12 Chinese language learners (3 to 8 million): namely, 1 – 2.5 million. Anecdotal data from designers, teachers and learners themselves would suggest that among Chinese language learners worldwide, a large percentage are ethnically Chinese or have some Chinese ancestry. However, there are no reliable published figures to verify this widely held impression.

³⁵² ‘China Expat Population: Stats and Graphs’. Sampi.co. October 24, 2018. <https://sampi.co/china-expat-population-statistics/> (accessed September 2, 2020); Zhou, Qian and Elsinga, Steven. “Nali lai de?” – An Overview of Expats Demographics in China’. China-briefing.com. January 8, 2015. <https://www.china-briefing.com/news/nali-lai-de-overview-expats-china/> (accessed November 2, 2019).

³⁵³ Another source indicates that, by 2017, there were 600 English-language schools in China, welcoming a total of 475,000 children – those being children of expats, Chinese returnees, and local Chinese families. Though the proportion of children of expats and locals is unspecified, the number is congruent with the estimate proposed here. ‘The 4 types of international schools in China’. Studyinternational.com. September 4, 2018. <https://www.studyinternational.com/news/demand-for-western-ed-in-china-breeds-4-types-of-international-schools/#:~:text=%E2%80%9CExpats%20schools%2C%E2%80%9D%20as%20they,who%20holds%20a%20foreign%20passport> (accessed September 2, 2020).

Category 2: Chinese community schools (0.5 – 2.5 million, of which 0.1 – 1 million Independent Internet users)

The second group consists of commercial or private community schools that provide Chinese language studies for the children of the ‘Chinese diaspora’ or ‘overseas Chinese’. There are an estimated 50 million ‘overseas Chinese’ in the world, of whom 35 million live in Asia.³⁵⁴ No global figures were available to detail what proportion of those are children enrolled in a community language school. I therefore proceeded by extrapolation from the case of the Australian state of Victoria, where statistics are available. The 2017 survey of the Victorian Government indicates that there were 12,718 new students registered to learn Mandarin at community Chinese schools (Hughson, Hajek & Slaughter 2018) and 25 accredited community Chinese language schools (by location) in Victoria alone in 2020 – an extra one being ‘Cantonese’.³⁵⁵ The 2016 Census data indicates 370,644 people in Victoria as having ‘Chinese ancestry’ (Australian Bureau of Statistics 2016). This means enrolments in Chinese community schools make up roughly 3.5% of the total population of people in Australia with Chinese ancestry. While there are evident risks of extrapolating from a single local example (that of Chinese language enrolments at community schools in Victoria, Australia), nonetheless it provides the only means available to me to gauge the scope of Chinese language learning at community schools across different countries, for such learners form a significant group in their own right.

Hence, by assuming that Chinese language learners at community schools make up 3.5% of the total population of some 50 million overseas Chinese worldwide, we would be able to state that there are 1.5 million such school-age language learners internationally. The margin of error would need to be +/- 1 million (to account for the lack of verifiable evidence). This would allow us to say that at the very least, there are 0.5 – 2.5 million Chinese language learners enrolled in courses at community schools worldwide. While we know that students everywhere use the Internet, we cannot know for certain how many would access and use

³⁵⁴ Textor C. ‘Number of Chinese people living overseas as of December 2018, by continent’. Statista.com. May 27, 2020. <https://www.statista.com/statistics/632850/chinese-nationals-number-overseas-by-continent/> (accessed June 2, 2020).

³⁵⁵ ‘Accredited Community Language Schools’ 2020. Education.vic.au. https://www.education.vic.gov.au/Documents/school/teachers/teachingresources/discipline/languages/Accredited_CLS_2020.pdf/ (accessed September 2, 2020).

digital Chinese language learning tools. It is important to note that there is likely to be significant overlap between this category of Chinese language learners and the category of students discussed previously, who are learning Chinese as part of their regular school curriculum.

Category 3: students at Chinese universities (0.15 – 0.35 million)

The third category consists of international students enrolled in Chinese universities. Here, my starting point was a 2014 paper by Tian and Lowe, quoting sources from the Chinese Ministry of Education (Tian & Lowe 2014).³⁵⁶ The paper indicates that between 2001 and 2011, the number of international students at Chinese universities increased from 52,150 to 292,611. The majority of these students are from Asian countries, with just 16% from Europe and 8% from North America in 2011. In 2010, the Chinese government declared its intention to increase the numbers further, to more than half a million by 2020, with a better balance across countries of origin. According to the Chinese Ministry of Education sources quoted, there were 173,774 students who were enrolled in regular university courses. Tian and Lowe also indicated that these students were mostly taking short-term language and culture courses, and were not enrolled in degree-awarding courses.³⁵⁷ Statistics for Taiwan published on a Taiwan government website indicate that there were 19,977 students enrolled

³⁵⁶ The figures in this section, unless otherwise mentioned, are quoted in Tian & Lowe's paper and sourced from the following: Ministry of Education, China. (2002). 2001 nian duiwai hanyu jiaoxue nianqian [Statistics of teaching Chinese to international students in China in 2001]. Retrieved from <http://202.205.177.9/edoas/website18/53/info1353.htm> ; Ministry of Education, China. (2010). Liuxue zhongguo jihua [Studying in China scheme]. Retrieved from <http://202.205.177.9/edoas/website18/52/info1285655371911352.htm> ; Ministry of Education, China . (2012). 2011 nian quanguo laihua liuxxuesheng shuju tongji [Statistics of international students in China in 2011]. Retrieved from <http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/s5987/201202/131117.html>; Hao, P. (2009). Jiefang sixiang, kaituo chuagnxin, tuidong laihua liuxuesheng gongzuo fazhan [Emancipate the mind, strive for innovation, promote the scientific development of international students education in China]. World Education Information, 9, 16-23.

³⁵⁷ I was unable to find more recent statistics, and assumed that those numbers were relatively stable over the 2010s.

to learn Chinese in Taiwan in the year 2015-2016.³⁵⁸ On the basis of these figures, I estimated that there would be between 200,000 – 400,000 students enrolled in a language course in either the Chinese mainland or Taiwan over the period 2015-2017.

Category 4: students at universities outside China (0.75 – 2 million)

The fourth category consists of students enrolled in a Chinese course at a university outside China (i.e. mainly in their home country). Finding those figures required a combination of proxy measures and extrapolations. A source from the Modern Language Association indicated that 53,000 students were enrolled in Chinese classes at American universities in 2016.³⁵⁹ By comparison, 175,667 were learning French, and 712,608 learning Spanish the same year. A 2013 article from Le Monde indicates 17,000 students enrolled in Chinese language studies at universities in France, with most students taking these courses as electives rather than as part of their major.³⁶⁰

As I was not able to find information for university enrolments in other countries, but had calculated an estimate of learners in K12 institutions, I decided to make an ‘educated guess’ by calculating a ratio relating K12 Chinese language learners and Chinese language learners at university, based on figures in France and the US. In the US, 2016 figures for K12 students learning Chinese were 227,086 and 53,000 for university students. This means that university students learning Chinese were about a quarter (or 23.3%) of the number of students learning Chinese in K12 institutions. The 2013 figures for France gave a somewhat similar ratio, with 17,000 students learning Chinese at university vs 33,000 learning Chinese in high school (it should be noted that the French figures I had found indicated enrolments in high school as opposed to K12). Based on those two examples, I estimated that the figure for students learning Chinese at university can be reasonably assumed to make up a quarter of

³⁵⁸ ‘Learning Mandarin – Do you know?’. Taiwan.gov.tw. https://www.taiwan.gov.tw/content_13.php (accessed November 3, 2019).

³⁵⁹ Buchholz, Katharina. ‘American Language Learners Are Diversifying’. Statista.com. November 15, 2019. <https://www.statista.com/chart/19979/languages-studied-at-us-universities/> (accessed May 5, 2020).

³⁶⁰ ‘L’enseignement du chinois en plein boom en France’. Lemonde.fr. April 23, 2013. https://www.lemonde.fr/education/article/2013/04/23/l-enseignement-du-chinois-en-plein-boom-en-france_3164677_1473685.html (accessed November 3, 2019).

K12 students learning Chinese in a given country. I estimated earlier that the total number of K12 Chinese language learners globally was between 3 and 8 million: therefore, I estimate the total number of students learning Chinese at university as ranging between 0.75 and 2 million. It is important to note that, with Confucius Institutes partnering with universities throughout the 2000s and 2010s, there is likely to be a high level of overlap between the figures for this category, and the figures for Confucius Institutes give below.

Category 5: adult students in Confucius Institutes & independent schools (2 – 3 million)

The final category that I considered consists of adults learning for personal or professional reasons at Confucius Institute or commercial language schools. There is likely to be a measure of overlap between this category and the previous one, to the extent that Confucius Institutes are typically attached to universities, so that the number of students learning Chinese at a university can easily be merged with Confucius Institute numbers (in the absence of systematically collected statistics available, I was unable to confirm the degree of overlap in calculating statistics). Confucius Institutes in certain countries also double as K12 schools: this is the case, for instance, in Ghana.³⁶¹ This latter point indicates a possible double count with the first category.

A China Daily article from October 2017 quoted the figure of 2.1 million students enrolled in Confucius Institutes around the world in that year, and stated that 7 million students had attended courses at Confucius Institutes since the program started.³⁶² A Xinhua source from December 2018 indicates a consistent (though distinct) figure of 1.87 million students.³⁶³

In addition to Confucius Institute, there are commercial language schools both in China and internationally. One example would be Hutong, a private commercial brick and

³⁶¹ ‘Ghanaian college adopts Chinese language as credit course’. Xinhuanet.com. 03 July, 2019. http://www.xinhuanet.com/english/2019-07/03/c_138193507.htm (accessed November 3, 2019).

³⁶² ‘Over 500 Confucius Institutes founded in 142 countries, regions’. Chinadaily.com. October 07, 2017. https://www.chinadaily.com.cn/china/2017-10/07/content_32950016.htm (accessed November 3, 2019).

³⁶³ ‘世界各地已有 548 所孔子学院’ [There are 548 Confucius Institutes around the world]. Xinhuanet.com. December 05, 2018. http://www.xinhuanet.com/world/2018-12/05/c_1210009045.htm (accessed May 20, 2020).

mortars Chinese language school, with 14 locations worldwide for immersive programs and introductory language courses.³⁶⁴ The number of students enrolled in those schools is unknown. Anecdotal data from digital tool designers, teachers and learners, as well as blogs and forums on learning Chinese indicate that there are sizable numbers of adults who are actively learning Chinese at Confucius Institutes, universities offering short language courses, or through private tutors. There are also special language centres that provide intensive Chinese language training for army personnel, professional workers, and top executives.³⁶⁵ On the basis of my field and online research, I would estimate the total number of Chinese language learners in this category to be either slightly or noticeably higher than the number of learners enrolled in Confucius institutes, yielding a range of between 2 and 4 million for people learning Chinese at Confucius Institutes, commercial language schools, or through private tuition.

Further data – the HSK test

In order to test the orders of magnitude proposed in this appendix, I considered the numbers of learners taking the HSK test. Here again, the figures fluctuate and cannot be verified. The Wikipedia page on Chinese as a foreign language states that ‘in 2010, 750,000 people (670,000 from overseas) took the Chinese Proficiency Test’.³⁶⁶ A post from the ‘global exam’ website from February 2018 indicates that 5 million students took the HSK test in 2013, and that the figures are tripling every year.³⁶⁷ A 2014 blog post on the FluentU blog, titled ‘Top 4 reasons Why you might want to take the HSK’, more enthusiastically states that,

³⁶⁴ ‘Home’. Hutong-school.com. <https://www.hutong-school.com/> (accessed September 2, 2020). It should be noted that Hutong also provides online courses.

³⁶⁵ One of the places where I found the most enthusiasm for my research over the course of my candidature was the Defence Forces School of Languages. This is probably Australia’s best resourced language learning centre (per student), with clear incentives (teachers looking at having the maximal level of fluency in a limited amount of time).

³⁶⁶ ‘Chinese as a foreign language’. Wikipedia.org. https://en.wikipedia.org/wiki/Chinese_as_a_foreign_language (accessed January 4, 2019). The associated source was no longer accessible at the time I consulted the page.

³⁶⁷ ‘HSK Test – Introduction’. Global-exam.com. February 27, 2018. <https://global-exam.com/blog/en/hsk-test-introduction/> (accessed November 3, 2019).

over the 30 years of the HSK (at the time of writing), the test had been taken ‘over 100 million times around the world over 120 countries.’³⁶⁸ Meanwhile, a Quora thread on Chinese language learning numbers redirected to a February 2013 post on the Sina blog of Zhang Jijun titled ‘新 HSK 考生人数统计 (2013 年)’ [Statistics on the number of new HSK candidates (2013)]: this blog post presented a table of HSK exams from 2010 to 2013 (the source was not mentioned), indicating the figure of 117,294 people in total taking the HSK in 2010, of which 98,405 were outside China; and 234,275 people taking the test in 2012.³⁶⁹ Those numbers are consistent with numbers provided on the Hanban website, which indicate 646,000 participants in the HSK and other tests in 2017. However, these numbers are notably lower than those quoted on Wikipedia or the sources mentioned above.³⁷⁰ That number of 646,000 participants in the HSK and other tests in 2017 would mean that between 3 and 10% of people studying Chinese globally take the HSK test. In the absence of a benchmark or other indication, this is at least congruent with other figures proposed in this appendix.

Total figures

K12 students: 3 – 8 million (of which Independent Internet Users: 1 – 2.5 million)

³⁶⁸ Baggio. ‘Top 4 Reasons Why You Might Want To Take The HSK’. Fluentu.blog.com. <https://www.fluentu.com/blog/chinese/2014/10/06/new-chinese-hsk-test-why/> (accessed November 3, 2019).

³⁶⁹ ‘新 HSK 考生人数统计 (2013 年)’ [Statistics on the number of new HSK candidates (2013)].

blog.sina.com.cn/zhanjijun. February 20, 2013. http://blog.sina.com.cn/s/blog_53e7c11d0101f02j.html (accessed November 3, 2019).

³⁷⁰ ‘关于汉语考试’ [about the Chinese test]. Hanban.org. http://www.hanban.org/tests/node_7475.htm.

(accessed November 3, 2019). Hanban has developed examinations in addition to the HSK, including an oral exam (HSKK), an exam for primary and middle school students (YCT), and an exam for business language (BCT). The figure of 646,000 in the source aggregates those various exams. A much higher number of 6.8 million candidates for Chinese tests in general is mentioned, but the nature of those tests is unspecified. It should be noted that this number exceeds the number of students enrolled at Confucius Institutes, which is given as 1.87 million in a 2018 Xinhua article (‘世界各地已有 548 所孔子学院’ [There are 548 Confucius Institutes around the world]. Xinhuanet.com. December 05, 2018. http://www.xinhuanet.com/world/2018-12/05/c_1210009045.htm (accessed May 20, 2020)).

Community schools: 0.5 – 2.5 million (of which Independent Internet Users: 0.2 – 0.8 million)

Students at universities in China: 0.2 – 0.4 million

Students at universities outside China: 0.75 – 1.5 million

Confucius institutes and independent schools: 2 – 4 million

Non-rounded total: 6.45 – 16.9 million

Rounded total (assuming some overlap): 6 – 17 million

Rounded total (Independent Internet Users): 4 – 9 million

I propose a rounded total that assumes a measure of overlap, ranging between 6 and 17 million in total – or between 4 and 9 million for Independent Internet Users. It is important to highlight the inadequate evidence on which I derived those figures, and the unreliability of many of the available sources, as discussed above. In particular, it seems likely that for regions where less or no data is available, or available on sites I was not able to access (such as sites in Korean, or African, or Central Asian languages), there may be indications of Chinese language learning in relatively significant numbers that I have not captured in this account.

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