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Secondary School Teachers' Views on a Psychological Science Framework to Support Their Teaching of Psychology

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Abstract

This thesis concerns the teachers of psychological science in secondary schools. Senior psychology is a well-established and very popular science study in Victorian schools in Australia but is not included within the Foundation to Year 10 (F-10) Victorian curriculum nor the F-12 Australian curriculum. Psychology's problems with establishing its place in the F-10 science curricula could have implications for psychology teachers' professional career and the ways they view and implement their curriculum. Contemporary psychology identifies with science and curricula should portray psychology's science base (Cranney, Provost, Katsikitis, Martin, White, & Cohen, 2008). Science education advocates teaching concepts together with science practices (NRC, 2011), shifting the emphasis from teaching 'facts and skills' to teaching 'how we know' and 'why we believe' (Duschl, 2008) and promoting a broad contemporary view of science (Duschl & Grady, 2013). A psychological science framework, with a contemporary science base, was originally created for my Master of Education (MEd) thesis to map the Victorian curriculum documents in terms of a progression of learning psychology concepts with the science practices that inform these concepts (Marangio, 2013). While there are many science practices (NRC, 2011), the science practices within the framework include systems, models, explanations, patterns and observations. The purpose of this PhD thesis is to consider how this psychological science framework is perceived by Victorian secondary school teachers as a support for their teaching of psychology.

Teachers' views are central to this constructivist (interpretivist) study. There were three phases to this research. A total of 87 Victorian psychology teachers completed phase one, an online survey, designed to capture a snapshot of teachers' current views of psychological science relevant to the framework. It consisted of Likert scale items and three open-ended questions, many items adapted from previous surveys (Friedrich, 1996; Provost, Martin, Peacock, Lipp, Bath & Hannan, 2011; Rowley & Dalgarno, 2010; Rowley, Hartley, Betts, & Robinson, 2008), with responses analysed via descriptive statistics and thematically respectively. All but two teachers viewed psychology as a science and reported that they teach psychology as a science. Interestingly, responses suggested that psychology teachers hold a range of views of science, sometimes multiple and conflicting views, and ways of teaching psychology as a science. A total of 11 teachers participated in one of two workshops, phase two, in which they undertook a curriculum mapping exercise and critiqued the framework. Individual interviews, phase three, two to three months later were conducted with nine teachers to follow up on their views and experiences. The data were thematically analysed. Teachers' views of the framework for a support for their teaching were built around four themes: promoting the discipline of psychology, connecting with the intended curriculum (documents), supporting implemented curriculum (teaching) and conditions for teacher change. The teachers viewed the framework in different ways and integrated it into their teaching to different extents. Most recognised the shifts required for changing their teaching were too big and were open to professional learning to support such shifts. Teachers' use of the framework as a support for their teaching will depend on (1) building a shared understanding of contemporary psychological science and what this understanding means for teaching psychology; (2) curriculum reform to establish psychology's place in science; and (3) ongoing support and advocacy for psychology teachers as professionals.

KEYWORDS: secondary psychology, teaching of psychology, psychology teachers, psychology curriculum, psychological science, science practices

Declaration

Thesis is an original work of my research and contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, 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:

Karen Marangio

Date: 30 May 2019

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List of Abbreviations and Terms

ACARA	Australian Curriculum, Assessment and Reporting Authority
APS	Australian Psychological Society
Area of study	Topic or focus, with two areas of study per unit of work within the VCE Psychology Study Design (2012-2016).
AusVELS	Victorian Foundation (Preparatory) to Year 10 curriculum documents that incorporates the Australian curriculum and Victorian Essential Learning Standards.
F-10	Foundation (Preparatory) to Year 10
F-12	Foundation (Preparatory) to Year 12
Intended curriculum	Relates to curriculum policy documents or the written curriculum.
Implemented curriculum	Relates to the school or teacher's curriculum in terms of what they construct, plan and teach.
KLA	Key Learning Area (Department)
Key knowledge	Section in the VCE Psychology Study Design (2012-2016) that outlines the specific content to learn within each area of study.
Key skills	Section in the VCE Psychology Study Design (2012-2016) that outlines the set of skills that are considered essential to psychology across all units of work.
Realised curriculum	The students' experience and what they learn, including the hidden and null messages.
Research methodologies and ethical considerations	Section in the VCE Psychology Study Design (2012-2016) that outlines the specific knowledge of research methodologies and ethical practices required within each unit of work.
Selected science practices	The science (scientific) practices (observations, patterns, explanations, models and systems) incorporated in the psychological science framework at the centre of this research study.
SHE strand	The Science as a Human Endeavour strand within the Victorian AusVELS and Australian curriculum
SIS strand	The Science Inquiry Skills strand within the Victorian AusVELS and Australian curriculum
Study Design	The VCE curriculum policy document
SU strand	The Science Understandings strand within the Victorian AusVELS and Australian curriculum
The framework	The psychological science framework at the centre of this research study.
Unit of work	The curriculum is divided into 4 units of work, typically each is a semester in length.
VCAA	Victorian Curriculum and Assessment Authority
VCE	Victorian Certificate of Education

Chapter 1: Introduction

1.1 Introduction

This study concerns the teachers of psychological science in secondary schools. All Australian states and territories, except New South Wales (NSW), offer senior school psychology as part of the post-compulsory secondary education for 16 to 18 year olds. Psychological associations promote psychology as a science, advocating secondary and tertiary educators to teach how psychology uses the methods of science to create its knowledge (Cranney, Provost, Katsikitis, Martin, White & Cohen, 2008) and this emphasis is reflected in senior school curricula. Furthermore, psychology is part of the Science Learning Area in most places, except Australian Capital Territory (ACT) (Behavioural Science), Tasmania (Humanities and Social Science), and NSW (not taught). While each state and territory has its own curriculum, there is also the Australian curriculum. Across Australia, each state and territory decide the extent to which it will implement and/or supplement the Australian Foundation (Preparatory) to Year 12 (F-12) curriculum, although psychology is not included in this curriculum. Psychology is a marginal (not core) study, and its limited place in the curricula has potential flow on effects for teachers of psychology.

To prepare school students now and into the future, there is a current push to aim for psychological literacy: to build students' capacity to apply psychology to support personal, professional and societal goals (Cranney & Dunn, 2011). To support scientific literacy in science education, there is a push to shift emphases from teaching 'facts and skills' to teaching 'how we know' and 'why we believe' (Duschl, 2008) to promote a contemporary view of science (Duschl & Grady, 2013). There is a recognised need to think across boundaries of disciplines (Schleicher, 2018) and highlight commonalities between psychology and other science disciplines while maintaining the identity of psychology. The identity of psychology, with its science base, could support psychology's place in these new curricula directions. The recognition of the role of the psychology teacher as professional teachers in these new curricula directions is equally important. Teacher variables are the most significant factor in determining the way a curriculum is taught to engage students with science, not curriculum variables (Osborne, Simon & Collins, 2003). Teachers of psychology can have profound impact on the way their students and in turn, the public, understand psychology. Teachers' views are central to this study as it considers what it could mean to teach psychology as a science.

A psychological science framework was originally created in my MEd thesis to map the Victorian curriculum documents in terms of a progression of learning psychology concepts with the science practices that inform these concepts (Marangio, 2013). Psychology in the Victorian curriculum is considered a science and this framework has a contemporary science base. The framework has now been applied to support the teaching of psychology in Victoria. The purpose of this study is to consider how this psychological science framework is perceived by secondary school teachers as a support for their teaching of psychology.

In this chapter, I will introduce the research context, the psychological science framework, my personal motivations, the research questions and the potential significance of this study.

1.2 Context of This Research

This section will consider the context of this research in terms of contemporary psychological science and how contemporary psychological science is related to public perception of psychology, psychology curriculum policy documents and the teaching of psychology. Psychology is ever-changing and dynamic with new knowledge, technologies and new processes in terms of how its knowledge is created (Cacioppo, 2013). Psychology uses multiple levels of analyses, from micro (biochemical) to macro (socio-cultural), and a range of empirical methods (quantitative and qualitative) to create its knowledge; each with their own inherent complexities including ethical and moral considerations (Bronfenbrenner, 2001; Glassman & Hadad, 2009). Psychology utilises science practices to study the complexity and subjective nature of an individual's mental processes and behaviours (Glassman & Hadad, 2009), adhering to overarching science disciplinary processes in the constitution of its knowledge. Contemporary science centres on important epistemic and social practices (Duschl, 2008), such as building theories and models, constructing arguments using specialized ways of talking, writing, and representing phenomena within the science community (National Research Council (NRC), 2007). Today psychology has emerged as a contemporary science (Cacioppo, 2013) as it draws on science practices to study mental processes and behaviours and support a range of personal, social and global issues. Psychology is viewed as one of seven specific hub sciences (mathematics, physics, chemistry, earth sciences, medicine, psychology and science sciences), labelled this way because it works with a range of other disciplines (Boyack, Klavans & Börner, 2005), from natural to personal to social sciences and non-sciences. Through engagement in interdisciplinary and multidisciplinary research teams, contemporary psychology can contribute to evidence-based solutions to real world cases (Proctor & Vu, 2019).

For a couple of decades there has been a push to raise awareness of psychology's relationship with science in society (Lilienfeld, 2012), with a key Australian Psychological

Society (APS) strategic objective to foster and promote the scientific knowledge base of the discipline (APS, 2015). However, this depiction is not straight-forward. While there are a number of views of psychology, not all psychologists view their work as science (Ardila, 2007; Trapp, Banister, Ellis, Latto, Miell & Upton, 2011) and not everyone in the public subscribes to the view that psychology is a science (Lilienfeld, 2012). While not everyone subscribes to view that psychology should be exclusively scientific, similarly "different understandings on the nature of science exist" (Brock, 2011, p. 255). "When one uses the word science to describe practices or knowledge there is no guarantee that everyone involved is thinking about the same thing" (Milne, 2011, p. 7). There are also a range of views of science within the public arena (Lederman, 2007; McComas, 1998) that makes it difficult to grasp the ways people interpret psychology as a science. Both psychology and science are complex and multifaceted constructs and can mean different things to different people. Just as the portrayal of contemporary psychological science can be problematic, so can the portrayal of science, with different understandings of psychology and science leading to a variety of understandings of psychology as a science. Therefore, understanding psychological science requires an understanding of psychology <u>and</u> an understanding what it means for psychology to be a science, to highlight a shared understanding of the nature and values of science disciplines, while maintaining psychology's identity.

Cranney and Dunn (2011) argue that an essential outcome for undergraduate psychology education, as part of a liberal education in a democratic society, is to develop psychologically literate citizens. Such citizens "use their knowledge of psychology to problem-solve in ethical and socially responsible ways that directly benefit their communities" (Cranney & Dunn, 2011, p. 10). An education with a vision to build psychological literacy assumes that students will acquire skills, knowledge, values, insight and social responsibility and be able to apply these learnings to make informed decisions in everyday life (Hulme, 2014). While goals for tertiary students are different to secondary students, a curriculum with psychological literacy in mind promotes skills in critical thinking, scientific reasoning and communication as well as understanding psychological issues that are fundamental to everyday life in our society. These are aspirational goals and require careful and ongoing consideration to unpack what they may mean for teaching psychology in secondary schools.

In line with the goal for psychology literacy, there is a push to portray psychology as a science through the psychology curricula while acknowledging the multiple dimensions that make up psychological literacy (Cranney et al., 2008). Senior School Psychology has dramatically grown in popularity over the past 25 years and is now one of the most popular subjects in Victoria, Australia (Victorian Curriculum and Assessment Authority (VCAA), 2013), the United Kingdom (UK) (British Psychological Society (BPS), 2013; Joint Council for Qualifications (JCQ), 2010; Walker, 2010) and the United States of America (US) (Keith, Hammer, Blair-Broeker, & Ernst, 2013). “With increasing popularity, it becomes more important that students see an accurate portrayal of the discipline as a science.” (Hakala, 1999, p. 123). For students who are not engaged in learning other sciences, including the large number of females who are over-represented in Senior School Psychology (VCAA, 2013), psychology has the potential for them to ‘switch onto science’. In Australia, science is compulsory to Year 10 and, with English and Mathematics viewed as a core subject, often given more teaching time. Psychology as a science presents opportunities to ‘switch students onto psychology’ at these younger years.

In Victoria, psychology is part of the science suite of studies and was first categorised as a Victorian Certificate of Education (VCE) science study in 1992. Before that time (1970s and 80s) it was seen as a Group B study that did not contribute to the final Year 12 score (for university entrance purposes) or part of the science suite of studies. The introduction of VCE Psychology, like the introduction of any new subject into curriculum policy, should be seen as an achievement.

Despite VCE Psychology's popularity, however, psychology remains absent from the Victorian F-10 and Australian F-12 curricula, including within the science learning area. Debate exists or continues around issues of content (what knowledge is selected as valuable?) and form (how is this content organised within and across the year levels?) (Atweh & Singh, 2011). There are likely to be a number of reasons why psychology cannot find its place in the F-10 science curriculum, for instance, the curriculum's traditional approach of dividing the science understandings into traditional areas of biological sciences, chemical sciences, earth and space sciences and physical sciences. Psychology will need to either replace some current science understandings or require reform of the current curriculum to allow emerging and contemporary sciences, such as psychology, to be included. Such decision making will spark debate among curriculum designers and stakeholders, highlighting the complex and complicated nature of curriculum and difficulties working towards curriculum change (Pinar, 2004).

In Australia, little research has investigated aspects of the secondary school psychology curricula: intended (curriculum policy documents or written curriculum), implemented (enacted by teachers - what they plan, construct and teach) or realised (the students' experience and what they learn, including the hidden and null messages). A very small number of studies have considered the intended curriculum, focussing on the psychology curriculum policy documents published by the curriculum authorities (Fenwick, 2011; Skouteris, Mrouwinski, Cranney, & Voudouris, 2008). In Victoria, VCE Psychology has been criticised for being very content-heavy with “topic areas are studied in isolation with no overarching thematic organisation” (Skouteris et al., 2008, p. 22). In South Australia, priority is given to superficial factual knowledge with an overemphasis on examinations and content within the South Australian Certificate of Education (SACE) Psychology curriculum 2010 (Fenwick, 2011). Similar criticisms have been directed at international secondary school psychology curricula, for instance A-level Psychology in the UK has been judged for too much emphasis on rote learning content knowledge rather than skill development (Kitching & Hulme, 2013; Maras & Bradshaw, 2007; Rowley & Dalgarno, 2010; Smith, 2010). While these studies focus on the intended curriculum (curriculum documents), they raise questions about how this curriculum is implemented by the teachers and how psychology teachers are supported as professional teachers within the systems they teach. In what ways and to what extent do teachers connect different elements of the curriculum documents together, such as knowledge with skills, and use these documents to connect and build curriculum experiences? In what ways do teachers portray psychology as a science? In what ways are they given opportunities for ongoing professional learning?

Senior secondary psychology curricula are influenced strongly by tertiary curricula, with a ‘push down’ effect since there is no psychology in the younger years to create a ‘push up’ influence on the curricula. Tertiary psychology curricula typically includes the research processes of science in separate research methods units, emphasising the need to develop understandings and skills related to these processes. While these curricula recognise that these processes of science should not be exclusive to these research methods units, the units have been criticised for separating the psychology knowledge from the processes of science and prioritising experimental methods without acknowledging the reasons, values and limitations of selecting such methods (Costa & Shimp, 2011; Kuhn, 1996). Prioritising experiments without acknowledging why this method suits the particular research context could lead to a misinformed view that experiments equate to 'the scientific method': a single multistep formula that scientists use every time they solve a problem (McComas, 2011). Such a perspective could also lead to a view that the use of standardised experimental methods over others is the only way to obtain unambiguous, objective and reliable truth (Lederman, 2007; Wivagg & Allchin, 2002). This perspective diminishes other central aspects of science, including the diverse processes and practices such as the diverse range of research methods it employs and the roles of decision making, observation and inference, argumentation, creativity and complexity in psychology. To what extent do psychology curricula consider the diverse ways psychological knowledge is developed and why this knowledge is valued?

Similarly, secondary psychology curricula typically include a research methods section. The VCE Psychology Study Design 2012-2016 (VCAA, 2012) consists of three different elements: (1) Key skills; (2) Key knowledge; and (3) Research methodologies and ethical considerations. Teachers are expected to connect these elements together rather than teaching them in isolation, but this is problematic. In my Master of Education (MEd) thesis, I developed a psychological science framework (Table 1.1) to map the Victorian curriculum, looking for opportunities to connect psychology concepts with science practices as a way of interweaving these three sections together. Starting points to interweave the curriculum elements were limited, placing the curriculum in danger of being taught as single, isolated and unrelated topics, including separating psychology knowledge from the science processes, with a narrow focus on experiments (Marangio, 2013).

Since teachers play a critical role as curriculum developers and enactors generally but particularly in Australia, this PhD thesis builds on my MEd thesis, working with teachers of psychology to explore their views and aspects of their implemented curriculum. The framework was originally used to map the Victorian curriculum and, in this study, it is used with the teachers who are implementing the same Victorian curriculum. To gain a deeper understanding of the teaching of psychology concepts with science practices in VCE Psychology, this study introduces teachers to the psychological science framework and considers the ways they view the framework as a support for their teaching.

1.3 A Framework to Support the Teaching of Psychology Concepts with Science Practices

In my MEd thesis (Marangio, 2013), a psychological science framework (Table 1.1) was developed to analyse the intended curriculum. The mapping of the VCE Psychology Study Design was inspired by Bruner's (1960) notion of a spiral curriculum: the systematic revisiting of key concepts in different contexts over the curriculum leads to deeper understanding of the underlying concepts and links between and within topics, allowing greater flexibility and more opportunities to challenge the creativity and development of learners' ideas of their own.

Table 1.1

A psychology science framework to map the curriculum in terms of connecting psychology concepts with science practices. Example: perception

CONCEPT with the PRACTICE	**Linking practice with perception**	**Further information linking perceptual concepts with science practices**
PERCEPTUAL **SYSTEMS**	Perception as a dynamic **system**	Perceptual systems consist of a dynamic and organised group of components or processes that are interdependent on each other
	Perceptual systems interact with other **systems**	Perceptual systems interact with other systems in our world in non-linear ways, and demonstrate the multiple factors that contribute to the richness, complexity and diversity of people and a range of (similar and different) perceptual experiences.
PERCEPTUAL **MODELS**	Perceptual **models** that represent understanding or explanations	Models are developed, tested, compared and revised to understand, explain and predict perceptual experiences. The durable but tentative nature of perceptual models over time.
	Perceptual **models** of multiple or different levels of analysis	Perceptual models can represent multiple or different levels of analysis: micro (biochemical) to macro (socio-cultural). Selecting, using, designing, comparing and integrating perceptual models of different analysis to understand and explain how perception occurs, recognising limitations of just one model.
EXPLAINING *PERCEPTIONS*	**Explanations** of the perception, using empirical evidence in light of the model	Selecting, analysing and critiquing the evidence, the method of inquiry and the model discussed in order to explain or understand the perceptual experience. .
	Arguments to justify **explanations** of perception	Reasoning, justification and debate of the evidence, the method of inquiry, the perceptual model discussed and the explanation and application.
	Applying **explanations** of perception to different contexts and individuals, own lives and society	Possible applications of the perceptual explanations (including the extent generalisations and transferability of findings) in an ethically and morally sound manner.
PATTERNS IN *PERCEPTUAL* DATA	Recognising **patterns** in the perceptual data	Intentionally deciding which data to select and which method to employ, and understanding how to recognise and communicate patterns within the perceptual data and why this is an important role in evidence
OBSERVATING *PERCEPTIONS*	Intentional **observations** of perception.	Intentionally deciding what to observe and how to observe perceptions and generate data to suit the purpose of the research. Understanding the value and limitations of observing in this manner and the role this data plays in establishing evidence. Understanding the challenges that observing mental processes (such as perception) and behaviours presents.

Note: The science practices are in bold. They are iterative and do not operate in isolation. There are many more science practices – this is a limited selection for secondary school psychology. This is not an exhaustive list or designed as a checklist for teaching.

This framework was designed to focus on the interweaving of psychology concepts with the science practices that inform these concepts within the curriculum. Contemporary science education shifts the emphasis from facts and skills *towards* interweaving concepts with science practices (how we came to know and develop this knowledge and why we believe we know it) (NRC, 2011). I took the approach that interweaving the key concepts with the science practices that inform these concepts together enhances the learning of both concepts and science practices (Duschl, Maeng, & Sezen, 2011), providing opportunities to connect different elements of the curriculum together. In other words, understanding of the key concepts goes hand-in-hand with understanding of the science practices (Duschl, Maeng, & Sezen, 2011) and represents an avenue to connect psychology with science.

The framework uses a systems approach (Bronfenbrenner, 2001) as a way to view psychological systems as dynamic, multileveled and interconnected to each other and other systems in our world. It takes a broad contemporary view of science and includes a systems approach to connect (natural, personal and social) sciences and non-sciences together. It considers science practices that are used to build conceptual understanding within psychological systems. The term practice is used here instead of skills to emphasise that the construction of science knowledge requires both skills and knowledge specific to each practice (NRC, 2011). Science practices are used across all domains of science, with different ways of enacting them depending on the domain and research question. As such, they are a way of linking the different domains of science, providing a way for interrelating knowledge from various areas of science. While recognising that there are many science practices (NRC, 2011), the focus was narrowed to the practices of systems, models, explanations, patterns and observations. These practices build conceptual understanding and each practice (observation, patterns, explanation, models and systems) is intricately linked both to the concepts and each other, in an iterative manner. Each practice is complex and deserves specific attention in developing a more sophisticated understanding of both the practice itself and the concept in question.

While my MEd thesis analysed the intended curriculum (curriculum policy documents) with this framework to consider the implemented curriculum (teaching), the current study takes the next step. In teaching contemporary science, there is a shift as the emphasis *moves away from* teaching facts and skills *towards* focusing on how we came to know and develop this knowledge and why we believe we know it (Duschl, 2008; NRC, 2011) via the teaching of concepts together with science practices (Duschl et al., 2011). The development of conceptual understanding and scientific practices supports students' future role as scientifically literate citizens (NRC, 2011). Therefore, teaching psychology concepts with science practices should provide opportunities for teachers to be explicit about how psychological science works within the given context and has the potential to promote psychology's place in science and STEM education and aim for psychological literacy and beyond. This framework offers *overarching themes* to systematically connect and build on the teaching of psychology concepts together with the science practices that inform these concepts within a unit, and across units and year levels. The framework is iterative and not designed to be a checklist or an exclusive list – there is no set order or sequence, not all areas need to be addressed all the time but understanding how the practices work together to build knowledge should be kept in mind.

1.4 Why this Study is Important to Me

Obviously, I am passionate about the teaching of psychology as a discipline subject in schools and its value for students. I have been incredibly fortunate to work closely with psychology teachers and teach preservice (student) teachers for a number of years. I am an experienced teacher of psychology, having taught a range of different curricula (in Australia and overseas), a co-author of psychology and science textbooks and have been heavily involved in external assessment in psychology (VCE and International Baccalaureate (IB)) and have served on VCE Psychology Study Design panels. I have been supporting teachers to create and map their Year 7 to 10 Psychology curriculum with the Australian and Victorian F-10 curriculum. Within my work, however, I am frustrated with the lack of research we can use to support the teaching and learning of psychology in secondary schools.

I have been dismayed with psychology's silent voice within the debates around the development of the Australian Curriculum. That said, I find it frustrating that the science curriculum remains focussed on four traditional disciplines of science (biological sciences, chemical sciences, earth and space sciences and physical sciences) while intersections between them and other disciplines, including emerging areas of science, get little attention. I am hoping more interest is taken now given that all other states and territories (with the exception of NSW) incorporate psychology in their senior school curriculum. Furthermore, psychology has its place with school's core science education, STEM education and interdisciplinary and multidisciplinary programs, programs that many schools are currently developing and grappling with. An approach I have taken in this thesis is to combining the wealth of education research related to school science education and tertiary psychology education, as these bodies of work are valuable and can build and complement each other.

In my various roles within Initial Teacher Education, I have coordinated 35 different teaching (pedagogy) methods. Teacher education has made big shifts over the last 20 years, including towards an evidence-based approach. Sadly, psychology education in secondary schools is one of the least researched methods. Advocacy and support for psychology teachers via not-for-profit teacher associations is also minimal. I am also mindful of the cultural diversity in my classes, both local and international pre-service teachers, and the schools in which they are placed, and plans to begin their teaching career in Melbourne and other places in Australia and across the world. Australia's senior school psychology curricula focus on American (western) psychology from last century. We should be working towards more diverse and inclusive curricula, for example embracing Australian psychology including indigenous Australian psychology.

The work of psychology teachers, as professionals, to date needs to be recognised and valued, including advocacy and support for ongoing learning throughout their career specific to the teaching and learning of psychology. Boosting education research is a starting point to highlight the value and possibilities for teaching of psychology in school curricula. I have spent a long time wondering what teaching 'psychology as a science' can look like and hope this study contributes in some small way to the debate about the purpose and teaching of psychology as a subject in schools and that its place in the curriculum is firmly established. This research has the potential to inform policy and teaching practice, supporting both teacher and student learning, and in turn stimulate further research into the scholarship of teaching and learning psychology.

1.5 Purpose and Research Questions

A framework has been applied to support the teaching of psychology concepts with the science practices that informs these concepts. The purpose of this study is to consider how this psychological science framework is perceived by secondary school teachers to support their teaching of psychology.

To consider how this framework is perceived by teachers, it is important to explore both their views of psychology and their teaching of psychology as a science. This study aims to introduce the framework to teachers and explore how they can understand and view this framework as a support for their teaching of psychology. The research questions guiding the study are:

1. What are psychology teachers' views of psychology as a science and teaching psychology as a science?
2. What are teachers' views on using the psychological science framework as a support for their teaching of psychology?
3. In what ways does this psychological science framework shift teachers' views for teaching psychology?

Teachers' views are central to this study. It is the teachers who plan, teach, reflect and understand their curriculum within their classroom context. As such, they are in the best position to explore possible new ideas and critique and use a framework to support their teaching. Their views of psychology and ways of teaching psychology influence their teaching, although views do not necessarily transfer into teaching.

The framework was originally used to map the Victorian curriculum documents. In this study, it is used with teachers who are implementing the same Victorian curriculum. Therefore, only Victorian teachers were selected for this study based on both convenience for the researcher and to extend my MEd research (Marangio, 2013) using the same curriculum.

1.6 Significance of This Study

This study contributes to the research literature on teaching of psychology using a science practices framework, with the findings adding to the sparse research on teaching and learning psychology in secondary schools. The teachers' views and experiences are central to this study, as it focuses on their views and their implemented curriculum. It starts with an online survey, then a small number of teachers of psychology engaging in a workshop to introduce the psychological science framework and finally follow up individual interviews regarding teachers' views and use of this framework.

This study has the potential to help teachers and students understand and explore how psychology is underpinned by science and connects to the science curricula, especially in curricula where psychology is endorsed as a science study. As such, it can open up opportunities to engage in interdisciplinary science discussions and consider ways to support students to think about what psychology as a science discipline entails and to think across the discipline boundaries. It takes the view that teaching the nature and values of a discipline is more important for students both now and into the future than the memorisation of heavy content. In this way, I am interested in how teachers' views and experiences of the psychological science framework can be communicated to other psychology and science teachers and researchers and curriculum panels. The findings may have potential significance for psychology curriculum, both at school and policy level.

This study is only a starting point. It gives teachers a voice and opportunity to validate this framework for their own practice. This study is broad, considering overarching themes, and does not consider each science practice with each psychology concept in great detail. The intention of this thesis was to focus on the teachers, too often overlooked and at risk of being isolated in the systems they teach, including missing out on professional learning opportunities. Depending on the outcome of this study, observing their teaching of psychology, exploring students' views and monitoring their learning and the alignment between teachers' views, the ways they teach and their students' learning could (and should) be areas to investigate in the future. These areas are deemed equally useful, important and necessary as the teachers' views but beyond the scope of this research.

I am hoping that this research sparks further interest, research and debate about teaching and learning of psychology in secondary schools. I hope it encourages professional learning for psychology teachers and celebrates the incredibly complex work of teachers. I hope this contributes to a body of educational research to inform policy, establish psychology's place in the curriculum and what it may mean for teachers of psychology and their teaching of psychology as a science and the associated benefits for our students and society.

1.7 Outline of This Thesis

This thesis has nine chapters. Following this introduction chapter, the literature review is presented in two chapters. Chapter 2 considers psychology today and the current views of science, its' nature and values, for school F-12 science education. It then reviews teachers' and students' views of psychology. Chapter 3 considers the inclusion of psychology in different curricula around the world, with a closer look at Victoria, Australian curricula that the teachers in this study were teaching. It then considers the implications for psychology teachers' growth throughout their professional career, tying together views of psychology as a science, the curriculum and psychology teachers' opportunities for professional learning. Chapter 4 discusses the underpinning methodological aspects and the methods used in this research. Chapters 5 and 6 present the Phase One (online survey) and Phases Two (workshops) and Three (individual interviews) data analyses accordingly. The next two chapters discuss the significance of these results in relation to the research questions and the aspects of the literature presented earlier. Chapter 7 answers research question 1, looking more carefully at teachers views of psychology and teaching psychology as a science. Chapter 8 answers research questions 2 and 3, considering teachers views of the framework as a support for their teaching and teacher change. In Chapter 9, conclusions and implications are drawn in relation to using the psychological science framework as a support for teaching of psychology.

1.8 Chapter Summary

This chapter considered the context of this study. This study plans to contribute to our understanding of what it could mean to teach psychology as a science in secondary schools. Psychology is a popular senior school study in Australia, and in 2019 is taught in all but one state and territory of Australia (NSW). In most places in Australia, including Victoria, psychology sits within the science key learning area, but is marginalised as a senior secondary subject. Not being part of the core science, or any other core key learning area, has likely consequences for psychology teachers as professional teachers. A psychological science framework was originally designed to map the VCE Psychology curriculum, focusing on how the intended curriculum promotes and builds on the interweaving of psychology concepts with science practices. For teachers of psychology, using the framework as a support is likely to involve a shift in emphasis from teaching 'facts and skills' to teaching 'how we know' and 'why we believe'. The framework reflects a broad contemporary view of science, as reflected in the Australian science curriculum, and potentially could be used to support the teaching of a range of science subjects. This study considers the implemented curriculum, drawing on teachers' views on using this psychological science framework to support their teaching of psychology, with the Victorian teachers' voice central to this understanding.

Chapter 2: Views of Psychology

2.1 Introduction

The literature review builds on Chapter 1 that discussed the context for this study and introduced the psychological science framework that takes a contemporary science view intended for Foundation (kindergarten) to Year 12 (F-12) school audiences. The literature review is divided into two chapters, with this chapter focussing on views of psychology and the next chapter considering the psychology curriculum and psychology teachers who implement this curriculum. This chapter starts with a brief look at psychology today and changes to the ways science has been viewed over the last century. Since psychology has been placed in science in the curriculum at the centre of this thesis, and there is a lack of education research on views of psychological science for a school audience, views of science appropriate for F-12 science education are considered. Finally, secondary school psychology teachers' views of psychology are considered.

2.2 Psychology Today

Psychology is ever-changing and dynamic. Psychology knowledge develops with new understandings, technologies and methodologies and ways of re-examining existing data and models become available (Breen & Darlaston-Jones, 2010) as seen in emerging areas, such as neuroscience, behavioural genetics, behavioural economics, positive psychology, cultural and health psychology. The Australian Psychological Society offers the following description:

> As a science, psychology is the study of the human mind and its wide-ranging functions and influences. Psychological research advances our understanding of human emotion, personality, intelligence, memory, perception, cognition, attention, and motivation, as well as the biological processes that drive these human functions and behaviours.
> In essence, psychology studies individuals and groups to better understand how people, communities and societies function and ways to help them thrive (APS, 2018, para. 1-2).

The professional associations promote psychology as a science discipline, encompassing a range of subfields (such as biological, behavioural, cultural, ecological, individual, and social psychology) to study mental processes and behaviours. These broad subfields create the discipline of psychology, as a human science, connecting psychology with natural and social sciences. This section introduces contemporary psychology, as a science, in light of the way science has changed over the last century.

Like every discipline, there are unique considerations when studying the subject matter, and psychology is no exception. There are inherent complexities with studying wilful, caring, intelligent and social individuals, with Dyer (2006) highlighting the following three characteristics of humans that make studying psychology challenging:

1. Humans are conscious

   We are self-conscious and aware of our self, interactions with others and our environment. We experience and reflect on our own thoughts, feelings and behaviours and that of others.

2. Humans are active and autonomous agents in the world

   We experience our own mental self as the cause and controlling force of our behaviour. We can make intuitive decisions about ourselves and others.

3. Humans are social entities

   Our thoughts, feelings and behaviours are influenced by the presence of others, whether we realise this or not. We may control behaviour in the presence of others.

The multiple challenges of studying complex and diverse individuals has contributed to the debates within psychology since it ‘officially’ became a separate science discipline in the late 1800s, designed “to replace explanations of behaviour based on whim or wishful thinking with explanations based on rigorous standards of evidence and reasoning” (Wade, 2009, p. 12). Psychology’s beginnings as a discipline, studying mental process and behaviours of inherently subjective and interactive individuals, and the important ethical and moral implications, contributed to relatively independent sub-specialities with diverse perspectives (theoretical approaches) around the nature of psychology (Glassman & Hadad, 2009; Gross, 2009; Watson, 1967). Different psychological perspectives have arisen from different beginnings (for example, philosophy, medicine, anthropology, sociology, biology), each with its own ontology, epistemology, methodology and models (Glassman & Hadad, 2009). Underlying philosophical tensions have existed between different perspectives in terms of ontological issues (for example, neurophysiological processes versus phenomenological experience) and epistemological issues (explaining versus understanding), levels of analyses (micro versus macro-level) and research methods (quantitative versus qualitative) (Goertzen, 2008; Kendler, 2002). Other debates have included, and are not limited to, the roles of free will and determination, reductionism and holism, and nature and nurture (Glassman & Hadad, 2009). Psychology encompasses behaviour, experience and mental processes (Glassman & Hadad, 2009) but still the nature of psychology is contested (Ardila, 2007, Trapp, et al., 2011).

Today, many argue that these tensions do not need to be seen as dichotomies, they really depend on what question is asked and how the perspectives may work together to develop a better understanding of the complex and multiple interrelated factors that influence human experiences (Bronfenbrenner & Morris, 1998; Gross, 2009; Witherington & Margett, 2011). To focus just on one factor, such as micro level of analysis, without bringing in others, such as macro levels, limits understanding the bigger picture of what psychology means, is and does. While once studying an individual's subjective experience and the influence of society (such as social, economic and political contexts) on an individual was distanced from science, today it is seen as a central aspect of contemporary psychological science. Today psychology works towards a more integrated approach (Cacioppo, 2013), connecting different subfields of psychology for a more systems way of thinking (Bronfenbrenner & Morris, 2006), rather than seeing the subfields of psychology as separate and isolated entities.

Contemporary psychology is emerging as an influential and integrated science, "no longer simply a collection of independent subspecialties based on historical or administrative distinctions, psychology in the 21st century is becoming an integrative multilevel science" (Cacioppo, 2013, p. 307). Disciplines, including psychology, do not have tight boundaries, they overlap and spread out with the development of new understandings, processes and technologies, and it is only when they become subjects for study that they are given boundaries (Radford, 2008). Real world problems are not confined to a single discipline (Proctor & Vu, 2019). Each science discipline has unique ways of looking at the world and can offer unique contributions, including psychology (Magnusson, 2012). Identified as one of seven specific hub sciences (mathematics, physics, chemistry, earth sciences, medicine, psychology, and the social sciences), psychology sits and works with a range of other disciplines rather than as an isolated and unrelated science discipline (Boyack, Klavans, & Börner, 2005). Discipline knowledge is essential, but equally important is the value of collaborating and communicating that expertise with other disciplines to develop a bigger picture of personal, societal and global issues (Krohn, 2017). The classification of cross-disciplinary research is not universal, with multi-, inter and trans- approaches often used interchangeably (Yu, Bedru, Lee, & Xia, 2019). Using Yu et al.'s (2019) distinctions, to solve a complex problem, *multidisciplinary* researchers use their own expertise and unique contributions but with limited collaboration; *interdisciplinary* researchers integrate different disciplines methods and concepts through collaboration; and *transdisciplinary* researchers work in collaboration using a shared conceptual framework that combines theories and approaches of specific disciplines. For contemporary psychology, the emphasis is not only on developing psychological knowledge, but also to be able to engage with a variety of disciplines to work on specific real-world issues. Contemporary psychology works with a range of other disciplines rather than just as an isolated discipline on its own, and is a more integrated, interdisciplinary and collaborative science than ever before. This study takes a broad contemporary view of science, designed to reflect and embrace psychology as a natural, personal and social science.

2.3 Science over the Last Century

Psychology identifies with science and promotes itself as a science in the community but is often viewed as a new or young science (Glassman & Hadad, 2009), despite psychological science often stated to have officially began with Wilhelm Wundt's publication of Principles of Physiological Psychology in 1874 (Gross, 2010). As a 'new' science discipline, psychology has worked hard over the years to establish itself as a discipline in its own right and as a science. This section considers how science has changed over the last century and considers psychology's fit with these changes.

Science is ever-changing and can be seen as going through a number of iterations in the ways science is understood over the last century, with conceptual (what we know), procedural (how we know) and epistemological (why we believe) implications (Duschl, 2008). While science has always been about developing new knowledge, the ways science is viewed has changed over the years. Such views influence the way science knowledge grows and is undertaken, with different emphasis on science practices. A broad overview of such changes are briefly summarised in Table 2.1.

Table 2.1

Broad overview of changes in viewing and undertaking science over time

Time	**Science view:**	**Science consisting of:**
Early 1900s to 1960s	Logical positivism	Experiments, testing hypothesis
1960s to 1990s	Post-positivist movement: Scientific revolutions	Building and revising theory
1990s to present	Contemporary science	Model building and revision, working between evidence and explanation. Systems approach, working in large interdisciplinary and multidisciplinary teams

Traditionally (early 1900s to 1960s), the sciences were understood to be based on logical positivism (Ardila, 2007). In this way, processes were prioritized and seen as separate from theory and its specific theoretical assumptions. This view of science "provided a special and superior form of knowledge through the use of a special kind of method; the scientific method" (Costa & Shimp, 2011, p. 26). Such a method legitimized and promoted science knowledge as being empirical, objective, reliable, factual and unambiguous and prioritized the use of standardized experimental methods over others. It instilled the view that science is about discovering the truth (undisputed facts) (Lederman, 2007).

Early behavioural psychologists adopted this logical positivism scientific position giving priority to experiments (as 'the' scientific method) with the focus on directly observable (overt) behaviour without inferring these observations to unobservable mental processes (Koch & Leary, 1985). The mind and self and associated mental processes were considered too difficult to study scientifically and these observations were considered the 'ultimate, non-subjective truth' (Staats, 1983). The use of experiments, as 'the' scientific method, aligned psychology with science, and with it the prestige of being a science discipline. However, justifying psychology as a science because of its use of 'the' scientific method misrepresents psychology and the diverse range of science methods it utilises. While there is no science without method, there is no universal method across all sciences and therefore no such thing as 'the' scientific method (Chalmers, 2013). Scientists use a range of scientific methods depending on the research question, and experimental research involves the use of theory, making subjective judgements and interpretations throughout the research process to work towards creating new knowledge. By adopting 'the' scientific method, the danger is a fixation on 'the' method, overlooking a range of interactive and contextual factors involved in the psychological processes (Pérez-Álvarez, 2018) and that psychology utilises a range of research methods, each purposely selected to generate data that are in line with the purpose of the research. Not limited to psychology education, this fixation on 'the' scientific method has implications for F-12 science education and discussed later in this chapter.

As part of the post-positivist movement, Kuhn (1996) defined a paradigm as a common global perspective: *a collective set of values, attitudes, assumptions, methods and* *terminology*. According to Kuhn (1996), paradigms go through changes over time and depend on societal preferences as well as the available evidence. Kuhn emphasised “most of theory change that occurs in science is not final theory acceptance but improvement and refinement of a theory” (Duschl, 2008, p. 274). Observations take on different meanings according to the paradigm researchers are working in *as well as* the social and personal factors of the researcher. The three historical stages that highlight the order of progression of a science are:

Prescience: no universal paradigm exists but several schools of thought or theoretical orientations.

Normal science: an accepted paradigm exists. This dictates what can be studied, how it is studied and interpreted. Thus, there is a clear set of core assumptions, subject matter and methodology.

Revolution: a paradigm shift occurs when there is overwhelming conflicting evidence for the old paradigm.

Kuhn (1996) classified psychology as prescience since it lacked an overarching set of core assumptions. He viewed psychology as being splintered into different psychological perspectives (Glassman & Hadad, 2009) as discussed earlier. Some philosophers agreed but others proposed that psychology has already gone through a number of paradigm shifts (Bem & Looren de Jong, 2006; Glassman & Hadad, 2009; Gross, 2009; Hunt, 2007).

While psychology may or may not fit into Kuhn’s paradigm of a normal science, it does fit with his notion that science is a social process that involves sharing ideas and observations and debating their meanings. Each psychological perspective has its own set of *assumptions, models, metaphors and methods* that have largely grown independently of each other, with different focuses on *what* and *how* to study human nature (Glassman & Hadad, 2009; Gross, 2009; Westen, Burton, & Kowalski, 2009). As discussed earlier, one perspective (subfield) of psychology cannot successfully explain all psychological events and so rather than insisting that a perspective must be absolute for all situations, they are often integrated or selected accordingly to develop an overall picture.

Contemporary science, moves away from logical positivism and on from Kuhn's paradigm shifts and centres on important epistemic and social practices as science:

- emphasizes the roles of models and data construction in the scientific practices of theory development;
- sees the scientific community as an essential part of the scientific process; and,
- sees the cognitive scientific processes as a distributed system that includes instruments, forms of representations, and agreed upon systems for communication and argument. (Duschl, 2008, p. 273)

Like the past, science is not defined by the location or content of an investigation but rather as a process of developing of new knowledge using observational data and theories in a public arena that is open to peer review and evaluation. Scientists have for some time considered the states of complex systems that can be applied to real-world problems. Traditionally, science was carried out as individual endeavour, working mostly in isolation on a specific area of science. Whereas today, as discussed earlier, the emphasis is more on the social processes with scientists working in large interdisciplinary and multidisciplinary teams to examine local and global issues (MacLeod, 2018; National Academy of Sciences, 2009). This change signifies a recognition that one discipline is too rigid or narrow to solve these complex issues. Instead of working in isolation, a range of scientists and non-scientists collaborate in large teams. Each expert draws on their own discipline knowledge, taking a systems approach that acknowledges the complexity and interrelatedness between disciplines, to investigate and navigate better solutions for complex personal, societal and global issues. The emphasis has shifted more to the epistemic and social practices of science, including the ability to collaborate, communicate and take a systems style of thinking.

Psychology fits with this contemporary view of science. Psychological models are built on, tested, compared, evaluated, refined, established and substituted, rather than being seen as the final product, as logical positivism seems to suggest. Today psychology works towards a more integrated approach (Cacioppo, 2013), rather than seeing the subfields of psychology and other science disciplines as separate and isolated entities, as discussed earlier.

While a more integrated approach is generally accepted, different views about science exist, both within the psychology academic community and beyond. The challenges to portray psychology to the public and policy holders can equally present opportunities, as explained here:

> "While all agree that psychology is an empirically and scientifically grounded subject, there would seem to be value in broadening our definition of 'science' (and particularly the definition which is used by the public and policy makers) to beyond that of the traditional natural sciences, and of stressing the added value of psychology as a subject for study that offers "STEM plus" skills for students and graduates (e.g. as including numeracy, empirical research skills, ethical awareness, literacy, historical awareness and interdisciplinary team-work). The fact that we do not live in a period/ culture where the definition of science is agreed upon, known or widely understood can perhaps be seen as an opportunity rather than a problem – many agree that psychology should be much bolder in publishing what it does as a discipline, a subject of study and as a profession, as well as the importance of having psychologically literate citizens (Trapp, et al, 2011, p. 7-8)."

Equally, seeking opportunities to promote a broader and more contemporary view of science and critique ways an empirically grounded subject fit with contemporary science views. Importantly, promoting the value of learning psychology, and the ways psychology works with a range of science and non-science disciplines can start in school education. Navigating a place for psychology in a curriculum, one that views psychology as core rather than a marginal senior secondary subject, is worthy of attention.

In summary, today psychology can be seen to accord with a contemporary notion of science with beneficial value for both individuals and society. Psychology has a place working on a range of challenges facing the world today, including issues involving environment, sustainability, poverty, hunger, education, food and energy security, conflict and peace building, physical and mental health. While psychology has tried hard to align with science in the past, it now fits with contemporary views of science, and in an ideal position to lead a systems approach in F-12 science education.

2.4 Views of Science Appropriate for F-12 Science Education

The psychological science framework at the centre of this study is proposed to promote contemporary views of psychology and used to support F-12 psychology education. The framework aims to support the teaching of psychology concepts together with science practices. The role of science practices is to engage both science content knowledge and skills meaningfully to support how knowledge is constructed and why this knowledge is valued (NRC, 2011). Therefore, understanding and experiencing science practices can support appreciation of the nature of science knowledge (Erduran, Kaya, & Dagher, 2018).

The Victorian teachers at the centre of this study and working with a senior secondary psychology curriculum that is part of the science curriculum. Since there is very little research on views of psychological science appropriate for secondary school psychology, it is fitting to draw from science education. For decades, science education researchers have been advocating the importance of including the special characteristics, values and assumptions that science knowledge is based on and developed in F-12 science education, although conceptualising these characteristics has occurred in a number of different ways (Hodson & Wong, 2017). While there is no one agreed way of conceptualising the special characteristics, values and assumptions of science, each view is designed to enable teachers to promote ways science knowledge is constructed and therefore influence their teaching. It is difficult to locate psychology educators' involvement in generating appropriate views for F-12 science education. This study on teachers' views on the psychological science framework offers the potential to open up conversations and involve F-12 psychology education in the future, highlighting commonalities and points of difference between disciplines.

This section considers some of the views of science, as deemed appropriate for F-12 science education. It gives a brief overview of a range of views regarding the ways science knowledge is constructed (refer to Table 2.2) and considers how this aligns with the work in this thesis.

Table 2.2

Examples of views of nature and values of science constructed for F-12 science education

Views of science	**Examples**
Consensus views of nature of science (NOS)	Lederman, Abd ‐ El ‐ Khalick, Bell, and Schwartz (2002) and Lederman (2007) Osborne, Collins, Ratcliffe, Millar, and Duschl (2003) McComas (2004)
Features of science (FOS)	Matthews (2012)
Family resemblance approach (FRA)	Irzik and Nola (2014) and Erduran and Dagher (2014)
Values in science	Allchin (1999)
Myths of science	McComas (1998)

2.3.1 Consensus view of nature of science.

Science educators, scientists, philosophers, historians and sociologists of science tend to agree that the nature of science (NOS) should be taught in F-12 science education despite ongoing debate about 'what is science' (Abd-El-Khalick, 2013; Allchin, 2011; Duschl & Grandy, 2013). While there are diverse views about science, there has been a degree of consensus around certain aspects regarding the NOS appropriate for F-12 science education (Lederman, Abd-El-Khalick, Bell & Schwartz, 2002; McComas, 2004; Osborne, Collins, Ratcliffe, Millar & Duschl, 2007), dubbed the 'consensus view'. Some lists of NOS characteristics are outlined in Table 2.3, and with very similar characteristics, it is no surprise that these lists have generated what has been called the 'consensus view'. Interestingly, while McComas (2004) and Osborne et al (2003) highlighted a range of scientific methods, Lederman (2007) did not include processes of science (science practices or diversity of science methods or scientific inquiry) in the list of NOS characteristics. While recognising that these aspects overlap and interact in important ways, Lederman (2007) emphasises the importance of distinguishing between nature of science and processes of science.

Table 2.3

Towards a consensus view: views of 'nature of science' for F-12 Science education

Core nature of science ideas (McComas, 2004)	**Characteristics of nature of science (Lederman, Abd-El-Khalick, Bell and Schwartz, 2002; Lederman, 2007)**	**Nature of science aspects (Osborne, Collins, Ratcliffe, Millar and Duschl, 2003)**
Science knowledge is tentative but durable. This means that science cannot prove anything because the problem of induction makes "proof" impossible, but scientific conclusions are still valuable and long lasting because of the way that knowledge eventually comes to be accepted in science.	Science knowledge is tentative.	Science knowledge is tentative.
Science demands and relies on empirical evidence.	Science knowledge is empirically based.	Science is about hypothesis testing (+ other aspects related to induction & generalisation).
Science has a subjective element.	Science knowledge is subjective.	Science involves interpretation.
Science is a highly creative endeavour.	Science knowledge involves human inference, imagination and creativity.	Science involves creativity.
	Distinction between observation and inference.	Science involves theory construction and revision.
There are historical, cultural and social influences on science.	Science knowledge is socially and culturally embedded.	Science involves peer review and evaluation.
Laws and theories are related but distinct kinds of scientific knowledge.	The functions of and relationships between science theories and laws.	
Knowledge production in science includes many common features and shared habits of the mind. However, in spite of such commonalities there is no single step-by-step scientific method by which all science is done.		Scientific methods are diverse.
Science and technology impact each other, but they are not the same thing.		
Science and its methods cannot answer all questions.		

These lists of characteristics should not be seen as definitive or exhaustive and are not meant to convey a singular conception of NOS, but represent those NOS aspects that are noncontentious and educationally appropriate for F-12 students (Lederman, 2007; Osborne et al., 2003). The characteristics offer starting points for teachers, including psychology teachers, to consider how each may be integrated in their F-12 classrooms. The characteristics within each list are interconnected and dependent on each other and each should be considered as equally important. Osborne et al. (2003) warn against viewing the nature of science characteristics as a checklist:

> A concern arising from this study is that the findings might be seen to give legitimacy to decomposing the nature of science into a set of atomistic components that might, at worst, be taught in isolation in a highly decontextualized manner (Osborne et al., 2003, p. 712).

The consensus view has stimulated debate and opened up conversations around what is appropriate for students to appreciate science as a way of knowing and understand the way science knowledge is generated and validated, even with Osborne et al's (2003) warning not to view the NOS characteristics as checklists. In recent years there has been increasing concerns against the consensus view of science (Allchin, 2011; Duschl & Grandy, 2013; Matthews, 2012). Criticisms tend to centre around the list of characteristics as being over simplified, unhelpful, philosophically naïve, confusing a number of aspects of science (epistemological, ontological, sociological, ethical and philosophical) and not reflecting contemporary science practices for a F-12 school audience, as Hodson and Wong (2017) sum up the arguments:

> This portrayal of science is too general, fails to capture the complexities and diverse practices of generating knowledge across the subdisciplines, and risks limiting teaching about science to learning a list of supposedly generic items that apply to all fields of science (Hodson & Wong, 2017, p. 6).

Indeed the arguments for oversimplifying views and failing to capture the diversity across and within science disciplines strikes a chord here. The 'consensus' list could distort historical depictions of science and assume similarities across science domains, including across areas within psychological science. Additionally, psychologists and psychology educators were not involved in the construction of these ‘consensus’ lists of characteristics and this absence opens up questions regarding new ideas and understandings may result if a range of psychology academics and psychologists, psychology F-12 teachers and researchers and students contributed to the construction of these characteristics.

2.3.2 Features of science (Matthews, 2012).

Matthews (2012) does not offer one definition of science but sees a number of related features that many sciences may or may not share. Matthews (2012) argues against presenting the consensus view as a ‘list to learn’ as each characteristic is open to interpretation and therefore risks learning the nature of science out of context. A science discipline will use methods and values relating to an array of features of science, but may not display all of them, as he explains:

> Science is a human and thus historically embedded truth-seeking enterprise that has many features: cognitive, social, commercial, cultural, political, structural, ethical, psychological, etc. All of these features are worthy of study by science students as well as by disciplinary specialists; and differences of them come into clearer focus when considering different sciences, and when considering different aspects of the history, achievements and practice of the different sciences. Some of the features are shared to a large degree with other knowledge-acquiring enterprises, some are shared to a limited degree, and some are not shared at all (Matthews, 2012, p. 4).

Matthews (2012) advocates a move from ‘nature of science’ to ‘features of science’ (FOS), as a way to offer a broader philosophical, historical, moral and socio-cultural stance. Factors such as the person’s philosophical stance, the nature of the specific science discipline and historical and social-cultural elements contribute to an individual’s depth of understanding of science. Consequently, each of Lederman’s NOS characteristics have been subject to much debate over a long time. For instance, 'scientific knowledge is subjective' is an ambiguous claim that can be answered both 'yes' and 'no' depending on the stance taken. 'Yes' in the sense that it is theory-laden and created by scientists and therefore subjectivity is unavoidable in a philosophical sense, and 'no' in the sense that scientists do not deliberately try to avoid objectivity or minimise subjectivity from a psychological sense. Matthews (2012) warns that incorporating nature or features of science must be at an appropriate level for school students and teachers as it is unrealistic to expect teachers and students to become "competent historians, sociologists or philosophers of science" (p. 21). In doing so, Matthews (2012) considers Lederman's NOS statements, and rephrases each to create more open stance, seeing the change to a more relaxed, contextual and heterogeneous FOS. Each FOS can be elaborated, discussed and inquired about, rather than seen as fixed, definitive and declarative statements about science to be simply learned and assessed. There is room to extend these features to include "any number of other important and engaging features of science" (Matthews, 2012, p. 20), including science practices.

FOS resists labelling views as naïve if a view does not align with a tenet or sophisticated if it does, recognising that sophisticated arguments may be given to justify viewpoints whether or not in line with a tenet (Matthews, 2012). A FOS approach incorporates processes of science into understanding features of science and avoids F-12 students memorising a narrow list of tenets, accepting difference within and between science disciplines and therefore has appeal for learning how psychology knowledge is constructed suitable for a F-12 school audience.

More recently, the family resemblance approach (FRA), has been developed for F-12 science education (Erduran & Dagher, 2014; Irzik & Nola, 2014). FRA embraces the diversity and complexity of the cognitive, epistemic and social-intuitional systems of science by including a range of features of science and emphasising the dynamic and interactive relationships between these features (Erduran & Dagher, 2014; Irzik & Nola, 2014). Science is viewed as a coherent whole to help enable students to see the relevance of science for their everyday lives, rather than science as a list of unfragmented and irrelevant ideas (Erduran et al., 2018). FRA recognises the role of science practices to engage both skills and knowledge meaningfully in science investigations and understand the relationship between science content knowledge, skills and epistemology:

> In order to appreciate the nature of scientific knowledge, one has to both understand and experience scientific practices (Erduran et al., 2018, p. 8).

Like Matthews (2012), FRA does not offer one definition of science but sees a number of related features that many sciences may or may not share. Matthews' (2012) broad approach and inclusion of science practices aligns with the emphasis on teaching concepts with science practices that inform the concepts within the psychological science framework. For teaching of psychology in F-12 education, the use of science practices can offer insights into ways of thinking about, investigating and explaining psychological phenomena and features of science.

2.3.4 Values of science (Allchin, 1999).

Science is a value-laden human endeavour and understanding core values in science can contribute to appreciating the nature of science, including the ways values connect with science practices. Allchin (1999) calls for teaching about the role of values in science that underpin the way science works, including values that guide the scientific research itself, those embedded within the science culture and individual scientists (whether consciously or not), and those associated with science processes and knowledge that are or may be applied in society, including those that can create new societal challenges. Allchin's (1999) seminal work highlights the values of science that underpin science as a way of thinking and acting (or disposition to acting). He divides the values of science into 'epistemic' (cognitive or constitutive) and 'non-epistemic' (non-cognitive or contextual) as divided in Table 2.4. These values emerge as both a product and a practice of science.

Table 2.4

Values of science (Allchin, 1999)

Values of science		**Examples**
Epistemic (cognitive, constitutive)		Objectivity (reducing bias), accuracy, precision, consistency, scope or unifying power, explanatory power, fruitfulness or fertility, testability, generality, simplicity
Non-epistemic (non-cognitive, contextual; personal, socio-cultural factors)	External aspects	Ethical guidelines, societal views of science and scientists, political funding, application of science knowledge, communication of science to the public
	Internal aspects	Personal values of scientists (as a scientist, a member of science community and a member of society), responsibilities of scientists in mitigating inductive risks and sources of error, critical checks and balances within the social structure of science.

Science is strongly guided by 'epistemic' (cognitive, constitutive) values such as objectivity (reducing bias as much as possible), accuracy, precision, consistency, scope or unifying power, explanatory power, fruitfulness or fertility, testability, generality, and simplicity. Science is also affected by 'non-epistemic' (non-cognitive, contextual) values including those related to personal, social and cultural values. These non-epistemic values can play an important role on external aspects of science, such as ethical guidelines, societal views of scientists and benefits of science for society, political funding and encouragement of scientific work, application of science knowledge and ways scientists communicate science to the public. Equally, they influence internal aspects, such as the responsibilities of scientists in mitigating inductive risks and sources of error and critical checks and balances within the social structure of science. According to Allchin (1999), the diversity in values promote the robustness of knowledge through justification within the science and societal settings, highlighting science as a human endeavour and the ethical, cultural and political aspects of science. Values of science are fitting with the ways psychology operates to develop new knowledge and plays a role in understanding psychology as a science.

Teachers do not necessarily understand the values of science in the academic way that Allchin (1998) states. Through their work with science teachers at professional development sessions, Corrigan and Gunstone (2007) found that the teachers construct their understandings of values of science differently. Teachers translate the values more readily into ways that fit into their pedagogical practice. Instead of framing values as epistemic and non-epistemic, they are more comfortable with using the following:

1. Science as process (in line with epistemic values)
2. Cognitive values (in line with epistemic values)
3. Human qualities (in line with non-epistemic values)
4. Societal values (in line with non-epistemic values)

These four categories offer a line between the F-12 science education views and how teachers think about values (Corrigan & Gunstone, 2007). Consensus views on the nature of science (Lederman, 2007; McComas, 1998; Osborne et al., 2003), Matthews (2012) features of science are also likely to fit into these teachers' views as well, offering a more holistic and coherent view about the influences on the ways science constructs its knowledge.

Importantly, F-12 teachers may use these values when discussing their views of the psychological science framework as a support for their teaching, to show how the practices are used to create new knowledge and why this knowledge is valued in the psychological science community.

2.3.5 Myths of science (McComas, 1998).

While the idea of what it means to have a well-developed understanding of the nature of science varies, this is not to say that 'anything goes'. McComas (1998) outlines a number of issues related to elements of the nature of science, which he describes as 'myths of science' that are widely-held, yet incorrect ideas about the nature of science. Often these myths are perpetrated in science curricula, classrooms and textbooks (refer to Table 2.5).

Table 2.5

Summary of McComas (1998) commonly held 'Myths of Science'

Myths of Science
1. Hypotheses become theories that in turn become laws
2. Scientific laws and other such ideas are absolute
3. A hypothesis is an educated guess
4. A general and universal scientific method exists
5. Evidence accumulated carefully will result in sure knowledge
6. Science and its methods provide absolute proof
7. Science is procedural more than creative
8. Science and its methods can answer all questions
9. Sciences are particularly objective
10. Experiments are the principal route to scientific knowledge
11. Scientific conclusions are reviewed for accuracy
12. Acceptance of new scientific knowledge is straightforward
13. Science models represent reality
14. Science and technology are identical
15. Science is a solitary pursuit

While this list is reduced to a number of definitive and decontextualized statements, each statement offers powerful starting points for discussions, including the notion of 'the' scientific method. "In reality, doing science is an idiosyncratic pursuit that applies many shared methods (e.g., rigorous and sufficient data collection, careful record keeping, intellectual honesty, the application of induction and deduction) in pursuit of problem solving and data collection." (McComas, 2011, p. 123). Furthermore, in practice, science is characterised as follows:

> Scientists follow hunches, clues and questions obtained from observations, earlier claims, reading etc. They explore how to generate relevant information. They consider possible sources of error. They engage others in interpreting evidence. Results usually lead to more questions. Ideas are refined. Some change, some are abandoned (Wivagg & Allchin, 2002, p. 646).

Science is not following 'the' scientific method, a multistep formula that scientists use every time they try to solve a problem, one that guarantees discovery and unambiguous and reliable conclusions, which seems to transcend science classes and texts (McComas, 2011). While science research publications appear to follow 'the' scientific method, they are reconstructed accounts of the work and written to fit the standardised requirements for publication, rather than describe how research is conducted in practice. What it means to undertake science and the values of science, are downplayed.

While there are large differences between and within different disciplines of science in regard to the approaches taken to research (Matthews, 2012), the disciplines of science are "united in their commitment to rapid communication of findings, open and unfettered criticism, and willingness to change position in the light of good evidence and argument to the contrary." (Hodson & Wong, 2017, p. 9). Science education should be promoting the various processes used in science and the multiple ways of collecting evidence, whether this be via direct or indirect means, experimental, correlational, observational and so on, and creating arguments to support inferences and highlighting the creative and imaginative thinking that one must have to do science. Hodson and Wong (2017) urge teachers to create opportunities for students to experience and understand that there are major differences relating to the kind of research questions asked and the methods employed to investigate these questions.

The way psychology works is much more than undergoing experiments and understanding the type of evidence sought, the data collection techniques and technologies used, the way data are analysed, the type of arguments created to justify conclusions, and the standards by which investigations and conclusions are evaluated. Furthermore, there are dangers promoting 'the' scientific method over the psychology concept in question, as Pérez-Álvarez (2018) argues: "With the scientific method, a certain psychological complex in psychology might be spoken of, in which the fear of not being seen as science leads it to fixation with method as if that were something in itself." (p. 32). Similarly, many other psychologists, such as Lilienfeld, Sauvigné, Lynn, Cautin, Latzman, & Waldman (2015), argue that term 'scientific method' is inaccurate and misleading and should be avoided in psychology.

In summary, teachers' views of science are likely to influence their views of science practices. While the debate over distinguishing characteristics and values of science continues, "we can no longer, however, wait to teach the nature of science until we have the "perfect" list" (Scharmann & Smith, 2001, p. 693). The consensus 'list' creators warn that these lists must not be seen as definitive or absolute or be treated as a checklist to rote learn (Lederman, 2007; Osborne et al., 2003), but others consider them problematic regarding their interpretation for use in F-12 science education (Hodson & Wong, 2017; Matthews, 2012). Rather than indoctrinating students into a particular stance of NOS, Matthews (2012) moves to features of science, enabling items in the consensus list to be elaborated, refined, and discussed within the context of the content studied at the point of time, not simply learned and assessed. Such an approach also embraces values of science (Allchin, 1999) and science practices, and is the stance taken here for views of psychology appropriate for secondary school psychology. In this thesis, psychology teachers' views on and ways of teaching the special characteristics, values and assumptions that science knowledge is based on and developed is likely to influence their views on using the psychological science framework as a support for their teaching, shifting the emphasis from teaching 'facts and skills' to 'how we know' and 'why we believe'. In what ways do their views represent broad and contemporary views of science and influence their teaching? In turn, this study has the potential to open up conversations around what is appropriate for F-12 psychology education, including commonalities and points of difference within and between psychological sciences and other science disciplines. These conversations could seed follow up research and influence policy, teachers and their teaching practice and student learning. They could also open up discussions about the emphases within curricula and the ways different curriculum emphases prioritise different views of science and why different teachers using the same curriculum may teach with different emphases depending on their vision of science for school education.

2.4 Shifting emphases: Visions for psychology and science education.

This thesis focuses on teachers of psychology teaching with a curriculum that endorses psychology as a science. This section briefly introduces the notions of psychological literacy and scientific literacy with reference to curriculum emphases and what this could mean for teaching psychology. Teachers' views of contemporary psychology are likely to influence the ways they teach. It opens up the notion of supporting teachers to shift their curriculum emphasis for teaching psychology, ideas that are discussed in detail in Chapter 3.

Psychological literacy.

Psychological literacy is a common goal in psychology education, seen as an umbrella term to describe the attributes or capabilities of psychology graduate (Cranney & Dunn, 2011). Psychological literate citizens have the ability to use their psychological literacy to apply to personal, social and vocational lives and society in ethically, beneficial and socially responsible ways (Cranney & Dunn, 2011), thus distinguishing between psychological literacy and psychological literate citizens in terms of the later as being capable to apply their understandings. Belar (2011) argues that psychologically literate citizens are important to aim for in psychology education because:

> "skills in critical thinking, communication, information and technological literacy and scientific reasoning promoted in psychology are essential to an educated citizenry and useful in many careers other than psychology. So is an understanding of psychology's topics that are fundamental to everyday life, such as discrimination, emotions and behaviour change in areas as diverse as health habits, safety and environmental protection"(p. 52).

An education that aims for psychological literacy offers personal relevance and encourages students to learn apply their psychological understandings to cope and prosper in today's society. Such a goal aims to a range of psychological skills, knowledge, values, insight and social responsibility and be able to apply these learnings to make informed decisions in everyday life and potentially has ongoing benefits for society (Hulme, 2014). With so many students studying psychology at secondary school, such a goal should have a profound effect on psychological literate citizenry. While student learning of these multi-faceted capabilities that contribute to psychological literacy is beyond the narrow scope of this thesis, it should be the focus of research in the future.

Curriculum emphases in science curricula.

Psychology education can offer a unique contribution to helping students thrive now and in the future because of the content it studies. Psychology also shares a common science base with other sciences. Roberts (1982) developed the concept of curriculum emphases to understand and distinguish between different educational goals that are characterised in school science education. Curriculum emphases relate to the context that is to be learned about science and the reasons for learning it rather than the content to be learned (Roberts, 1982). Curriculum emphases are “a coherent set of messages about science (rather than within science). Such messages constitute objectives which go beyond learning the facts, principles, laws and theories of the subject matter itself – objectives which provide answers to the student question: Why am I learning this?” (Roberts, 1982, p. 245). Reasons for learning science can be explicit or implicit by the context, and a curriculum is likely to have a variety of emphases though some may be more dominant that others.

Different curriculum emphases prioritise different views of science and the learner, teacher and society (refer to Table 2.6) and the same intended curriculum can be implemented in different ways by different teachers (Roberts, 1988). Seven different curriculum emphases were initially identified via analysis of curriculum documents and textbooks mainly in the US, Canada and England: everyday coping; structure of science; science, technology and decisions; scientific skill development; offering correct explanations; self as explainer, and solid foundation (Roberts, 1982). Several other emphases have since been identified, for example, science argumentation, context-based science, socio-scientific issues (Fensham, 2011). Curriculum emphases cannot always be distinguished from each other but rather combined in certain curricula and often change (Roberts, 1988) and teachers could teach a number of curriculum emphases in a science subject. They are objects of choice for curriculum policy makers and teachers. Roberts (1982) argues that when one of these emphases becomes the criteria for selecting content to learn, different curricula results. As science content changes to reflect different emphases, so should teaching pedagogy and assessment, although these changes do not always occur (Roberts, 1988). Too often, however, curriculum emphases are characteristic of traditional (default) science emphases, namely solid foundation and correct explanations, without much attention to the applications to students' real lives, by either the curriculum policy makers or the teachers themselves (Roberts, 1988). In a study regarding the goals of chemistry education in the Netherlands, for example, teachers supported all curricula emphases but there was large differences between the ways they prioritised each in their classrooms, largely depending on the future tertiary needs of their students (van Driel, Bulte & Verloop, 2008). In essence, teachers have the biggest influence on whether a curriculum emphasis is implemented into their teaching practice, not the intended curriculum (policy documents) and therefore have a major role in implementing new emphasis in the curriculum.

Table 2.6

Examples of four curriculum emphases, their relationship to scientific literacy visions (Roberts, 2011) and views of science, learner, teacher and society (Roberts, 1988)

Scientific literacy vision	Curriculum emphasis	View of Science	View of Learner	View of teacher	View of society
Vision I: inward looking	Structure of science	A conceptual system for explaining naturally occurring objects and events, which is cumulative and self-correcting.	One who needs an accurate understanding of how this powerful conceptual system works.	Comfortable analyses the subject matter as a conceptual system, understands it as such, and sees the viewpoint as important.	Society needs elite, philosophically informed scientists who really understand how that conceptual system works.
	Solid foundation	A vast and complex meaning system which takes many years to master.	An individual who wants and needs the whole of a science, eventually.	One who is responsible to winnow out the most capable potential scientists.	Society needs scientists.
Vision II: outward looking	Science, technology, decisions	An expression of the wish to control the environment and ourselves, intimately related to technology and increasingly related to very significant societal issues.	Needs to become an intelligent, willing decision maker who understands the scientific basis for technology, and the practical basis for defensible decisions.	One who develops both knowledge of and commitment to the complex interrelationships among science, technology and decisions.	Society needs to keep from destroying itself by developing in the general public (and the scientists as well) a sophisticated, operational view of the way decisions are made about science-based societal problems.
	Self as explainer	A conceptual system whose development is influenced by the ideas of the times, the conceptual principles used, and the personal intent to explain.	One who needs the intellectual freedom guided by knowing as many of the influences on scientific thought as possible.	Someone deeply committed to the concept of liberal education as exposing the grounds for what we know.	Society needs members who have had a liberal education – that is, who know where knowledge comes from.

Scientific literacies.

Like psychological literacy (Cranney & Dunn, 2011), scientific literacy is a common goal in science education in many countries across the world, and even though the term lacks clarity, it is likely to remain a common goal for some time to come (Dillon, 2009). Scientific literacy has many different definitions and often seen to embrace every objective in a school science curriculum, and therefore a mega-blend of curriculum emphases (Roberts, 2007) and should really be called 'scientific literacies' (Dillon, 2009). Similarly, with psychological literacy seen as an umbrella term to describe the attributes or capabilities of psychology graduate (Cranney & Dunn, 2011), a mega-blend of curriculum emphases is what appears to be happening with psychological literacy, with the term likely to encompass a variety of meanings for different stakeholders in secondary school education.

Roberts (2007; 2011) notes two types of visions for scientific literacy, each incorporating different curriculum emphases:

- Vision I, a more traditional approach, is inward looking, focusing on the products and processes and characteristics of the science enterprise itself.
- Vision II, a more progressive approach, is outward looking, concerned with situations that students are likely to encounter as citizens and the role of science in personal, local and global science-related situations.

The visions can be viewed as scientific literacy and scientific literate citizens and provides a synergy with psychological literacy and psychological literate citizens. The visions for scientific literacy, like the emphases, should not to be seen as more or less correct/ incorrect from each other. However, tensions exist between the two (Dillon, 2009) and often Vision II downplayed (Fensham, 1998). It may be written as an overall goal within a curriculum but not reflected in other parts of the curriculum, especially in regards to assessment (Aikenhead, Orpwood & Fensham, 2011). The alignment between intended curriculum, pedagogy and assessment do not match. The visions should provide choice for the curriculum policy makers (and teachers) and potential ways of understanding teachers ways of implementing their curriculum (refer to Table 2.6). That said, to take a Vision II stance, Roberts (2007) argues, will subsume Vision I. Scientifically literate citizens need to know some science (Vision I) and other types of understandings about science for making sense of the world we live in (Vision II). In this way, Vision II offers a wider scope of curriculum emphases for new innovations in schools as it connects Vision I with the 'real' world. Such innovations include impact of science and technology on everyday life, making informed personal decisions about science-related issues, evaluating media reports that involve science and critical thinking and communicating science to variety of different audiences, and more recently, science's role in STEM education programs. The relationship between science knowledge, the nature and values of science, and science-related issues in society are emphasised. These innovations represent moves to a humanistic science education (Aikenhead, 2011), including awareness of metacognitive, cultural, moral and ethical development of students to enable students to understand science-related issues.

An education that aims for psychological literacy citizenry would also be aiming for scientific literacy citizenry, with Vision II curriculum emphases. Teaching psychological concepts with science practices that informs these concepts demands a shift in emphasis from teaching 'facts and skills' to teaching 'how we know' and 'why we believe'. It supports a Vision II approach, recognising that psychology content and skills are required to get the bigger picture of the epistemic and social aspects that go with creating psychological knowledge. A core assumption taken in this thesis is that each science discipline, with its unique features, can work towards developing scientific literate citizens. Psychology education can offer unique and valuable contributions to developing psychological and scientific literacy to meet the demands of today's society.

Contemporary science education shifts the emphasis *from* teaching facts and skills *towards* interweaving concepts with science practices (how we came to know and develop this knowledge and why we believe we know it) (Duschl, 2008; NRC, 2011). The psychological science framework represents this shift, but is not designed to represent all curriculum emphases at all times nor to be taught with at all times nor be the complete solution to teaching for psychological literate citizens. The argument is that could be a potential vehicle to support teachers to facilitate student's psychological literacy in terms of understanding how psychology knowledge is developed and why this knowledge is valued in our society and connections to students' life and society. Furthermore, the psychological science framework has the potential to highlight common elements between science disciplines, rather than seeing each subject as siloed and content driven. In schools, this could mean psychology partnering with science and other key learning areas, recognising psychology's place in interdisciplinary and multidisciplinary teams, and therefore incorporating psychology into their school's curriculum.

2.5 Teacher and Students' Views of Psychology

While views of psychology applicable for secondary school psychology can be informed by the psychology profession and F-12 science education research, views of psychology from those teaching and learning psychology in secondary schools are central to understanding how psychology is portrayed in secondary settings. Despite psychology's popularity at secondary and tertiary levels around the world (Takooshian & Landi, 2011), there is relatively limited published information on people's perceptions of psychology, including secondary school teachers (Provost, Mellish, Cranney, & Martin, 2012) and university and secondary school students (Bennett, Brudenall, King, Palmer, Spicer-Wensley & Taylor 2007). This section first considers teachers' views of psychology, and given the limited research, extended to students' views of psychology.

2.5.1 Teachers' views of psychology.

Very few studies have considered teachers' views on the nature of psychology, including psychology's relationship with science. A couple of studies within the United Kingdom suggest a recent shift in the way teachers view psychology in terms of its scientific basis. Maras and Bradshaw (2007) surveyed 160 A-level psychology teachers and found that just 62 percent of teachers thought psychology is a science. Just three years later, however, Rowley and Dalgarno (2010) found 87% of the 109 A-level psychology teachers they surveyed agreed psychology is a science. This change coincided with the reclassification of A-Level psychology to science, suggesting the reclassification may have influenced teachers' views. Rowley and Dalgarno (2010) surveyed teachers about the nature of science in general, as well as how psychology compared to other sciences and asked them to explain why or why not psychology is a science. The survey also included seven Likert scale items related to Osborne, et al.'s (2003) nature of science characteristics (refer to Table 2.3). While there were only a small number of items, and these were general rather than contextual items, the findings offer an important starting point for discussing psychology teachers' views of science. Rowley and Dalgarno (2010) found that teachers may have different views about the nature of psychology and nature of science. Teachers viewed science as either '*truth-seeking*' with a fixed body of knowledge *or* science as a '*process*' with the emphasis on theory construction and revision based upon the systematic analysis of data. Teachers who did not believe or were unsure of the status of psychology as a science tended to view psychology as lacking in a number of areas including objectivity, precision of findings and a fixed body of knowledge. They stated that only some aspects are scientific or that there are problems with objectivity when studying humans. Teachers who viewed psychology as a science tended to view psychology as involving theory construction, hypothesis testing and quantitative scientific methods, or simply uses scientific methods without expanding on what this means. Interestingly, the teachers who viewed psychology as a science also thought psychology was not as scientific as chemistry, physics, biology and geology. While the survey was brief, it raised further questions about teachers' views on what makes a discipline scientific and suggests a need for further exploration of the relationship between teachers' views of nature of psychology and nature of science. Both psychology and science can have different meanings to different teachers and account for views of psychology and what it means for science as a discipline.

2.5.2 Students' views of psychology.

With the lack of research on secondary school psychology teachers' views, it is worth exploring secondary school students' views of psychology, although research in this area is also difficult to find. Some studies are limited to just asking if secondary school students view psychology as a science. Bennett et al. (2007) surveyed 775 senior school students in Western Australia just prior to the introduction of psychology as a curriculum subject. The survey included questions such as 'what is psychology?' and 'is psychology a science or humanities subject?' Very few students saw psychology as a science although females tended to acknowledge psychology as both a science and humanities where males did not. Most viewed psychology as counselling in relation to dealing with social problems and abnormalities. The survey did not extend to their views of science or humanities. Mercer, Sander, Williams, and Jones (2013) found similar findings when they conducted focus groups with 35 male A-level students to discuss how they view psychology. Psychology was perceived as a 'sort of' science by male secondary students mainly because they understood psychology content to have a diverse subject base that is related mainly to emotional topics and not relevant for males. In both studies, psychology was viewed by males as less or non-scientific and limited to exploring emotional and social relationships.

Some have argued that psychology is often viewed as restricted to the study of psychological disorder(s) at the individual level (Rees, 2013) and studies found a narrow understanding of the diversity of psychology, limited to 'helping' with mental and behavioural problems (Goedeke & Gibson, 2011; Rosenthal, McKnight, & Price, 2001). While they do not delve deeper into what 'helping' means, it appears that related psychological theory and research is not emphasised. Rosenthal et al. (2001) surveyed 63 US undergraduate students to find that many had mistaken ideas around the level of education needed to be a professional psychologist and the range of subject content, with 50 percent viewing psychology as a profession that helps and counsels people with mental problems. Goedeke and Gibson (2011) conducted focus groups with 19 New Zealand students at the beginning of their tertiary studies on their beliefs about psychology. They found "students appear to conceptualise the discipline with little reference to its scientific base. Instead the perception of psychology is closely related to its practical, clinical applications." (Goedeke & Gibson, 2011, p. 138). In these studies, psychology is narrowed to the role of clinical psychologist or counsellor in health settings, ignoring other applications and research and psychology's broad areas. The findings could also be supporting the common misunderstanding that psychology is merely 'common sense' and 'unscientific' rather than informed by science practices (Lilienfeld, 2012).These studies suggest a lack of appreciating the diversity of psychology and range of psychology-related careers and applications, and the underpinning of the development of knowledge that informs practice in clinical and other settings.

Rowley, Hartley, Betts & Robinson (2008) designed a survey to compare views about the nature of psychology and nature of biology. They surveyed 170 first year psychology undergraduate students within the very first week of tertiary study, therefore the responses are more likely to represent pre-tertiary education experiences. All participants had A-level Psychology qualifications, with 54 with A-level Biology and the remainder with no other science (e.g. biology, physics, chemistry) qualification. Participants read one of two brief descriptions of research, related to psychological or biological development at a time, and answered 10 Likert scale items based on epistemological dimensions suggested by Hofer and Pintrich (1997); Hofer (2000); and Estes, Chandler, Horvath, and Backus (2003): nature of knowledge (certainty of knowledge and complexity of knowledge), process of knowing (source of knowledge and justification of knowledge) and interpretability of knowledge. Participants were also asked open-ended questions, including ‘what makes something scientific?’ Like Rowley and Dalgarno (2010), Rowley et al. (2008) found different understandings of science, with psychology viewed as a science, but less so than biology. Students viewed biology as either more scientific than psychology (53%), or both as scientific (47%) while no-one viewed psychology as more scientific. When asked ‘what makes something scientific?’, answers were mostly classified around *the process* (eg science involving research, concepts of replication, fallibility, control), with some focussing on *the outcome* (discovering something unknown or providing proof), a few considering *the subject matter* (as in physics and chemistry) and some unable to answer. Furthermore, biology was viewed as more certain, less complex and less open to evaluation and interpretation than psychological research, especially by those who had completed A-level Biology. This gives a fascinating insight into how they view science and prompts further questions about what is viewed as “more” or “less” scientific and how the nature of science is taught in A-level Biology. For students whose only science was psychology, their ideas of what makes something scientific were more around *the research process*, with Rowley et al. (2008) concluding “psychology might offer fertile ground upon which to develop students’ understanding of issues relating to the nature of science” (p. 24).

A few studies within US have considered undergraduate views of psychology, with most using the Psychology as Science (PAS) scale (Friedrich, 1996). PAS was designed because of “concerns students were learning methodological and statistical principles, but little attention has been paid to assessing the degree to which students endorse the notion that psychology is, indeed, a science” (Friedrich, 1996, p. 6). PAS consists of 15 Likert scale items that are not based on a particular philosophy of science (no theoretical bases were identified). Friedrich (1996) surveyed 51 US junior and senior undergraduate psychology students and found that those students entering undergraduate psychology have relatively low PAS scores and this only increases slightly as they progress though their undergraduate course. More recently, Holmes and Beins (2009) surveyed 201 US undergraduate psychology students at different stages of course completion and found that students did not see psychology as a science, even those more progressed through their course. On the other hand, Amsel, Baird, and Ashley (2011) surveyed 438 US undergraduate psychology students and found that those who had completed more psychology units or planned to major in psychology tended to have a strong belief that psychology is a science. In a different study, (Amsel, Johnston, Alvarado, Kettering, Rankin, & Ward 2009) surveyed 227 introductory psychology students to complete the PAS scale twice, once in terms of what their professor may think and the other time in terms of what they think. Interestingly, they found that students rated higher PAS for the professor than themselves suggesting that while they know psychology is considered to be a science within the academic community, they do not necessarily believe this. Although students must complete research methods, and understand this area, Amsel et al. (2009) went further to question if students perceive the relevance of learning about research methods for psychology as a discipline.

In contrast, Australian undergraduate psychology students tend to view psychology as a science within their first few weeks of study (Wilson, Dennis, & Provost, 2007). A survey of 96 Australian tertiary psychology students across four year levels at the start of semester found that “most students are studying psychology because they are interested in its content, and in general they are favourably disposed to the view that it is a scientific discipline. The greater the student’s aspiration for study in psychology, the stronger this attitude.” (Wilson et al., 2007, p. 368). Provost, Martin, Peacock, Lipp, Bath, & Hannan (2011) surveyed 650 first year psychology tertiary students across three universities in Australia to capture their views on the nature of science (NOS) and psychology. The survey was broken into different sections, incorporating Friedrich’s (1996) PAS scale and a purposely created Science Knowledge and Attitudes scale (SKA) comprising of 16 Likert scale items. The SKA scale was inspired by aspects of Lederman et al’s (2002) characteristics of nature of science (NOS) (refer to Table 2.3) plus items on refutability, something they thought was central to psychology and overlooked in Lederman et al.’s (2002) work. The items used the term science rather than psychology, and identified three underlying factors in the SKA scale: naïve view of science (NVS), social and cultural perspective (SCP), and knowledge of refutability (KR). While PAS was not found to identify aspects of NOS, results indicated that students’ viewed psychology as a science. A further survey of 622 Tasmanian tertiary psychology students found that students understandings of the nature of science (NOS) did increase with years of study (Provost et al., 2011), with KR increasing and NVS decreasing with years of study.

Overall, the research suggests that secondary psychology teachers and students tend to perceive psychology as a science although there are different views about what makes a discipline scientific. These views could be linked to a person's secondary and tertiary background and the psychology curricula they teach or study. Further research on exploring teachers' views of psychology as a science and psychology's use of science practices was not located.

2.6 Possible Views of the Science Practices that Inform the Psychological Science Framework.

The psychological science framework at the centre of this thesis takes the view that the science practices work together to build psychological understandings:

> Science is an iterative process with the practices intricately tied together. The practices of *observations* (through direct and indirect means) and *patterns* recognised within observational data form the scientific evidence. *Explanations* (inferences) are made using this evidence in light of the model (representing the theory and system) and arguments are used to justify both explanations and applications. M*odels* play a functional role in representing theory, explanations and dynamic, interconnected and multilayered s*ystems* (Marangio, 2013, p. 62).

This research study centres on teachers' views of the psychological science framework as a support for their teaching of psychology, especially as starting points for F-12 school audiences to show how psychology utilises a range of science practices to construct its knowledge appropriately (Marangio, 2013). The psychological science framework only highlights a limited, albeit core, number of science practices, with other practices as equally important.

Since the framework aims to promote the teaching of psychology concepts with science practices, the teachers' views of the ways the science practices work together to inform psychological knowledge and the selected science practices within the framework is likely to be heavily influenced by their views of science and the ways science practices work together to build psychological understandings. These influences are stated with caution as reported views are likely to be heavily influenced by what is on their minds at the time of recall (Tversky & Kahneman, 1974; Wade, 2009). Furthermore, values, beliefs and attitudes are complex and people can hold multiple, even contradictory, views that make it difficult to use these views as predictors of behaviour (Wallace, Paulson, Lord, & Bond, 2005).

While teachers' views of psychology's use of science practices was not located in the education research literature, it is worth considering potential views for each selected science practice from the literature discussed in these first two chapters. Guided by the F-12 science education research literature, psychology teachers' and students' views discussed in this chapter, and work in my MEd thesis (Marangio, 2013), psychology teachers could hold a broad range of views of psychology as a science and the selected science practices in the framework. Two examples of possible contrasting views for each science practice can be proposed (refer to Table 2.7), generated from the F-12 science education research literature, including consensus views of nature of science (Lederman, 2007; Osborne et al., 2003), Matthew's (2012) features of science, Allchin's (1999) values of science, McComas' (1998) myths of science, NRC's (2011) practices, crosscutting concepts and core ideas. It is important to keep in mind Matthew's (2012) argument that views may change depending on the context or concept in mind and sophisticated arguments may be given to justify these viewpoints. It is also likely that teachers have a range of views in terms of the iterative nature of science practices within the framework. The examples just begin to tap into a range of possible viewpoints.

Table 2.7

Examples of contrasting views of the selected science practices within the psychological science framework

Science Practice	Examples of two possible views of each science practice
Systems	**Psychological systems interact with components within a system and other systems in ongoing and non-linear ways.** Systems are interconnected to other systems in our world. One psychological system does not work in isolation to another, they interact in dynamic and non-linear ways with components within the system and between other systems in both unique and patterned ways over time. Systems highlight the multiple factors that contribute to the richness, complexity and diversity of people. **Psychology consists of diverse and unrelated areas, with each operating in isolation to the others.** There are simple and linear relationships between components within psychology, suggesting one variable leads to the other, without acknowledging other possible influences. Different perspectives or areas in psychology do not overlap.
Models	**Psychological models represent theories and systems to describe and explain a phenomena or concept.** Psychology models are constructed to represent understandings and explanations and therefore make sense of the world, including the theory and systems they represent. Each model has its own set of assumptions, value and limitations. Some models may complement each other and allow some flexibility to move between them while others may conflict. Models are developed and revised according to current evidence and acceptance within the science community, highlighting how models can be durable but tentative over time. **Models are exact replicas of the phenomenon.** Models are viewed as exact replica, and seen as correct, factual, certain, objective, universal and unchanging. Theoretical models are seen as hunches or guesses, not developed in light of empirical evidence.
Explanations	**Psychological explanations are created using empirical evidence in light of a model, theory or system.** Psychological explanations involve using empirical evidence and models to create inferences about the psychological phenomenon or even in question. Scientific arguments are required to critique and justify explanations, including in light of alternative claims, and possible applications (generalisations and transferability of findings), open for peer review in psychology community and general public. Therefore, explanations are informed by a number of personal, societal and cultural values, and currently accepted understandings and methodologies. **Psychological evidence provides the facts.** Data is collected and interpreted without creative or subjective influence of the scientist. If there is enough data then it proves the right answer, the data becomes truth that is irrefutable, unchanging, objective, universal and atheoretical.
Patterns	**Patterns are recognised in observational data to form psychological evidence.** Patterns (trends, cycles, relationships between variables) are recognised in the observational data (from primary or secondary sources; qualitative and/or quantitative). Patterns may be universal, specific for the context or culture or uniquely individual. Deciding which systematic methods to employ to recognise and communicate patterns in data will differ according the research question, the type of data collected, currently accepted understandings, and personal values and expectations. Deciding which data counts is important and anomalies in data can spark further questions. **Data speaks for itself and therefore is not open to different interpretations.** Data is numbers only, limited to quantitative aspects, and all claims must be justified with statistical measures to be acceptable. All data must be treated equally. Anomalies in data are entirely due to mistakes from procedural or experimental error rather than possible influences from other variables.
Observations	**Intentional observations are made in psychology.** Observation is essential in science to collect and record data from a source, either via direct (ie own senses) or indirect (ie scientific instruments) means. Observation is more than merely describing surface features or events, it is a directed activity as to 'what to observe and how' in an ethical manner. There is a distinction between observation (what is observed) and inference (how it relates to the psychological (abstract) concept). There are many ways to intentionally observe and deciding what and how to observe depends on their research question, frame of reference (eg level(s) of analysis), currently accepted research methodologies and psychological understandings, and personal values, experiences, understandings and expectations. **Observations are objective truth.** Observations occur via experiments (the scientific method, a universal step by step objective process) to prove idea or theory is correct. The psychology phenomena must be directly observable and collected objectively with no subjective input from researcher or participant. Observe facts to prove theories are true.

The contrasting views in Table 2.7 could be the impetus to spark more interest and debate and further research into views of science practices across a range of science disciplines, not just limited to psychological sciences. The examples offer broad and contemporary views of science and could be used with teachers and students to open up important conversations on the ways the science practices work in psychology and other science disciplines. Such considerations could allow teachers and students to locate their current understandings and ways these may change between different contexts or concepts. The table could enable teachers, both psychology and other science teachers, to think more deeply about the ways science is portrayed in their school curricula, and what it could mean to teach psychology as a science.

2.7 Chapter Summary

This chapter began with considering contemporary psychology in light of changes in science over the last century, highlighting psychology as ever-changing and its place as a contemporary science today. Since the teachers at the centre of this study are teaching with a senior secondary psychology curriculum that is part of science, it is important to consider of what is could mean to teach psychology as a science. Furthermore, views of psychology appropriate for secondary school audience can be guided by the F-12 science education research literature, including consensus views of nature of science (Lederman, 2007; Osborne et al., 2003), Matthew's (2012) features of science and Allchin's (1999) values of science and McComas (1998) myths of science. The chapter then moves to secondary school teachers' and students' views of psychology, showing them as diverse and possibly linked to teacher's tertiary psychology background (includes or lacks psychology) and psychology's place in the curriculum (classified as a science or not). It finishes with a look at two possible contrasting views of the selected science practices within the framework, providing an impetus for further conversations and research into views of science and science practices and the ways these views may change depending on the related content or context. This chapter argued that this study on teachers' views of psychological science framework has the potential to create further interest and research into what it could mean to teach science practices not just within K-12 psychology education but within other science disciplines, and highlight the commonalities and differences between psychology and other disciplines. The next chapter takes these teachers' views further, as it considers psychology curricula and the psychology teachers who are teaching these curricula.

Chapter 3: Psychology Curricula and Teachers

3.1 Introduction

The literature review continues in this chapter, building on Chapter 2's exploration of nature of psychology today and F-12 science education, and secondary school psychology teachers and students. This chapter is divided into two sections: psychology curricula and the teachers who teach it. It first explores psychology's status (inclusion and place) in school curricula in various places in the world and potential implications for the implemented curriculum as a result. Psychology, if and when placed in a curriculum, tends to be marginalised to senior secondary curriculum, and may or may not be incorporated in science. It is not deemed part of a core subject, and therefore likely not to be given the privileges that other core subjects, such as science, mathematics and English, enjoy. This is the case in Victoria, the context of this study, despite psychology being viewed as a senior science subject. As evidenced in the literature, psychology has had problems establishing its place in the curricula, especially pre-senior school levels, and this could have flow on effects in terms of psychology teachers establishing themselves in the teaching profession. The chapter then considers psychology teachers' opportunities for professional growth throughout their career, finishing with a focus on Victorian psychology teachers and their opportunities for learning and networking as they develop as a specialist within the teaching profession. These opportunities are likely to influence teachers' views and ways of teaching, including their views on using a psychological science framework to support their teaching.

3.2 Psychology's Status in School Curricula

Psychology is found in an increasing number of school curricula around the world, especially senior school, and is increasing in popularity (Takooshian & Landi, 2011). This section provides an overview of psychology's status as a discipline subject within curricula, rather than implicitly incorporated into other subjects or programs across a school. Curriculum is explored in two ways: first it focuses on the intended curriculum (the curriculum policy documents) to consider the extent psychology is included as a discipline subject in curricula around the world. Then it considers the potential implications for the implemented curriculum (the way teachers create and teach their own psychology curriculum), recognising the integral role of the teacher. Discussions centre mostly on teachers who teach senior secondary students in Australia, United States (US), United Kingdom (UK) (particularly England) and Europe, where the research literature tends to be located, ending with a focus on Victoria, Australia since this thesis explores Victorian psychology teachers' views.

3.2.1 Inclusion of psychology in curricula.

Psychology is taught in schools in many countries but is still to be accepted in others (Takooshian & Landi, 2011). The overall intended curriculum, including the curriculum of a specific discipline and integrated disciplines, expresses the purposes and aims for education within the specific country or jurisdiction (authority) for which it is intended although the values that underpin it are often not explicitly articulated (Walker, Soltis & Schoonmaker, 2009). Curriculum systems differ across each jurisdiction in countries across the world, reflecting different purposes based on numerous factors such as societal needs, culture, values and traditions within the particular context (Pinar, 2004; Walker, Soltis &

Schoonmaker, 2009). A number of different stakeholders exert a variety of pressures into what should be included in a curriculum and why this inclusion is important, and therefore curriculum changes reflect the shifting power and influence amongst various stakeholders (Fensham, 2009). Creating and establishing room for a new discipline or new material in a curriculum is extremely difficult and initiating and sustaining change in a curriculum should be viewed as a continuous and long-term process. Generally something already well established needs to be compromised to make way for new curriculum material, such as some material omitted, reduced or combined. Given the highly contested nature of curriculum (Pinar, 2004), psychology has done remarkably well to establish itself in curricula in so many places in the world, even though this tends to be limited to senior school.

To gauge an idea about the extent psychology was included into the intended curriculum, a search of curriculum policy documents, reports and research literature in a range of countries across the world was undertaken. Identifying, understanding and comparing curricula however, is very difficult. Curriculum may be partly or entirely overseen by an external authority, from authorities that give less guidance so teachers can create their own school curriculum, to those “top-down” curriculum authorities that control what is to be taught, and others somewhere in between (Walker, Soltis & Schoonmaker, 2009). The curriculum policy documents are typically written in the country’s official language, may not be accessible on the internet (Karandashev, 2009), have different aims and values and require an understanding of the local needs and socio-cultural context to appreciate their meaning (Brady & Kennedy, 2010).

Curricula around the world that includes Psychology.

Psychology is taught in many locations around the world and is very popular in international schools, including International Baccalaureate Psychology (International Baccalaureate Organisation, 2017; 2018) and Advanced Placement Psychology (National Center for Education Statistics, 2013). Psychology, as a senior school subject, ranges from being well-established in some countries (for example England and United States) to ones that are relatively new (for example, India, New Zealand and Scotland) or ones that are yet to be incorporated (for example, Ireland) or yet to be considered as part of the curriculum (for example, China and South Africa). In some places, psychology is not a subject in its own right, such as being incorporated in a social studies subject in Czech Republic and Slovakia. Across Europe, the inclusion of psychology tends to be limited to senior school, although some jurisdictions or schools do incorporate it as a subject at the younger levels (Williamson, Coombs, Schrempf, & Sokolová, 2010). Many places do not offer psychology. In some places, psychology is embedded within a therapeutic school, for example Malysia and some African nations. Apart from the odd exception and international schools, psychology is generally not taught as a discipline subject in schools in many African, Asian, South American and Middle Eastern countries. It was difficult to identify if psychology is explicitly (or implicitly) included as part of interdisciplinary or multidisciplinary subjects in other curricula, as an elective or compulsory subject, and/or part of a vocational, personal development, wellbeing or mental health program.

Psychology's place in Key Learning Areas (departments).

Most school curricula systems classify subjects into different key learning areas (KLAs) or departments. Scientific psychology is more likely to be established in western societies such as Australia, New Zealand, United Kingdom and United States, showing how cultural context impacts on curricula and some places do not consider psychology a science. The curricula located promoted the science base of psychology (psychology draws its understandings from scientific research), although the extent it does so could not be determined, and psychology's classification into a KLA varied. Interestingly, curricula tend to classify Psychology into different key learning areas (KLAs), including as Science (for example, Victoria, Australia), Social Sciences (Ontario, Canada), Individuals and Societies (International Baccalaureate) or Arts and Humanities (India). Other times it was difficult to identify where psychology is placed in the curricula, by itself (own KLA) or with other subjects. Some curricula, such as New Zealand, place psychology with social science but acknowledge that it can be studied as a science or social science subject. These differences show that the classification of psychology is not straight forward, with strong links to a number of key learning areas (KLAs), such as science, social sciences, and health. As such, psychology has been described as "having an 'identity crisis'; not fitting comfortably into either the pure sciences or the humanities but falling somewhere in-between." (Rees, 2013, p. 4). As discussed in previous chapter, psychology's historical roots are from different beginnings (for example, philosophy, medicine, anthropology, sociology, biology), and while psychology encompasses behaviour, experience and mental processes (Glassman & Hadad, 2009), the nature of psychology is still contested (Ardila, 2007; Trapp et al., 2011). It is possible for psychology to sit in a range of different KLAs, creating some confusion for policy holders about its place, and likely to be one of the reasons why psychology is marginalised to senior secondary, if taught at all, in curricula.

Psychology's 'identity crisis'

Psychology's 'identity crisis' could open up rich discussions about how both psychology and science is viewed by curriculum policy makers and the purposes of the specific curriculum in which it is placed. These intersections between science and humanities are important to explore, including ways psychology fits (and doesn't fit) with science and humanities. This intersection could open opportunities to explore the possible benefits for incorporating psychology into the curriculum, one that can draw on the beneficial features of learning both humanities and science, such as perspective taking and scientific reasoning. The demands of most curricula and school systems to place subjects into key learning areas creates issues for psychology and could explain why psychology is marginalised to senior secondary levels, if included at all. The department, if any, psychology is placed in the curriculum could also play a role in how the subject is conceptualised in schools.

Exploring how and why psychology is, or is not, seen as a science and the implications for psychology's 'identity crisis' within education and public arenas therefore becomes important. In what ways do these mixed views support psychology education aims for psychological literacy? To what extent is psychology being included or likely to be included in STEM education and other interdisciplinary and multidisciplinary programs? Further investigation is needed to compare psychology curricula, including the extent and ways each endorses contemporary psychology with a science base, and the ways each justifies psychology's place in the curriculum.

The intended curriculum has a significant impact on the work of teachers and learning experiences of students (Ryder, 2015), and policy decisions such as the classification of psychology into a specific KLA can have flow on effects for the implemented curriculum and the teachers. A psychology curriculum classified as a science or humanities is likely to send different messages (intended and unintended) to school communities and the public.

The thesis focuses on psychology teachers as they are the ones who shape and define the curriculum based on what they think and believe, and what they do in their classroom ultimately shapes the kinds of learning their students experience (Hargreaves, 1994). The teachers in this study are implementing a curriculum that has been embedded within science for an extended period of time (since 1991). The links between teachers' understanding of intended curriculum and their implemented curriculum is deemed worthy of study. The psychological science framework, with its contemporary science base, takes a systems approach (Bronfrenbrenner, 2001), offering a way to embrace psychology as a natural, personal and social science, and in doing so, may support the challenges associated with psychology's 'identity crisis'.

3.2.2 Implications due to the psychology's status in the school curriculum.

Psychology in the US, UK and Australia offer interesting comparisons in terms of including psychology in the curriculum and implications for the teachers and their teaching. Each country is considered in turn, ending with a closer look at Victorian psychology curriculum. As a guide, curricula referred to in this section is listed in the Table 3.1.

Table 3.1

Selected curricula in US, UK and Australia

Curriculum	Description
International Baccalaureate (IB) Psychology	Year 11 & 12 Psychology Headquarters in Geneva, Switzerland Taught widely in international schools across the world, including US, UK and Australia
Advanced Placement (AP) Psychology	Year 12 Psychology Taught throughout US, and many international US schools across the world
The Australian Curriculum • F-10 • 11-12 • F-12	Curricula to *inform* Australian states & territories Foundation (4-5 years old) to Year 10 curriculum Senior Years (Year 11 & 12) curriculum The F-10 and F-12 curricula
The Victorian AusVELS Curriculum • F-10	Victoria, Australia Foundation (4-5 years old) to Year 10 curriculum Incorporates the Australian curriculum
The Victorian Certificate of Education (VCE) Psychology Study Design	Victoria, Australia Year 11 & 12 Psychology
A-Level Psychology	England, Wales, Northern Ireland, some international schools Year 11 & 12 Psychology
Scottish Highers Psychology	Scotland Year 11 & 12 Psychology
High School Psychology	United States Year 12 Psychology

United States.

In the US, the National Standards of High School Psychology (APA, 2011) acknowledge that psychology can be classified as social studies or science, although typically placed within social studies departments. While possible, it was difficult to identify US schools that label psychology as psychological science or place psychology within science departments. It is interesting to note that there is currently a trend in the US, and likely elsewhere, for tertiary psychology departments to change their names from ‘psychology’ to ‘psychological science’ as a strategy to convey psychology as a science, highlight its contemporary nature and support interdisciplinary science partnerships (Collisson & Rusbasan, 2018). Interestingly, most but not all academics support this change, with some arguing that a simple name was not seen to be the best way to counteract misunderstandings about psychology as a science or could intimidate science-adverse students (Collisson & Rusbasan, 2018). The name change arguments highlight the range of views regarding contemporary nature of psychology but are likely to fuel psychology's 'identity crisis' within school curricula. At the same time, there is a current push to raise psychology's status as a science in school curricula (Foley, 2018).

A number of reports have questioned the content within school curricula (Griggs, Jackson & Meyer, 1989; Hakala, 1999; Ragland, 1992; Weaver, 2014). The primary concern is around the focus on personal problems (understanding themselves and their life circumstances) rather than accurately reflecting the nature of psychology, including its science base and current status (Hakala, 1999). In many (34) US states, teachers are part of the social science department and have credentials to teach social sciences. However, these credentials have a 'meagre', if any, presence of psychology in the social studies preparation (pedagogy/ teaching method) curricula, and so many teachers do not have a psychology tertiary background and lack education specifically targeted to teach psychology (Weaver, 2014). Such teachers are said to be teaching 'out-of-field' when they are required to teach a subject they have not studied or specialised (Vale & Drake, 2019). Consequently, psychology teachers' readiness to teach psychology has been questioned, and there is a push to establish stronger psychology teaching credentials in the US (APA, 2011).

United Kingdom.

Different curricula jurisdictions exist within each UK country. A-levels are completed in England, Northern Ireland and Wales (and some international schools across the world), while Scottish Qualifications Certificate (SQC) Highers are studied in Scotland. In A-level Psychology, the inclusion of psychology as a science subject in schools met mixed reviews (BPS, 2013). Much praise was given for this reclassification from social sciences to science because "an A-level in psychology, with its basis in scientific approaches, should help to make a more critical and inquiring populace, and this is what we should be striving for" (Conway & Banister, 2007, p. 608). However, there appears to be some resistance by science teachers to include psychology, with psychology teachers discussing "whether this was the best position for the subject given the strength of the traditional sciences and the reluctance to include psychology in combined science curricula." (BPS, 2013, p. 15). Also, there is some concern that aligning psychology with the other sciences will make psychology 'artificially difficult' and ultimately reduce its popularity at all levels within the curriculum (BPS, 2013). That said, A-level Psychology has been criticised for its emphasis on knowledge and content rather than skills (Smith, 2010).

More recent developments to A-levels has meant that science investigation is no longer core to all science subjects. There is now a separate science practicals certificate that can be issued if this component is on offer at the school and successfully completed. In the past, depending on the provider, most A-level courses include science investigations as a curriculum assessment requirement, but this varied. Teachers viewed the lack of a science investigation as an assessment requirement in psychology by some providers (the only science not to have this requirement at this time) as a personal criticism of their teaching and the psychology discipline (Kitching & Hulme, 2013). They perceived these providers as viewing science investigations in psychology being of less value than other sciences and a lack of trust to teach science investigations. Psychology academics argue that not including a science investigation undermines the central role of scientific research in psychology (Hirschler & Banyard, 2003; Hulme & De Wilde, 2014), overlooking the importance of students experiencing what it is like to think and behave like a psychologist to develop new knowledge and why this knowledge is valued.

Findings from two surveys commissioned by BPS (2013), a survey of 434 teachers and a survey of 870 A-level Psychology students, offer further insights. Teachers mostly agreed that the A-level Psychology was contemporary and interesting for students, although mixed views were found concerning the inclusion of applied psychology (25.1 percent liked) and links to everyday life (20.9%). Teachers mostly agreed that curricula should provide opportunities for practical work and experience a range of research methods in practical work, although only 18.2 percent feeling that the curriculum encourages the development of an understand of scientific method and evaluative and analytical skills. Teachers generally thought the topics were not covered in sufficient depth nor should their students know how to use statistical tests. This is interesting as the results seem to suggest that teachers recognise the value in knowing how psychology develops its knowledge and carrying out research investigations although care needs to be taken not to delve too far into carrying out statistical tests.

Students tended to praise psychology in light of their other subjects as being more interesting (78.1 percent) and more relevant (71.1 percent) and the majority stated that it is the experience they were expecting (71.8 percent). Mixed views were found in terms of A-level Psychology being more difficult (49.8 per cent) and required more work (61.6 per cent) than their other subjects. Interestingly, Banyard and Duffy (2014) relate these findings in terms of dispelling myths that the subject is a soft science and messages about psychology and the scientific content within the course are filtering through the community, stating that the survey “indicates that students have made an informed choice about psychology and not chosen it because they believe it to be easy.” (p.118). While Banyard and Duffy (2014) express concerns about balance of historical psychology over contemporary psychology, they equally celebrate the high regard for psychology in the UK. They conclude with the following important message that is likely to strike a chord with psychology educators around the world:

> The message from psychology to policy makers is that the student representation of psychology in the UK is of a subject that is interesting, engaging, challenging and relevant. It is the personal science that contributes to the community beyond the restraints of school curricula and assessment. It is core curriculum (Banyard & Duffy, 2014, p. 119).

Australia.

Psychology is not included in the Australian curriculum. The Australian curriculum is developed by Australian Curriculum, Assessment and Reporting Association (ACARA) and overseen by the federal government. All states and territories ultimately decide how to implement the Australian curriculum, especially around assessment. Curriculum authorities in some states and territories, such as Victoria (Victorian Curriculum and Assessment Authority [VCAA]), have made considerable changes and therefore reflects different traditions, expectations, values and pressures from stakeholders that impact on curricula (Corrigan & Marangio, 2018).

In 2019, all Australian states and territories, except New South Wales, will teach senior school psychology. In places, such as Tasmania and Victoria, psychology is well established having been part of school curricula for decades. For instance, in Victoria Psychology was a Group 2 Year 12 subject (not accredited towards High School Certificate (HSC) tertiary entrance score) before becoming part of VCE in 1992. In other places, psychology has been part of school curricula for some time or is rapidly gaining traction, with Queensland the latest to introduce psychology in 2019. The senior psychology curricula vary between state and territory jurisdictions with different content, structure and nomenclature (Skouteris et al., 2008). Each curriculum views psychology as a scientific enterprise although they are not in sync as to where psychology sits within the curricula. Psychology is placed in Science KLA in Queensland, South Australia, Victoria and Western Australia, as a Behavioural Science in ACT and Humanities and Social Science in Tasmania (refer to Figure 3.1). Psychology's inclusion is quite an achievement given the complexities of different curriculum systems and indicates that the overwhelming majority of jurisdictions in Australia value psychology.

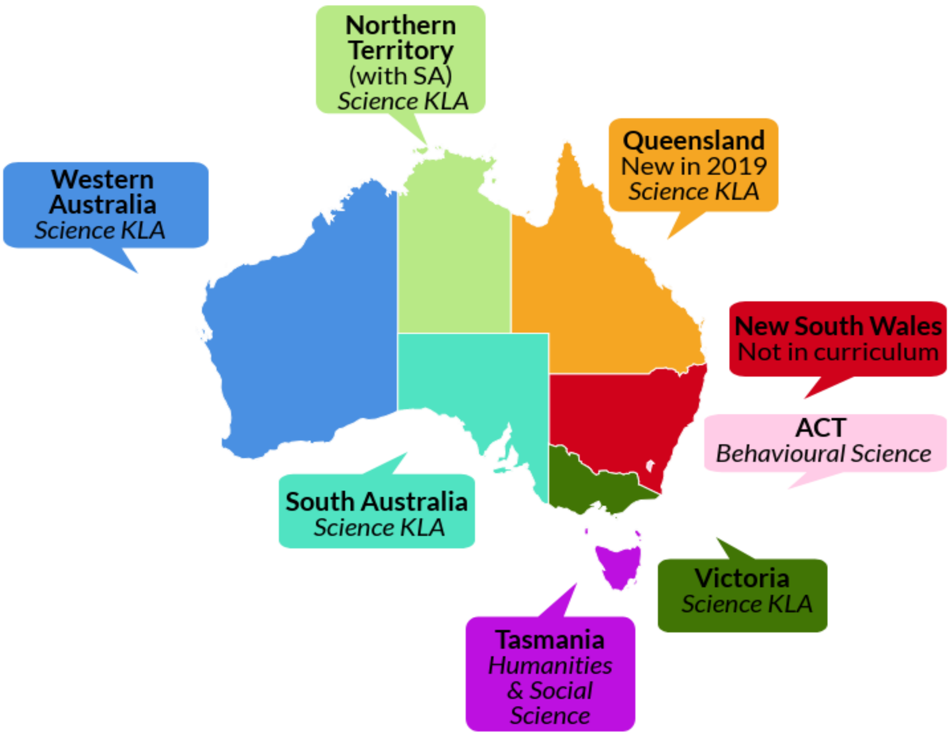

Figure 3.1. Teaching of senior secondary Psychology in Australia.

Psychology has not been considered for the Australian F-12 Curriculum, devised by the federal government, at this point in time. Many secondary and tertiary psychology educators advocate for psychology's inclusion in secondary schools. If psychology is accepted into the Australian Curriculum, there is a strong call for psychology's science base to be central, as "national standards for high school psychology curricula in Australia should strongly emphasise scientific methodology in the formative years of psychology training." (Skouteris et al., 2008, p. 22). This science emphasis is in line with Hakala's (1999) argument for US Psychology curriculum to reflect the nature of psychology, including its science base, no matter whether it is taught by teachers in science or social studies departments. Australian teachers may need support to represent psychology as a science within such a curriculum. A survey of 53 secondary school psychology teachers from Tasmania and Victoria (14 with VCE experience), found that the focus was largely (but not exclusively) on personal development and mental health issues but not the knowledge of the science base of the discipline (Provost et al., 2012). There are differences between the Tasmanian and Victorian curriculum, including psychology's place within key learning area (HASS and Science respectively) and so it is not clear the extent this finding relates to Victorian teachers. Provost et al. (2012) hope that psychology will eventually be incorporated as part of the Australian Curriculum, with science at the core of the psychology curriculum, although they see this inclusion as requiring considerable development of resources and support for teachers.

Towards inclusion of psychology in the Australian curriculum.

Given psychology's current status across Australia, if psychology is incorporated into the Australian curriculum, it is most likely to enter as a senior school science study. For psychology to be positioned within F-10 science is more problematic. Navigating curricula that forces disciplines into discrete key learning areas, as already discussed, and then further divides the KLAs (such as science) into discrete science disciplines presents a number of challenges. As discussed earlier, strong arguments to negotiate a place in the science curriculum will be needed, in building a case for emerging areas of psychological science and its potential place in STEM education.

The current science curriculum takes a traditional approach, separating science knowledge into biological sciences, chemical sciences, earth and space sciences and physical sciences (ACARA, 2015), in line with most science curricula around the world (Schleicher, 2018). This tradition makes it difficult to find room for emerging sciences, such as psychology, that work at the boundaries and intersect with other disciplines. Building a case for psychology's inclusion may mean emerging areas, such as neuropsychology, cognitive psychology and cultural psychology, need to negotiate places (combine) with other disciplines of science, to show how psychology contributes to new science knowledge and possible solutions to science-related issues.

More recently, the Australian governments' vision for curricula has extended to preparing students for multifaceted STEM careers, positioning STEM education as central to innovation and development of local and global economies (Office of the Chief Scientist, 2014, 2016). Providing STEM education, however, creates a complex set of challenges for schools within the constraints of a traditional curriculum and school system, especially in secondary schools (Rennie, Venville, & Wallace, 2012). STEM education, as an interdisciplinary and/or multidisciplinary program rather than teaching of individual STEM disciplines in isolation, requires collaboration between staff and negotiating ways to accommodate STEM - what goes into the curriculum and what is dropped? Some of these challenges are logistical and financial, as schools tend to revolve around a tight timetable, dependent on staffing and room allocation and resources, and navigating a STEM education program often requires thinking beyond the traditional timetable. Equally, schools are grappling with what and how a STEM Education program may look like within their school. Questions such as how do they go beyond teaching isolated STEM subjects in schools towards creating a STEM education program? How to build staff capacity to teach STEM? How to embrace STEM while maintaining the value of individual disciplines?

Arguments for psychology's inclusion into the F-10 curriculum could be built around STEM education, with psychology researchers often working in multidisciplinary teams to navigate real world issues (Proctor & Vu, 2019). As ways to address these new challenges for incorporating STEM education into schools are explored, there could be new opportunities for psychology to find its place in school curricula. Psychology needs to enter these discussions or risk failing to be embedded within the Australian, state and territory school curricula.

Contemporary science practices are already incorporated into the Australian curriculum and this inclusion offers compelling arguments for psychology to identify with science and support students learning of these science practices. The psychological science framework is based on a common science base and therefore the framework offers opportunities to open up discussions such as reasons why psychology is a science and psychology's value and contribution to understanding mental processes and behaviours of learners in classrooms today. The framework could play a role in connecting psychology with other science and non-science disciplines, highlighting potential contributions to personal, societal and global issues, and building a case for psychology's inclusion in the Australian curriculum.

3.3 The Victorian Curriculum and Implementing the Psychological Science Framework

This section gives a brief overview of the intended curriculum (curriculum documents) that teachers of psychology are working with in Victorian schools. It describes the basic structure of the senior secondary Psychology curriculum and the F-10 AusVELS Science curriculum (VCAA, 2015a) before looking at the use of psychological science framework at the centre of this thesis.

3.3.1 VCE Psychology Study Design.

At the time of data collection for this research study, Victorian teachers of psychology were working with the Victorian Certificate of Education (VCE) Psychology Study Design 2013-2016, published by Victorian Curriculum and Assessment Authority (VCAA) (2012). The VCE Psychology Study Design 2013-2016 (VCAA, 2012) outlines the rationale, aims and skills of the Victorian senior school psychology course and offers advice to teachers. Teachers are expected to teach three sections together:

- Key skills
- Key knowledge
- Research methodologies and ethical principles

The study is divided into four units of work, each a semester in length and designed to be taught to senior years in secondary school (Year 11 and 12 but not unusual for Year 10 students to enter Unit 1 and 2 and Year 11 students to study Unit 3 and 4). Each unit of work includes Key knowledge. At the beginning of each unit, there is an outline of research methodologies and ethical principles to cover within this unit. The teacher is directed towards the type of assessment task (summative assessment) to be used for each outcome, often with some choice. External assessment, in the form of an end of year exam, makes up part of the Unit 3 and 4 units of work (60 percent). While the study is designed to be completed in order from unit 1 to 4, there are no prerequisites into unit 1, 2 or 3.

A new VCE Psychology Study Design 2016-2021 (VCAA, 2015b) was to be implemented in the year following data collection for this thesis. Again this study design relies on teachers to connect sections together, in this case:

- Key knowledge
- Key science skills.

Both current and the future study designs are part of a high stakes curriculum, with a strong emphasis on experimental research investigations and a final Unit 3 and 4 external examination. The Victorian Psychology Study Design has a narrow view of science and only implicit links to contemporary science practices (Marangio, 2013) and therefore what this means for teaching this curriculum becomes important. With the 2013-2016 study design (VCAA, 2012), there are implicit connections with the science practices, and therefore possible connections with the psychological science framework (Marangio, 2013), as discussed in Chapter 1. Science practices are incorporated in the framework to emphasize that developing science conceptual knowledge requires not only skill but also knowledge that is specific to each practice (NRC, 2011) within the relevant science discipline context. The psychological science framework has the potential to connect the different sections of the curriculum together: Key knowledge, Key skills, and Research methodologies and ethical principles.

VCE Psychology is part of a high-stakes curriculum, with the external examination performance having the greatest weighting on a student's final study score (grade) for psychology. Schools are increasingly accountable and scrutinised, for example via publication of VCE rankings and top student results within each VCE study, and therefore teachers are under pressure to improve their students' academic grades. Student data, specifically examination data, and the nature of (such as specific content knowledge, integration between key knowledge and research methodologies, and relevance to life) and cognitive demands of the examination questions are likely to be used to inform their teaching. High stakes environments typically narrow the curriculum to meeting the assessment demands on students and, as a consequence, fragment content knowledge into isolated bits and increase teacher-centred pedagogies (Au, 2009). With science practices only implicit in the VCE Psychology Study Designs and not explicitly written into the external examination and internal assessment (Marangio, 2013), teachers may not have the knowledge and experience nor see the value of using the psychological science framework to support their teaching. The science emphases within the VCE Psychology Study Design, including assessment, and the teachers' views are likely to impact on ways the curriculum is taught (Roberts, 2007), as discussed earlier. Teachers are unlikely to change their practice if it requires significant change from their current knowledge, beliefs and experiences (van Driel, Beijaard, & Verloop, 2001). Additionally, as seen in higher education, teachers may view new ways of teaching as risky and therefore are more likely to stick with safe teaching practices (risk aversion) than innovate in their teaching practices (Hulme & Winstone, 2017).The demands that surround high stakes environment such as VCE curriculum are likely to have an effect with the ways the psychological science framework is implemented, at least in the first instances without student assessment data. A decision not to use the framework may reflect a risk management approach rather than pedagogical frailty. Further research in the context of VCE Psychology is needed to explore a number of areas including the nature and cognitive demands of the examination questions, the messages it sends (intended and unintended) about psychology (such as how psychology develops its knowledge and why this knowledge is valued), how teachers use student assessment data to shape their teaching and student learning as a consequence of using the framework.

3.3.2 Victorian AusVELS and Australian Science F-10 curricula.

The Victorian AusVELS Science F-10 curriculum (VCAA, 2015a) incorporates the Australian Science F-10 curriculum (ACARA, 2015). The curriculum presents a vision of science education that reflects learning key science concepts with how scientific knowledge develops. It is structured around the following three inter-related strands, designed for teachers to interweave and teach together:

- Science Understanding (SU): consists of the science knowledge, divided into traditional science areas of biological sciences, chemical sciences, earth and space sciences and physical sciences.
- Science as a Human Endeavour (SHE): considers the nature and development of science and the use and influence of science, including responses to personal, societal and global issues. This is extended to the important role of science in contemporary decision-making and problem-solving and possible science career pathways.
- Science Inquiry Skills (SIS): focuses on the science inquiry skills such as posing questions, planning, conducting and critiquing science investigations, evaluating claims made with evidence and communicating findings.

The SU strand consist of propositional statements to highlight key conceptual ideas within each traditional science area. The SHE and SIS strands are welcome new initiatives to the curriculum (Atweh & Singh, 2011) but are a significant change to science curriculum. The reforms can be seen to represent the goals of scientific literacy and humanising the science curriculum (Goodrum, Hackling, & Rennie, 2001; Goodrum & Rennie, 2007; Tytler, 2007), to effectivity prepare students to participate in the workforce and capable of being active participants in a democratic society (ACARA, 2015). The goals of developing scientifically literate citizens focus on "helping students to understand more about science and it's processes, recognise its place in our culture and society, and to be able to use science to make informed decisions in their daily lives" (Goodrum & Rennie, 2007, p. 3). Scientifically literate citizens are "interested in and understand the world around them, engage in the discourses of and about science, are sceptical and questioning of claims made by others about scientific matters, are able to identify questions, investigate, and draw evidence-based conclusions, and make informed decisions about the environment and their own health and wellbeing" (Goodrum, Hackling, & Rennie, 2001, p. 15). Roberts (2007) views the Australian Curriculum in similar ways, supporting visions of knowing some science and knowing other types of understanding about science within society, as "typically reflect elements of both Vision I and Vision II, just because they are broad, idealized, multi-purpose, and intended to be enabling and facilitating" (p. 770). These goals for science education are in synchronicity with those broader goals of the Australian Curriculum. They represent a shift towards the often coined '21 century skills' that encourage students to apply knowledge creatively and ethically and work collaboratively to their own solutions, with thinking and reasoning skills more important than heavy memorising of content (OECD, 2014). While a shift in thinking across the boundaries of disciplines that is currently advocated in education reform (Schleicher, 2018), maintaining the traditional science areas within Science Understanding does not encourage such a shift. The science curriculum lists unifying ideas, including the science practices found in the psychological science framework, which could offer a way to teach science in an integrated way. However, teachers may not be aware of these unifying ideas or understand how to integrate the science practices into their teaching. Similarly, implementing SHE will likely to be difficult, with science teachers unlikely to have experienced SHE in their own science education (Aubusson, 2011).

Psychology is not explicitly mentioned in Victorian AusVELS (VCAA, 2015a), although implicit links to psychology within some SU strand and throughout SHE and SIS strands, and the selected science practices are embedded within these curriculum documents. If a teacher wishes to incorporate psychology pre-VCE level in light of the Victorian AusVELS, they can navigate the curriculum and find these connections, something that requires an understanding of how psychology knowledge relates to the SHE and SIS strands. The psychological science framework has the potential to connect the different strands of the curriculum together but will depend on the ways teachers understand these strands and the science practices. Since other science teachers have had difficulty understanding these strands (Lowe & Appleton, 2015), it is unlikely that psychology teachers will be able to make these connections without support. Teachers may also not fully understand the science practices, as part of new curriculum reform, and integrating Key knowledge with science practices may be difficult as they may not understand ways this integration could look like in their classes. They may read the documents through the lens of different curriculum emphases that what is intended (Roberts, 2007) or see the innovation ideas as too much of a risk to implement, and therefore take the safe option, as explained through the concept of pedagogical frailty (Hulme & Winstone, 2017). Implementing the intended curriculum, therefore, is likely to look different between teachers and schools irrespective of whether or not they use the framework as a support for their teaching.

3.3.3 Implementing the curriculum in reference to teaching with the psychological science framework concepts with science practices.

The psychological science framework (Table 1.1) was designed within the Victorian context to represent psychological science with the inclusion of contemporary science practices, as discussed in chapter 1. The framework places an emphasis on interweaving psychology concepts (content knowledge) *with* the science practices to open up opportunities to work towards a better understanding of the psychological conceptual knowledge <u>and</u> how science knowledge is constructed and valued. The framework was originally inspired by Duschl (2008), NRC (2007), Bronfenbrenner (2001) and Duschl et al. (2011) and used to map the curriculum documents in terms of learning psychology concepts with science practices over the units and year levels (Marangio, 2013). The focus of this thesis shifts to the teachers and their views for using the psychological science framework as a broad and flexible support for their teaching of psychology. This section draws together the ideas from the previous two chapters and those around curriculum in this chapter.

While there are many science practices (NRC, 2011), too many to incorporate into the framework, the selected science practices in the framework refer to knowing how, why and ways within the disciplinary context to carry out intentional *observations*, recognise *patterns* in data, construct and justify *explanations*, develop and use *models* to represent understandings and consider the interactions within and between *systems*. The science practices work together to inform psychological knowledge in iterative ways, and each science practice presents a number of challenges, such as those detailed below.

Science practices are deliberately used in the framework to avoid confusion with science skills or science inquiry. In terms of skills, understanding and engaging in science practices requires knowledge and competencies that are specific to each practice (NRC, 2011) within the relevant science discipline content area and context (Matthews, 2012), which is much more than a fixed skill set. These competencies are highly complex, and while cognitively demanding (Koeppen, Hartig, Klieme, & Leutner, 2008), they also require affective and motivational dispositions to cope with the challenges with undertaking research (Wessels, Rueß, Jenßen, Gess, & Deicke, 2018). For school education, learning about and undertaking science practices within the content area is more than performing generic science skills.

In terms of inquiry in science classrooms, inquiry may refer to teaching that prioritises science practices but can also be used much more generally as a pedagogical approach and either way is often poorly communicated or understood by teachers (Osborne, 2014). For instance, teaching may focus on replicating a series of step-by-step instructions for research investigation or only on performance of skills for successful experimentation (knowing how). Consequently, the analysis and interpretation of the data and an understanding the roles of science practices in developing science understandings (knowing that and knowing why) are omitted, leaving the impression that science investigations typically work and the anticipated outcomes are usually achieved (Driver, Leach, Millar, & Scott, 1996). Overlooked are the challenges and struggles in science that make the construction of science knowledge problematic and difficult to attain (Duschl & Bybee, 2014).

Duschl (2008) advocates the shifting of emphasis of science education from ‘what we know’ to ‘how we know’ and ‘why we believe’, and therefore shifting the focus from rote learning content and skills in isolation. Science curriculum has been criticized for emphasising large amounts of factual information and low level thinking skills (President's Council of Advisors on Science and Technology (PCAST), 2010) and presenting content and skill separately (Pruitt, 2014). Science teaching is often teacher-centred (Pimentel & McNeill, 2013), textbook directed and focussed on content acquisition (Alozie, Moje, & Krajcik, 2010), with too many topics and little depth (Pruitt, 2014). Too often, textbooks and curriculum identify ‘what we know’ and ‘general processes of science’ without meaningful connections to relevant contexts or development of conceptual knowledge and how science builds and refines theories, models and explanations. Consequently, teachers focus on teaching the content and often missing are pedagogical conversations focussed on ‘how we know, what we know and why we believe’ (Duschl, 2008). It is these rich pedagogical conversations that using the framework may support.

Interweaving concepts with science practices in science classes is designed to promote more realistic perspectives about *how* science works while learning the concepts and science practices, and ideally involves meaning-making from collaborative investigation of scientific questions, rather than to mimic the work of scientists (NRC, 2011). Such an approach in science classrooms highlights the important role of the teacher to support student learning. Studying or engaging in science practices involves developing epistemic, cognitive and social practices as students (1) develop and evaluate scientific evidence, explanations and knowledge, and (2) critique and communicate scientific ideas and information; and thereby opens up opportunities to be explicit about how science works within the given context and promote scientific literacy (Duschl & Grandy, 2013). Rather than indoctrinating students into a particular stance of NOS, Matthews (2012) advocates the use of activities in the classroom to develop a deeper interest in science by exploring appropriate questions that empower them to think more critically about the features of science. The science practices could be elaborated, refined, and discussed to consider the features of science within the context of the psychology concepts studied at the point of time they are considered in the psychology classroom.

There are a variety of approaches to placing science practices at the centre of teaching science. Allchin, Anderson, and Nielsen (2014) consider teaching nature and values of science in the following ways: engaging in science practices in the classroom (as Duschl and Grandy (2013) advocate), the of contemporary cases, and studying historical cases. Each approach has great merit but also presents a different set of challenges and using a mix of approaches is likely to give a richer learning experience (Allchin et al., 2014). The values of science (Allchin, 1999) could also be explicitly discussed, promoting the ways scientists establish creditability for their claims that they advance, and notions of reliable knowledge (Allchin, 2011). Teaching that prioritises science practices supports students to develop and apply knowledge in new and unique situations (Krajcik, Codere, Dahsah, Bayer, & Mun, 2014), therefore building competencies useful for students now and into the future. Conceptualising such approaches relies on the teacher to carefully plan for teaching within the specific context so that students can see how what they are learning applies to the ways science works, something that can be quite challenging (Allchin et al., 2014). This is likely to be the case for psychology teachers and whichever approach they use (carrying out science practices in class or using contemporary or historical cases) to highlight the science practices, teachers are going to have to plan carefully.

Rich learning opportunities occur in classrooms in which teachers connect science content and science practices (Lehrer & Schauble, 2010) but focussing on teaching that integrates content with science practices represents substantial challenges for teachers (Bybee, 2011). A teacher's knowledge about the concepts and science practices is necessary but not enough for teaching. Integrating concepts with science practices requires a set of knowledge, abilities, beliefs, and ways of teaching that primary teachers may not possess (Biggers, Forbes, & Zangori, 2013), and likely the case for secondary psychology teachers. Many science teachers may not know how to use science practices in their classrooms or how science practices are tied directly to content (Pruitt, 2014), or feel confident to teach science (Biggers et al., 2013), and teachers tend not to be good at scaffolding their students into the practices of science (Hmelo-Silver, Duncan, & Chinn, 2007). This is likely to be the case for psychology teachers too. For teaching with the psychological science framework, explicit knowledge of the science practices and ways they work together to inform psychological conceptual knowledge will be necessary but not enough knowledge for teaching. Teachers are likely to need support to make these shifts in focus in their teaching.

For psychology teachers, emphasising the teaching of psychology concepts together *with* the science practices aims to shift the teaching from 'rote- learning heavy content' to learning 'how we know what we know' and 'why we believe'. The ways psychology teachers experienced learning psychology and science, either at secondary or tertiary level, are likely to influence the ways they teach psychology as a science. Likewise, the ways they have learnt to teach psychology, both in initial teacher education and ongoing in their professional career, could influence the ways they teach psychology as a science. To what extent are they given opportunities to explore what teaching psychology as a science may look like? It is hoped that teaching with the psychological science framework will spark discussion on the ways psychology connects with contemporary science and opens up possibilities for the curriculum to connect isolated strands together and progress within and across units and year levels. However, the framework is likely to represent new ideas for psychology teachers, and using the framework to support their teaching could be quite challenging.

3.5 Psychology Teachers as Specialists

In striving for quality education, in line with research-led reforms, teachers require conditions for them to continue to grow and develop as professional learners and leaders throughout their careers (Schleicher, 2018). There are a number of issues faced by the profession of psychology teachers as evident in the literature so far, including a variety of views of psychology and science, psychology establishing a place in the curriculum (absent or marginalised to senior secondary), and lack of research into psychology curriculum (intended by policy, implemented by teachers and realised by students). Therefore, opportunities to develop as a specialist are especially important for psychology teachers.

Teachers need to continually develop their professional practices, knowledge and competencies required to guide their teaching and meet the expectations and diverse needs of learners today (Guerriero & Révai, 2017). These learning opportunities should include those related specifically to teaching and learning psychology. Learning psychology content often begins in tertiary education, developing as a professional teacher typically in initial teacher education and then continues throughout a teacher’s career. As professionals, teachers need to be viewed as active agents in their own learning (Hoban, 2002) and ideally be open to teacher change (Loughran, 2012). Teachers are more likely to want change, Loughran (2012) explains, when they perceive a need to change, and in turn, their cognitive dissonance facilitates motivation and openness to change, and are more likely to change their teaching practice if given the opportunity and support. Ideally, teachers need to actively seek and be given opportunities to draw on and continue to develop their expertise for teaching within their given teaching context to create quality learning experiences for their students. In this way, professional learning enables teachers to reflect and respond to their students learning needs, interests, issues and concerns within the contexts or systems (class, school, community, curriculum and so on) in which they teach.

Psychology education varies around the world, at both secondary and tertiary education, as does teacher education, both initial teacher education (ITE) and in-service teacher education, and so does the curriculum, school and student context in where psychology is taught. Therefore, the ways psychology is taught internationally will vary too. The remainder of this chapter focusses on the current learning opportunities for psychology teachers, in terms of teaching and learning psychology, in specific places in the world throughout their career, finishing with a focus on Victorian psychology teachers. These opportunities are likely to influence teachers' views and ways of teaching psychology as a science and their views of a psychological science framework to support their teaching.

3.5.1 Psychology teachers' tertiary psychology background.

Psychology teachers are enthusiastic about teaching psychology, a role they enjoy, and likely to be a factor in explaining why psychology is so popular in schools (BPS, 2013; Keith et al., 2013; Provost et al., 2012; Rowley & Dalgarno, 2010). Despite this praise, the suitability of secondary school psychology teachers background in studying the discipline has been called into question, both in Australia (Cranney et al., 2008; Provost et al., 2012; Skouteris et al., 2008) and other countries (European Federation of Psychology Teachers Associations (EFPTA), 2009; Griggs et al., 1989; Rowley & Dalgarno, 2010; Weaver, 2014). As discussed in previous chapters, teachers' lack of tertiary psychology (teaching 'out-of-field') may contribute to issues with the ways teachers may view psychology as a science and promote the science base of psychology within the psychology curriculum.

'Out-of-field' teaching refers to the teaching of a subject they have not studied or specialised (Vale & Drake, 2019) and can be defined in different ways (Ingersoll, 1998), including:

- teaching at a level of schooling for which a teacher is not formally qualified (such as teaching psychology at senior secondary level, but qualified to teach up to Year 8), and/or
- not having completed a minor sequence of discipline study (ie second year sequence in undergraduate tertiary degree), a major sequence of discipline study (ie third year undergraduate degree), or
- not having completed the discipline (pedagogy) method in initial teacher education (ITE). Prerequisites into a method usually require at least a minor sequence of study in the discipline.

In this study, 'in-field' teaching of psychology is defined as having successfully completed a minor sequence of psychology, as many teachers did have the opportunity to study psychology method in ITE. Teachers who have completed ITE generally have at least two teaching methods. They are usually employed as teachers first and their work includes the teaching of psychology. 'Out-of-field' teaching, while not ideal, is not unusual for all sorts of reasons, such as staffing shortages, schools need to fill a teachers' load, new school subjects that often reflect changes in education (such as STEM education programs, and moves to more interdisciplinary programs which are currently occurring in schools) and teacher requests to teach an ‘out-of-field’ subject and is open to new teaching opportunities (Marginson, Tytler, Freeman, & Roberts, 2013). ‘Out-of-field’ teaching is not equivalent to poor quality teaching, as teachers can assume the professional identity of a teacher of their ‘out-of-field’ subject, especially with support from the multiple systems in which the teachers work (Vale & Drake, 2019). When psychology is only taught at senior secondary level and there is only a limited number of classes, staffing issues may result and ‘out-of-field’ teaching is more likely to occur. This section begins with a brief look at teachers’ tertiary background and possible flow on effects for curriculum implementation.

United States.

Given a rise in popularity in the 1990s, it has been a concern for some time that US teachers without a psychology disciplinary background are teaching psychology (Weaver, 2014). As discussed earlier, many of these ‘out-of-field’ teachers have credentials to teach social sciences, where psychology is typically located, but these credentials have a ‘meagre’, if any, presence of psychology in the social sciences education (pedagogy/ teaching method) curriculum. There have been calls to establish a psychology teaching credential (APA, 2011) and new programs are being developed in the US.

United Kingdom.

Similarly, in the UK (mainly England and Wales where A-level Psychology is mostly taught) teachers’ psychology disciplinary background has been questioned, with many teachers deemed teaching ‘out-of-field’. A survey of 160 A-level psychology teachers found that only 47 percent had qualifications in psychology (Maras & Bradshaw, 2007). A later survey of 70 A-level psychology teachers found 61 percent with a psychology tertiary background (Rowley & Dalgarno, 2010). Those without a psychology background, came mainly from sociology, social science, biology or zoology academic backgrounds. As psychology has become more popular, other subjects in schools have declined and these teachers could have shifted into the teaching of psychology as a result (Rowley & Dalgarno, 2010). Similarly, a larger survey of 434 teachers found 60.1 percent has completed an undergraduate degree in psychology (BPS, 2013). Implementing a new subject into the curriculum, such as psychology, can have impact on teachers of other subjects and who teaches psychology, whether or not they have a psychology background.

Australia.

A similar shift was seen in the 1990s in Victoria, Australia, with the phenomenal increase in popularity of psychology in the early 1990s when it was introduced as a VCE Science study. A survey of 53 Tasmanian and Victorian psychology teachers found that teachers came from a diverse range of backgrounds, ranging from some highly qualified in psychology to others which were difficult to determine (for example, Bachelor of Arts or Science degrees) and those with very limited, if any, formal tertiary qualifications, including four stating ‘life experiences’ qualified them to teach psychology (Provost et al., 2012). The diverse backgrounds of teachers is not surprising, given tertiary psychology in Australia can be studied via courses situated in situated in Faculties of Arts, Heath, Science and Social Science. The number of ‘out-of-field’ teachers is a bit surprising since psychology has been taught for a long time (since at least the 1980s) in both states, and this study aims to update the status of Victorian psychology teachers. It is difficult to locate information about psychology teachers in other Australian states and territories. Senior secondary psychology has been very popular in Victoria since the early 90s when it became a VCE science study, making it more than likely that psychology teachers today have learnt psychology before they started teaching, while Tasmania is popular but not to the same extent and remained as a Humanities and Social Science study. Western Australia introduced psychology in 2008, and South Australia in the early 2000s, with Northern Territory following SA, and Queensland starting in 2019, all part of science key learning areas as discussed earlier. Creating conditions for for psychology teachers' ongoing growth then turns to learning about psychology pedagogy in initial teacher education (ITE) and beyond, creating conditions for teachers to explore their own attitudes, beliefs and values concerning the teaching of psychology in secondary schools, and developing their identity as a professional teacher of psychology and their identity within the science teacher profession.

3.5.2 Psychology as a teaching method in initial teacher education (ITE).

The ways teachers teach is strongly influenced by their knowledge and skills, attitudes and values about teaching and learning and classroom experiences (Shulman, 1987). With psychology not embedded as a core subject in school curricula, it may not be feasible for initial teacher education (ITE) programs to offer psychology as a teaching method. Most ITEs insist on two methods, often from core subjects within the curriculum, and this means students with psychology qualifications may not have the prerequisites to study to teach in secondary schools. In many places in UK, preservice (student) teachers are not given the option to study psychology method (EFPTA, 2010; Kitching & Hulme, 2013) and in the past A-level psychology teachers were also not satisfied with the limited, if any, psychology education method units available to them (Maras & Bradshaw, 2007). In the US, initial teacher education (ITE) offers little, if any, education specifically targeted to teaching and learning psychology (Weaver, 2014).

The story is very similar within most states and territories in Australia, with little, if any, psychology education method units in ITE programs until the last 10 years. However, ITE seems to have taken a different track within Victoria, Australia. In Victoria, psychology education method (pedagogy) units were introduced in mid to late 1990s, making it more likely that current psychology teachers are qualified with both tertiary psychology (a pre-requisite for psychology education method) and psychology method backgrounds. It is unclear how the structure of psychology methods units compares across different universities, including their underpinning philosophy and research literature and ways they promote the teaching of psychology as a science. ITEs in Australia, leading in Victoria, and starting to offer primary-secondary teacher education programs, and this offers those potential teachers who only qualify for one secondary method (psychology) to enter the profession and teach across primary and secondary sectors. Teacher growth, however, should not stop at ITE but continue throughout their careers.

To value psychology teachers' professional knowledge and teaching practice, they need to be a central part of latest developments in education. As professionals, psychology teachers should actively seek and be presented opportunities for professional growth. Opportunities for professional growth, including specifically targeted professional teaching and learning psychology experiences, should continue through a teacher of psychology's career, whether or not they have a tertiary psychology background or ITE psychology education method.

3.5.3 Professional development opportunities.

Professional development opportunities are particularly important for psychology teachers, especially given that psychology is not universally acknowledged in curriculum globally and across Australian states and territories. Professional development can be in various forms, such as a conference, and is often linked to a new policy initiative or curriculum change where teachers need to be brought up to date with the associated changes. Over the last 10 years, there has been a recognition of need for psychology-specific professional development opportunities in some parts of the world, and these opportunities are starting to materialise.

United States, United Kingdom and Europe.

Professional development opportunities, specifically targeting teaching of psychology in schools, are likely to come from professional teacher education associations. In places such as the UK (particularly England) and US, secondary school psychology teachers are embraced by their respective psychological association, the British Psychology Society (BPS) (BPS, 2013; Kitching & Hulme, 2013) and American Psychological Association (APA) (Keith et al., 2013; Weaver, 2014). In recognition that psychology teachers are unlikely to join as full members of their respective psychological association, they are encouraged to join teacher affiliated groups for low cost and ease. Teachers are able to use and contribute to the building of professional resources, developing curriculum, engaging in research and professional development opportunities and working with tertiary educators and researchers. The APA affiliated group, Teachers of Psychology in Secondary Schools (TOPSS), now enjoys a vast membership from USA and across the world, and worked with teachers to develop *Guidelines for preparing high school psychology teachers* (APA, 2013) and *National standards for high school psychology curricula* (APA, 2011). BPS is following a similar pattern, offering much support for teachers (Kitching & Hulme, 2013). The European Federation of Psychology Teachers Associations (EFPTA), as part of European Federation Psychologists' Associations

(EFPA), are in initial stage of promoting membership to secondary school teachers and developing conferences and resources for European psychology teachers (EFPTA, 2009). Plus, other psychology teacher associations exist, such as The Association for the Teaching of Psychology (ATP) in the UK, a voluntary body run by psychology teachers for psychology teachers, and recently formed European Society for Psychology Learning and Teaching (ESPLAT) for secondary and tertiary educators.

Australia.

The Australian Psychological Society (APS) has created an interest (affiliate) group for teachers of psychology (Psychology Education), and while the focus so far has been on undergraduate teaching, membership is open to secondary psychology teachers (APS, 2015). Interaction between teachers and members of APS, including the tertiary teachers has been minor to date but there is motivation to increase interactions. While teachers report feeling well connected to each other, they feel isolated from the academic and professional community (Provost et al., 2012). In turn, they do not feel a sense of belongingness to the discipline of psychology, however, but are open to the idea:

> University educators do not currently play an important role in the provision of information and support to high school teachers of psychology, but this input is likely to be well received and has the potential to act as a valuable conduit for the portrayal of scientific psychology to the community (Provost et al., 2012, p. 30).

In Australia, a specific ‘teaching of psychology in schools’ association has yet to be established and limited professional development opportunities exist. Science Teachers of Victoria (STAV) used to hold a popular annual conference for psychology teachers but with the cessation of this conference, the advocacy from the association now has limited reach with psychology teachers. Australian Science Teachers Association (ASTA) has not included psychology yet, and neither have those associations related to humanities and social studies (such as Social Education Victoria, SEV) and health education (such as The Australian Council for Health, Physical Education and Recreation, ACHPER). Provost et al.'s (2012) survey of 54 Psychology teachers found that the majority of teachers seek advice and information from other teachers. Advice from curriculum authorities and the internet and conferences were the next most common source of information (Provost et al., 2012). There is a very popular annual conference for psychology teachers in Victorian, run by a private for-profit organisation, Carter Downs Education Services (CDES), running workshops by teachers and for teachers, and marks the major event for psychology teachers during the year. Curriculum authorities (e.g. Victorian Curriculum Assessment Authority (VCAA)) run workshops, usually within the CDES conference, to support the implementation of a new study design or give external examination feedback. Other formal opportunities to engage with current psychology knowledge and research as well as research into teaching and learning psychology are limited.

It is encouraging that professional development opportunities are increasing for Victorian psychology teachers, and these can offer starting points for teacher networking and teacher change. Teacher change as a result of attending professional development should not be assumed. Professional development can often be considered a top-down approach, Loughran (2012) warns, something that is ‘done’ to teachers so that they can implement the new changes in their classrooms. Top-down approaches, however, are often unsuccessful because they fail to work with teachers existing attitudes, beliefs, knowledge and ways of teaching (van Driel et al., 2001), including short one-shot workshops that seldom help teachers integrate the ideas into their teaching practice (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2009). Without high quality support and resources, teachers often do not see the need or understand how to change, or end up shifting their understandings of the reform to align with their current teaching rather than the other way around.

3.5.4 Professional learning opportunities.

Professional learning works in a different way to professional development, "moving beyond doing activities that work and purposefully developing knowledge of why those activities work is the type of learning about practice that can't be mandated by others." (Loughran, 2012, p. 201). It often starts with the teachers having some commitment to change, something that may be driven or developed or refined by teachers. In this way, it is more of a bottom up approach, and work is with and/or by teachers and likely to be deeply personal as they shape and direct their learning. Teachers are viewed as active agents, central to teacher change (Hoban, 2002), and are in the expert position to make decisions on how change might be best implemented in their own context and practice (Loughran, 2012). Multiple strategies are required to support teacher learning, especially strategies according to the teachers' context, with emphases on

a. teachers' initial knowledge, beliefs and concerns,
b. opportunities for teachers to experiment in their own practice,
c. collegial co-operation or exchange among teachers, and
d. sufficient time (Crawford, Capps, van Driel, Lederman, Lederman, Luft, Wong, Tan, Lim, Loughran & Smith, 2014).

These strategies highlight the importance of support from the school systems to allow their teachers to work together to articulate their professional knowledge of teaching and learning and enhance the quality of the learning experiences they create for their students.

Similary, Hulme and Winstone (2017) present a model of pedagogic frailty to understand when higher education teachers are more likely to stick with safe teaching practices (risk aversion) rather than innovate their teaching practices. Innovation is less likely when the focus is limited to what and when to teach the material rather than exploring the underlying values of the approach or the connections between what to teach and how to teach it are not explicit and further tensions and external locus of control to implement change.

Opportunities for psychology teachers to engage in formal professional learning include mentoring, coaching, teacher action research and professional learning communities (PLCs). PLCs allow teachers to work collaboratively in teams but this work must be intensive and ongoing and works best when there is a high level of trust, support and encouragement between teachers (Darling-Hammond, 2005). Within effective PLC, teachers share expertise and leadership, have shared values and vision and critically reflect about their teaching practice as they learn from and with each other about and for their teaching practice. Outside sources may be sought to stimulate ideas, knowledge and different perspectives. The work in such a community is often anchored around the teachers in a school although they could exist between psychology teachers in schools or between schools, which becomes more important when a teacher is the only psychology teacher in a school.

Formal opportunities to critically reflect on teaching can offer a way forward for teacher growth and identity, and therefore their career pathways. Loughran (2006) argues that teacher learning is a social process as:

> "mentoring is about creating ways of building critical conversations so that the actions that follow may lead to concrete learning outcomes whereby the valuing of experimentation, risk-taking and learning through experience might foster the notion that learning about teaching is a community affair" (p. 170).

Potentially these opportunities support teachers to be less risk averse, especially if discussions are digging deeper into exploring the underlying values of a teaching strategy or approach (Hulme & Winstone, 2017).

Discussions about teaching and learning psychology, whether formal or informal, promote professional learning opportunities (Loughran, 2006). Informal networks of teachers exist within different pockets of the world, some that arise from the formal professional groups listed earlier, and offer opportunities to learn from and with each other and construct shared meanings as what it means to teach psychology. In Victoria, psychology teachers have played a leading role in creating a very popular subject, and while this happened without adjusting the professional learning opportunities for the new psychology teachers, teachers have created informal professional networks to share ideas and support each other (Provost et al., 2012). Besides these important informal networks, formal professional learning opportunities between teachers from different schools specifically focussing on the teaching of psychology are difficult to locate in the research literature. While they are likely to occur, the extent they exist in other areas is unclear.

3.5.5 Psychology teachers as curriculum leaders.

Psychology teachers, like all teachers, need opportunities to engage with the rationale behind intended curriculum, including curriculum reform, throughout their career. But above all, classroom teachers are central to curriculum leadership as it is their professional judgement that facilitates the interaction between the intended and the implemented curriculum, and ultimately influence their student's learning. While such opportunities have been discussed, further attention is given in this section to psychology teachers as curriculum leaders, particularly since the psychological science framework at the centre of this thesis draws on a contemporary science frame within F-12 science education and connects with science curriculum reform in Australia. Furthermore, using the psychological science framework as a support for teaching of psychology is likely to be difficult for teachers if they are not up-to-date with the current science curriculum reform or the framework is not in line with their existing attitudes, beliefs, knowledge and ways of teaching.

For most secondary school teachers, the culture within their key learning area plays a significant role in the way teachers plan their work and interact with students (Donnelly, 2000; Simon, Campbell, Johnson, & Stylianidou, 2011; Siskin, 1994). A number of factors interconnect to make each key learning area unique, including the specialist backgrounds and expertise of the individual teachers and the teachers themselves. Schools may set up PLCs within each KLA that aim to provide ongoing opportunities for collaborative and transformative learning and authentic collegiality (Darling-Hammond, 2005). Psychology's place in the schools KLA is likely to influence the opportunities to partake in collaborative work regarding curriculum. The ways psychology teachers embrace their work in a KLA, and the ways they are embraced within a school's KLA are important, including the ways they perceive professional growth and actively seek opportunities to support their professional practice and career pathways.

Implementing a new curriculum or new reform is not straight forward. Teachers can interpret the same curriculum quite differently from each other and the curriculum authority (jurisdiction) due to their individual and collective experiences, knowledge and values

(Clandinin & Connelly, 1992). As curriculum changes to reflect new and different curriculum emphases, so should teaching pedagogy and assessment (Roberts, 1988), although these changes do not always occur. In most cases of curriculum reform, teachers require ongoing support (Fensham, 2016) and successful implementation, in line with the curriculum intentions, is not likely if the reform conflicts or requires significant change from teachers' knowledge, beliefs and experiences (van Driel et al., 2001). The development of curriculum materials to support teacher learning, including possible ways to implement the intended curriculum with rationale behind these suggested ways, is helpful for teachers but unlikely to be sufficient when these types of materials are different to their current work (Davis & Krajcik, 2005) and do not fit their knowledge, experiences and beliefs (van Driel et al., 2001). Furthermore, the ways teachers understand these materials is influenced by their ability to critically reflect on their own teaching and to relate this to the intentions behind the materials (Korthagen, Loughran, & Russell, 2006). For instance, there were some problematic issues for science teachers as they implemented the new Australian curriculum in Queensland (Lowe & Appleton, 2015). Despite having a two year lead up to the new Australian science curriculum, teachers did not have the time to read and comprehend the curriculum materials and reflect on what the curriculum intentions may look like in their own classroom. Lowe and Appleton (2015) recommend extending the implementation period to encourage more opportunities for both professional development and professional learning by providing each school with a science educator to support and mentor teachers. In this way, the teachers will get opportunities to grow as a professional within their own school context, and these opportunities should be extended to psychology teachers to establish themselves as curriculum leaders in schools. Leadership includes opportunities to share their expertise and support and learn from and with other teachers.

Leadership includes opportunities to share their expertise and support and learn from and with other teachers with the KLA and beyond. Career pathways can extend in multiple directions both within and outside school contexts, such as working with pre-service teachers, curriculum authorities, professional associations and so on.

Psychology teachers at risk of being isolated or isolating themselves.

At the moment, psychology teachers may be at risk from being isolated or isolating themselves from such learning opportunities, especially if they do not identify with their key learning area or professional learning team, or are not accepted or included within such a team, or are the only psychology teacher at the school. Given the issues with establishing psychology in the curriculum, including the pre-senior years, the curriculum authorities, schools (teachers and school leaders) and psychology teachers themselves have a role in supporting and encouraging psychology teachers to be part of new initiatives and critically reflect on their teaching.

Professional learning opportunities should extend to learning about new initiatives within the overall curriculum and science curriculum in places such as Victoria where psychology is classified within the Science KLA. The extent psychology teachers are included in PLCs within key learning areas, such as Science in Victoria, or other education programs is not clear. They are likely to work closely with other psychology teachers, but what happens when there is only one psychology teacher at a school, or the teachers other teaching method is not aligned to the key learning area in which psychology is placed, and/or the teacher does not align themselves within psychology’s respective key learning area, and/or other teachers do not accept them into the PLC or KLA because they do not consider psychology to belong is unclear.

The psychological science framework presents an opportunity to discuss psychology's relationship with science and what this could mean for teaching of psychology and science across the F-12 curriculum. This requires an investment of time and patience as:

> Finding out what pedagogical approaches work best in what context takes time, deliberate investments in research, and collaborative practice, where good ideas spread and scale in the profession (Schleicher, 2018, p. 86).

Psychology teachers need ongoing opportunities to learn, collaborate, implement and reflect on curriculum reform in a way that suits their school context, personal beliefs and knowledge to continue to benefit their professional growth and leadership for teaching psychology throughout their career. Learning about the framework could support teachers' learning about their professional practice and connecting of their school curriculum in new ways, including integrating multidisciplinary and interdisciplinary work between psychology and other sciences in the school.

3.6 Chapter Summary

This chapter began with considering psychology's place in curricula, highlighting that psychology is accepted in many, but not all, places in Australia and around the world. Psychology is still trying to establish itself in the curriculum, and is usually limited to senior psychology and may sit with science or social science or other key learning areas. Within most parts of Australia, psychology is part of the science key learning area, although not part of the Victorian AusVELS F-10 or Australian F-10 Science Curriculum. Psychology is a marginal subject, outside the core, and not fully accepted as a science or humanities.

The second part of the chapter focussed on teacher professional career development and highlights the issues for teachers for ongoing professional growth as a psychology teacher. While professional organisations are now providing ongoing advocacy, support and opportunities for teachers of psychology in the UK, US and Europe, Australia has been slow to react. The Australian Psychology Society has a Psychology Interest Group and there are encouraging signs for it to embrace secondary psychology teachers. The same can be said for Australian science teacher associations and science education research. Once Victorian teachers enter the profession, psychology career development is currently limited to top-down approach delivered at conferences and via curriculum authorities, and professional learning opportunities via informal networking. While these forms of professional development and learning have been a valuable source of support and information for teachers, for those who want support to engage, collaborate, shape, research and direct their learning and career development, opportunities are limited. The chapter ends with considering the use of the psychological science framework to open up avenues to engage with science and non-science teachers within the school, and be leaders of curriculum reform.

Chapter 4: Research Methodology

4.1 Introduction

This chapter describes the methodology used to address the research questions. It begins with the research questions and theoretical framework (paradigm) for the research. It explains and justifies how the research was designed and implemented to address the research questions. It considers the three phases of the research (Phase One: Online Survey; Phase Two: Workshop; Phase Three: Individual Interviews), including instrument development and data collection techniques. Data analyses are discussed and finally, the procedures undertaken to ensure trustworthiness and address ethical considerations in this research are considered.

4.2 Revisiting the Research Questions

As discussed earlier, this study aims to explore secondary school psychology teachers' perceptions of a psychological science framework, previously developed to map the curriculum documents (Marangio, 2013), to support their teaching of psychological science (teaching psychology concepts *with* the science practices that build these concepts). The study draws on the views of psychology teachers to address the following research questions:

RQ 1 What are psychology teachers' views of psychology as a science and teaching psychology as a science?

RQ 2 What are teachers' views on using this psychological science framework as a support for their teaching of psychology?

RQ3 In what ways does this psychological science framework shift teachers' views for teaching psychology?

4.3 Research Methodology Framework

This study is guided by a *constructivist (interpretivist) research paradigm*. Denzin and Lincoln (2008) outline four major paradigms within social science research: positivist- post-positivist, constructivist-interpretivist, critical and feminist-post structural, with each offering different network of philosophical ideas to underpin thinking and research. The philosophical assumptions that underpin the intent, motivation, process and expectations of this research are based on people possessing the ability to interpret and make sense of our world. “Individuals seek understanding of the world in which they live and work. They develop subjective meanings of these – meanings directed towards certain objects or things. These meanings are varied and multiple” (Creswell, 2013, p. 8). We generate our own meanings (‘constructs’) as we engage with the world we are interpreting (Denzin & Lincoln, 2008). In this section, the choice of paradigm is discussed, explaining how the ontological, epistemological and methodological views of this research worked together to guide decisions along the way.

Ontology “is concerned with what is real or the nature of reality.” (Lichtman, 2010, p. 20), a philosophical stance that guides ‘what to know’ and ‘what is out there to know about’ (Grix, 2002). A constructivist *ontological* approach asserts the position that reality is socially constructed by and between the persons who experience it (Mertens, 2015). Individuals generate (construct) their own meaning or social reality and these constructs (perceptions/ views/ interpretations) of reality are built around the ways in which they interact with the world. Reality is not seen as separate to this interaction and therefore it is assumed that a universal single reality does not exist for everyone (Denzin & Lincoln, 2008; Schwandt, 2007). Many perceptions of reality exist and some may conflict with each other, and can change over time, including during the process of this research. Therefore, individuals can all have unique understandings of the world and their experiences of it, with this social process continuously shaped by a number of other contextual influences over time.

With ontology considering the nature of reality and questions such as ‘what we may know?’, epistemology concerns the nature of knowledge and questions such as ‘how we came to know or how can we know about the world?’ (Grix, 2002). A constructivist approach, in recognising the ability of a person to interpret and make sense of the world, takes a subjective *epistemological* view (Denzin & Lincoln, 2008). Therefore, in this study it is assumed that the nature of knowledge, like the nature of reality, is subjective and interactive, and not necessarily universal or quantifiable. Furthermore, just like reality is socially constructed, so is knowledge, emphasising the relationships between people and context in constructing this knowledge (Creswell, 2013).

The *methodological* approach as to how to acquire the knowledge to answer the research questions are in line with the constructivist assumptions outlined above. This approach acknowledges that knowledge is personally constructed through the interaction with participants and embedded in context (Mertens, 2015). The focus is on capturing, describing and understanding the range of participants’ views of the situation being studied (Creswell, 2013), providing opportunities for participants to elaborate and discuss their ideas. In this study, the methodological strategy is to look for patterns of meanings rather than testing a theory, as a post-positivist approach may take (Denzin & Lincoln, 2008). The goal is to describe, understand and interpret, rather than generalise.

In a constructivist (interpretivist) paradigm, the views of participants are paramount in the situation being studied (Denzin & Lincoln, 2008). VCE Psychology teachers’ views are central to this study acknowledging the subjective nature of their perceptions of psychology as a science and the psychological science framework and what this may mean for their teaching. The methodological approach seeks perceptions of a variety of teachers, along with their backgrounds and context, and seeks to provide opportunities for social interaction between teachers so they can elaborate and discuss their ideas about the framework, and work together to construct their own meanings as they consider how the framework can map onto part of their curriculum. The aim is to provide contextualised understandings and accounts of the teachers' personal experience and meanings. In this way, the emphasis is on their understandings and interpretations, valuing the socially constructed nature of reality, rather than quantity, intensity and frequency within a post-positivist approach (Denzin & Lincoln, 2008). The approach is exploratory in nature, relying on inductive rather than deductive procedures to interpret the findings. Teachers play the central role in implementing the curriculum, and the ways they do this are heavily influenced by their knowledge and beliefs. The reality of teaching VCE Psychology may mean different things to different teachers, although there is a 'sameness of reality' as they work with the same VCE Psychology Study Design within the Victorian education system. Furthermore, 'what is real' for teachers who participate in the study, is influenced by experiences with each other. Therefore, teachers may construct similar, different and multiple perceptions of psychology as a science and the psychological science framework and these may change throughout the process of this research. These constructivist assumptions have guided my choice of research methods, and these methods are discussed and justified in the rest of the chapter.

4.4 Research Design and Methods

The study draws on the views of psychology teachers on the use of a psychological science framework to support the teaching of psychological science. The framework interweaves the teaching of psychology concepts *with* the science practices that build these concepts. The research consists of the following three phases, with the views of psychology teachers central in each phase:

> Phase One, an online survey, designed to capture a snapshot of psychology teachers' views of psychology as a science and teaching psychology as a science.
>
> Phase Two, a workshop, designed to introduce a psychological science framework to small groups of psychology teachers and then discuss their views and ways to use it to support their teaching.
>
> Phase Three, individual interviews, designed to further explore the teacher's views and use of the psychological science framework for teaching of psychology since the workshop and in the future.

Each phase was conducted in sequential order to address the research questions as identified in Table 4.1.

Table 4.1

The Research Questions Primarily Addressed in Each Phase of this Study

Research Question	**Phase One: Online Survey**	**Phase Two: Workshop**	**Phase Three: Individual Interviews**
1. What are psychology teachers' views of psychology as a science and teaching psychology as a science?	✓	(✓)	(✓)
2. What are teachers' views on using this psychological science framework as a support for their teaching of psychology?		✓	✓
3. In what ways does this framework shift teachers' views for teaching psychology?		✓	✓

Note. ✓= primarily contributes to answering the question, (✓) = may contribute to answering the question

Within a constructivist paradigm, "qualitative methods predominate although quantitative methods may also be utilized." (Mackenzie & Knipe, 2006, p. 199) and this study is more qualitative than quantitative in nature. In this way, the focus is on the general patterns that emerge, with the emphasis on description and exploration of the teachers' views and experiences rather than prediction and explanation (Denzin & Lincoln, 2008).

Quantitative aspects are found within the first phase of this study: an online survey. Qualitative aspects are within all three phases and expand on the initial quantitative knowledge gained in Phase One. The quantitative aspects are designed to provide a snapshot of the current situation, and be integrated with the qualitative aspects to capture teachers' views and current teaching practices, providing a more detailed view of the current status and so a more robust answer to the first research question. Qualitative aspects within the second and third phase focus on teachers' responses to the frame, providing an in-depth exploration of how it is perceived by the profession and addressing the final two questions. A brief overview of the three phases is given below and summarised in Figure 4.1.

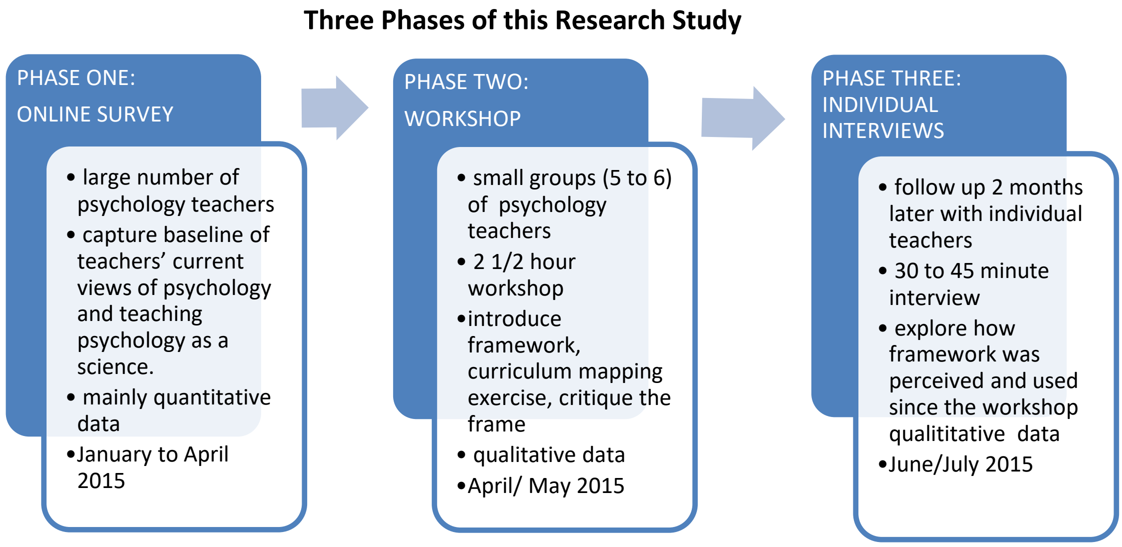

Figure 4.1. Summary of the three sequential phases of this research.

Phase One involved the development and administration of a short (10-20 minutes) online survey to Victorian secondary school teachers of psychology. It aimed to establish a base-line of teachers' views of psychology and teaching of psychology as a science. In doing so, it considers whether psychology teachers view and teach psychology as a science and, if so, what are their views of science. In addition, the online survey identified participants who were willing to continue further with the project.

Phase Two involved a workshop (2 ½ hour workshop) with a small self-selected group of teachers who completed the online survey and registered interest to participate further. The workshop represented a brief intervention and focus group interview, and was run twice with two separate groups. The aim was to introduce the psychological science framework, use it to map their next topic in their curriculum and explore their views on the potential value of using this frame as a support for teaching psychology.

Phase Three occurred 2 months later and involved individual interviews (30 to 45 minutes) with the intervention (Phase Two) teachers. The aim was to determine how the framework was perceived and the ways teachers used (or plan to use) the framework as a support for their teaching of psychology.

4.5 Participants and Context

Participants in this study were secondary school teachers of psychology, all self-selected volunteers with Victorian Certificate of Education (VCE) Psychology experience. The year of data collection, 2015, was the final year for teaching Unit 1 and 2 of the amended 2013-2016 VCE Psychology Study Design (VCAA, 2012), with Unit 1 and 2 2016-2021 VCE Psychology (VCAA, 2015b) being implemented in the following year and Unit 3 and 4 in 2017. Therefore, psychology teachers were currently using the same psychology curriculum that was critiqued using this 'psychological science' framework from my MEd thesis (Marangio, 2013).

Phase One: Eighty-seven secondary school psychology teachers (72 female, 15 male) completed the online survey (Phase One). All of the participants had teaching of secondary school psychology experience, ranging from 0 (within first year) to 33 years (M=10.03 years; SD =7.74), including Victorian Certificate of Education (VCE) Psychology experience. The gender imbalance is likely to be representative of the gendered nature of psychology teachers. While statistics for the total population do not exist, it is estimated that this sample represents approximately 10 to 15% of the population of VCE Psychology teachers in Victoria. Sample size requirements for specific statistical analyses roughly require at least 30 participants make this data meaningful to represent the population (Cohen, Manion, & Morrison, 2011), and while it was not planned to undertake parametric analysis, a minimum of 30 participants was originally set. More detailed demographics are discussed in the next chapter.

Careful consideration was given to determine the best way to reach the targeted audience (Martella, Nelson, Morgan, & Marchand-Martella, 2013). The most convenient way to reach a relatively large number of Victorian Psychology teachers was via a link (invite to the study) on the website of organisers of a popular annual teachers of psychology conference (Carter Down Education Services, CDES) in Victoria (refer to Appendix A). This link was advertised during semester 1 2015, including over the time of the CDES Annual Teachers of Psychology Conference.

The sample was one of convenience, with teachers self-selecting to be part of this research. This convenience could also be a limitation as some different voices may not have been collected. Teachers first need to notice the link before deciding to complete the survey. In addition, those who have thought about psychology's connection with science are probably more likely to complete the survey. Teachers clicked on the provided link in the explanatory statement and decided if they want to continue with the online survey. At the end of the online survey, participants were invited to provide their contact details (email address) if interested in being further involved with this study.

Phase Two: A total of 11 teachers of psychology (10 female, 1 male) participated in one of two workshops (Phase Two); with six (5 female, 1 male) volunteered to participate in Melbourne (Urban Group) and five (5 female, 0 male) in a rural setting (Rural Group). Their teaching of psychology experience ranged from 1 to 20 years (*M*=6.18 years). They were self-selected, recruited via email after expressing interest at the end of the online survey and being available at the time of the workshop. A total of 4 to 8 participants per workshop was deemed as suitable to manage and allow a range of different voices (Cohen, Manion, & Morrison, 2011) and two clusters of teachers in different locations (urban and rural) volunteered to participant. Sample size determination in qualitative research is generally made during data collection based on the sufficiently of the data reaching 'saturation' (Cohen, Manion, & Morrison, 2011), and it was felt that saturation point was reached after two workshops. In both workshops, two teachers worked at the same school and all the teachers knew each other in the Rural Group. Five of the eleven teachers were known to the researcher, four in previous university teacher-student relationships and one previously taught in a school with the researcher. By volunteering to continue with the study, the participants were likely to be more comfortable and able to discuss their views and work with others to use and critique the psychological science framework. More detailed demographics are discussed in the Chapter 6.

Phase Three: A total of nine teachers of psychology (*N*=8 females, *N*=1 male) ranging from one to twenty years of psychology teaching experience (*M*=5.33 years) participated in Phase Three, the individual interview. They had all participated in Phases One and Two, and were invited to participate two months after the Phase Two Workshop. All participants volunteered to continue participating in the study, and were interviewed within their own school setting at a time that suited them. As in the workshops, it was felt that this sample size was appropriate based on the sufficiently of the data reaching 'saturation' (Cohen, Manion, & Morrison, 2011). Full details regarding the demographics of this group of teachers is discussed in the Chapter 6.

The rest of this chapter discusses each phase in detail in terms of development, data collection and data analysis, and concludes with research positioning and trustworthiness of the research and ethics. A summary of the research procedure is given in Table 4.2.

Table 4.2

Summary of the research procedure

Phase	Purpose	Time and place	Participant Selection	Procedure	Data collected
Phase One Online Survey	Describe current psychology teachers views and ways of teaching psychology in relation to nature of psychology and teaching concepts with science practices	10 to 20 minutes Time & place that suits teacher	Invite (link) on CDES Psychology Teachers conference website 50 to 100 Victorian teachers of psychology	Three sections: A: Participant demographics B: Views of psychology C: Teaching of psychology (40 Likert items & three open-ended questions)	Online survey responses
Phase Two Workshop	Introduce this frame to teachers and allow them to work with and critique this frame in a group setting.	2½ hours Monash University or nominated school	Invite after registered interest for further involvement on the online survey 4 to 8 Victorian teachers of psychology per focus group Up to 2 focus groups, depending on interest and availability	Three sections: A: Introduce framework 1: Introduce Framework 2: Written reflections (individual task) 3: Focus group discussion, reflecting on the value, limitations and potential use of the framework B. Introduce curriculum mapping exercise 1. Introduce the task 2. In groups of 2 to 3, map their next VCE Psychology concept 3. Focus group discussion, reflecting on the value, limitations and use of the framework 4. Written reflections (individual task) C: Next possible steps 1: Discussion (including distributing individual interview questions) 2: Thank you	Audio recording of focus groups Mapping curriculum exercise (Group work) Written reflections Curriculum documents Researcher field notes
Phase Three Individual Interviews	Explore teachers use and views of this frame	30 to 45 minutes, approx. two to three months after focus group	Invite focus group teachers 4 to 16 Victorian teachers of psychology	Semi-structured interview Questions sent ahead of time	Audio recording of the individual interview In-situ chart Curriculum documents Researcher field notes

4.6 Phase One: The Online Survey

In this section, the development of the online survey, the data collection techniques and the approaches for analysing the quantitative and qualitative data is explained and justified.

Phase One addressed research question 1 and involved the construction and administration of an online survey to Victorian secondary school teachers of psychology. As discussed, the online survey was designed to give a broad-brush overview of the current situation. The ways teachers' view and teach psychology as a science could influence the ways they view the psychological science framework as a support for their teaching. The online survey offers starting points for further discussion and investigation.

This survey takes a *simple descriptive* approach: it is essentially a one-shot survey for the purpose of describing the characteristics of the sample at one point in time (Mertens, 2015). This survey is being used primarily to *describe* the population. Therefore, teachers' views will be described at a descriptive level, rather than employing inferential statistical analysis.

The online survey was chosen for a few reasons. First, there is scant research on the views of teachers of psychology, as outlined in the last chapter, and an online survey was chosen as the most feasible way to reach a large number of teachers and capture a snapshot of their views and demographics. The survey was chosen over other methods because it is generally economical, more likely to reach a large number of teachers who are often busy and difficult to locate, was simple in format (unlike the semi-structured interview questions which were more complex, open-ended and exploratory) and does not require an interviewer, hence the possibility of interviewer bias was minimalised (Martella et al., 2013). It could be completed anonymously, and was less intrusive as teachers can complete the online survey at a time and place that suits them. Items were delivered and answered in a standardised way, making data relatively easier to collect, compare and analyse than many other methods. But there were also limitations. Online surveys rely on teachers to self-report their views and behaviours and therefore responses are contingent on their honesty, awareness and understanding of the question that is asked (Mertens, 2015). In addition, there were limited opportunities to provide in-depth answers or determine if the participants had understood the questions appropriately or in a similar way. The online survey is not linked to specific psychology phenomena being studied. Contextualised elements were picked up later in the Phase Two and Three when teachers use the 'psychological science' framework to map part of their curriculum.

Second, the individual data can be used as a starting point to get a better picture of participants who continue with the study and support the way the workshops are conducted. Finally, a larger scale study will appeal to a broader audience in the sense it captures more teacher data, including teachers, researchers and curriculum panels and hopefully facilitate discussions into psychology as a science and its place in the curriculum. These starting points can then be complemented with the smaller, in-depth workshops and individual interview data.

4.6.1 Development of the online survey.

A number of steps, each requiring careful decisions, were involved in the construction of the online survey. A summary is given in Figure 4.2, and in the following paragraphs.

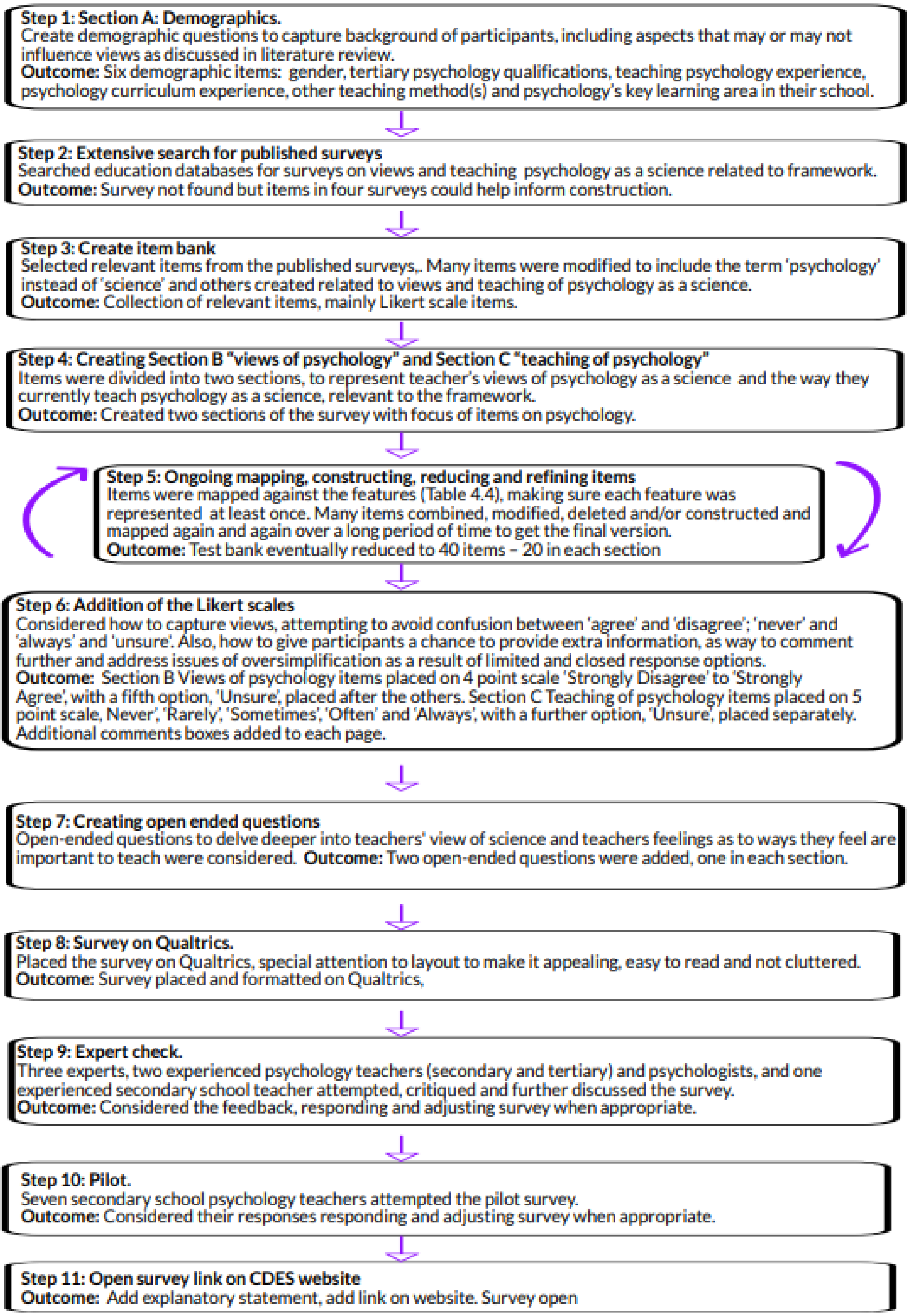

Figure 4.2 Summary of the steps involved in constructing the online survey.

The survey was divided into three sections:

Section A: Demographics

Section B: Views of psychology

Section C: Current ways of teaching psychology

As in the majority of surveys, demographics made up the first section, attempting to recognise who the sample represented. Two further sections were created, views of psychological science and current ways of teaching psychology as a science, to address the first research question.

Predetermined aspects guided the development of this online survey (Miles & Huberman, 1994). The online survey aims to capture different views and teaching of psychology as a science because these views may affect their perceptions of the psychological science framework as a support for their teaching. The online survey was designed with the selected science practices in mind and further inspired by different views of science, as discussed in Chapter 2. A published survey that could be used for the purpose of this study was not found, but aspects of four published surveys that could help inform the construction on the online survey for this study were identified.

1. Friedrich (1996) Psychology as a science (PAS) scale, no theoretical underpinning.
2. Rowley et al. (2008) Epistemic dimensions survey for psychology students, informed by Hofer and Pintrich (1997); Hofer (2000); and Estes et al. (2003).
3. Provost et al. (2011) Science knowledge and attitudes (SKA) scale for psychology students, informed by Lederman (2002).
4. Rowley and Dalgarno (2010) Nature of science survey for psychology teachers, informed by Osborne et al (2003).

These surveys included some Likert scale items and an open-ended question focusing on views of psychology and science relevant for the purposes of this online survey. The relevant items in each of the surveys were carefully reviewed.

The Section A demographic questions were developed by an examination of demographic variables and links to views of science and psychology in other surveys, as discussed in Chapter 2. Section A included six demographic questions: gender, tertiary psychology qualifications, teaching psychology experience, psychology curriculum experience, other teaching method(s) and psychology’s key learning area (department) in their school.

A total of 225 test bank items were constructed for Section B Views of psychology and Section C Teaching of psychology. Each item was examined for its intended purpose and eliminated any that were deemed ‘just nice to know’ questions (Mertens, 2015) and not to confuse the survey. Items were constructed, mapped, combined, refined and reduced numerous times to get to the final version. After much consideration and deliberation, both sections were finally reduced to 20 Likert scale items. Table 4.3 shows the mapping of each test item with the selected features for this study. Please refer to Appendix B for a sample of test items, why they were included, if they were developed from another published survey and what they are trying to measure.

Table 4.3

Mapping Online Survey Items with selected views of science including science practices

Views of science, including selected science practices	**Views of psychology as a science**	**Teaching of psychology as a science**
Psychology is a science (<-> not a science)	Part B Items **1** & 12	Part C Items **9** & 19
Empirical basis (<-> rational)	Part B Items **3**, 6, 7, 9, 12, 13, 14 & 15	Part C Items 1, 2, 3, 11, 12, 13 & 15
Tentativeness (<-> absolute)	Part B Items 6, **11**, 17 & 18	Part C Items 6
Theory dependence (<-> objective)	Part B Items 5, 6, 10, 13, 14, 15, **17** & 20	Part C Items 2, 3, **6**, 7, **8**, 10, 11, 14 & 15
Creativity (<-> rational)	Part B Items 5, 6, **10**, **14**, 15, 17 & 20	Part C Items 2, 6, 7, 8, 10, 14 & **16**
Cultural embeddedness (<-> universal)	Part B Items 15, 17, 18, **19** & 20	Part C Items 10, 15 & **20**
The practice of systems	Part B Items 2, **4** & 16	Part C Items **4**, 5 & 15
The practice of models	Part B Items **5** & 17	Part C Items 5, **6**, **7**, 8 & 15
The practice of explanations	Part B Items 5, 14 & 15	Part C Items **8** & 14
The practice of patterns	Part B Items **4** & **8**	Part C Items 8, **12** & **13**
The practice of observations	Part B Items **13**	Part C Items **11**, 12 & 13
Teaching psychology concepts with science practices		Part C Items 1, 11, 15, **17**

Note. Key item in bold. <-> denotes the range of the item on a continuum. Items may overlap and intertwine, so each item should not be seen as restricted to just these views of science.

Section B starts by asking if teachers view psychology as a science. It then considers a range of views of psychology and ways of teaching psychology as a science related to the psychological science' framework. Examples of different views are outlined in Table 2.7. These are not meant to be viewed as a complete, exclusive or exhaustive list of features related to science and psychology, but more relevant to the psychological science framework. The views are not mutually exclusive and are not in order of priority (there is no order) as they may intertwine and overlap. A range of broad and diverse views and ways of teaching are likely to exist for each and therefore not limited to examples given in Table 2.7. It is assumed that a range of interpretations and views are possible and possibly more views will become evident during data analysis.

Section B consisted of 20 Likert Scale items focussing on views of psychology as a science. Although teachers may or may not use the terms 'systems' or 'models', these terms were deliberately included in a couple of items, as it is an intention of this survey to gather a baseline that includes use of these science practices. The items were placed on a 4 point scale from 'Strongly Disagree' to 'Strongly Agree'. A fifth option, 'Unsure', was given, but placed separately from the other options to hopefully avoid any confusion between giving a deliberate response between 'Disagree' and 'Agree' and being 'Unsure'. This is an attempt to force participants to one side of the scale (agree or disagree) to be taken, with the option of selecting 'Unsure' if they do not know or cannot decide or neutral.

Section C consisted of 20 Likert scale items relating to the way teachers currently teach psychology as a science (or, if not currently teaching, most recently taught psychology in secondary school). Some items may be using terms that are unfamiliar to teachers, such as 'systems', 'models', 'levels of analysis' and 'human endeavour', because it is an intention of the survey to capture teachers understanding and use of these aspects. The items were placed on a 5 point scale: 'Never', 'Rarely', 'Sometimes', 'Often' and 'Always'. Similar to Section B, a further option, 'Unsure' was given.

Importantly, at the bottom of each page of the survey was the option for participants to provide additional comments if they selected 'Unsure' or wished to comment further on any of the items. This was also intended to help address issues of oversimplification as a result of limited and closed response options.

Open-ended questions were placed at the end of each section of the survey to delve deeper into teachers' understanding of what makes a discipline a 'science' (Section B) and teachers' feelings in terms of teaching in ways they feel are important (Section C). The 'what makes a discipline a science?' item deliberately does not mention 'psychology'. Reponses may shed light on the responses to the Likert Scale items that deliberately mention psychology. The 'Why do you think it is important to teach psychology in schools?' and 'Are you able to teach in ways that you feel are important? Explain' questions tap into an affective aspect and help explain any discrepancies between views and ways of teaching 'psychological science'. These items are likely to be answered in non-standardised ways, providing an opportunity for participants to express honest and personal views. In this way, teachers are "free to offer any of a large number of views on a topic" (Martella et al., 2013, p. 264), adding "richness, depth and authenticity to the empirical data" (Cohen, Manion, & Morrison, 2011, p. 255). Use of open-ended questions to capture participants' views supports the nature of a constructivist paradigm (Denzin & Lincoln, 2008).

On the final page of the survey, the teachers were given the opportunity to comment on any additional aspect(s) about the survey. They were asked if they were interested in further participation in this research project, and if so, to provide their contact details. The online survey was formatted and hosted on Qualtrics platform. The online survey is placed in Appendix C.

4.6.2 Validating the online survey.

To validate the online survey, expert checks and a pilot test were conducted before finalising the online survey.

Expert checks.

To establish face validity (if the survey tests what it claims to test) and clarity of the survey (do the items make sense), critical feedback from three experts was sought. Two experts, both psychologists and teachers with extensive experience teaching psychology at secondary and tertiary levels and in significant roles with curriculum authorities in secondary school psychology curriculum design and external assessment, but different secondary teaching methods (science and languages), critiqued the survey. They were instructed to check if the stem for each set of items were appropriate (not too obvious or ambiguous or asking for more than one aspect or sensitive in nature) for guiding a response but not forcing a response in one direction only; if items needed more clarification or were too terminology driven; if it was too long, tedious, hard or any other factors that would make it unlikely to be completed; and if the order of the questions was appropriate and would make completion more likely. Feedback was generally positive. At times, different views of science and psychology were captured, as the survey intended. After considering the feedback, some slight alterations were made, as outlined in Appendix D. To ensure that the instructions and items in the revised survey were understandable and unambiguous, critical feedback was sought from a third expert, a very experienced Victorian secondary school teacher of psychology. In light of feedback, a couple of minor changes were made, also outlined in Appendix D. Changes were made and sent back to the three experts for checking and approval.

Pilot test.

A pilot test to help increase the reliability, validity and practicality of the survey (Mertens, 2015) was completed. Seven VCE psychology teachers completed the online survey under realistic conditions; all female and ranging from 2 to 20 years of teaching of psychology experience (*M*=10.9 years), with five teaching in urban Melbourne and two in rural country areas. Since the majority of psychology teachers are female, this is a good representation of the population for the purposes of a pilot. The mean time taken was 17.01 minutes, with all but two participants falling within the estimated 10 to 20 minutes time frame. Responses to each item were checked, looking for blank or unexpected responses and misinterpretations. Comments were considered carefully and a couple of slight changes were made as a result. Section B Item 14 was changed from “In psychology, data must be collected and interpreted without subjective influence of the researcher” to “In psychology, data must be interpreted without subjective influence of the researcher”. This was to avoid ambiguity between researcher bias/ researcher when collecting and interpreting data and experimenter effects/ demand characteristics when collecting data and subjective interpretation. The item was meant to tap into the role of the researcher in deciding what to observe and how to observe and which data to keep, rather than the effect the researcher can have on the participant’s thoughts, feelings and behaviours. In section C item 2 “I teach research methods *within* a stand-alone unit and item the word ‘within’ was put in italics to make this stand out. These changes are outlined in Appendix D. Responses to the pilot study were excluded from the data analyses.

Once finalised, the explanatory letter (Appendix C) was added to the survey. This introduced the research, providing a background to the survey and ethical guidelines including informed consent, confidentiality and option to remain anonymous. The online survey was opened. The open survey link (Appendix A) was placed on the CDES website.

4.7 Phase Two: The Workshop

In this section, the selection of the methods for Phase Two, the workshop, including the data collection techniques is explained and justified. This phase facilitated a brief (one-shot) intervention and focus group interviews, as it allowed for the psychological science framework to be introduced, discussed and critiqued by groups of psychology teachers. The data collected in this phase contributed to answering research questions 2 and 3.

The purpose of the brief intervention, a one session workshop, was to bring attention to the psychological science framework, including interweaving psychology concepts with the selected science practices, and to give teachers an opportunity to understand the framework by mapping part of their curriculum onto it. The psychological science framework was introduced to teachers, and in smaller groups, they then used the framework to map out the curriculum they were about to teach. Individual reflective tasks were given to teachers at two stages – after the initial introduction to the framework and after the final focus group discussion. As outlined earlier, an interpretive approach to this research was taken, rather than an interventionist approach that seeks “to find out what would happen if some change took place or some procedure from the norm was instituted” (O'Toole & Beckett, 2010, p. 43). The workshop was a brief intervention rather than providing professional development over an extended period of time to create change.

Phase Two is an intervention in the sense that participation was likely to get teachers thinking about the ways they currently teach, or could teach, psychological science in new ways. However, teachers were never told that they ‘must’ change the way they teach, rather they were exploring ways the framework could be used as a support for their teaching.

Phase Two also incorporated a focus group situation, providing opportunities for teachers to reflect together on their initial views of the framework, mainly at two points, after completing the individual reflective tools following the initial introduction to the framework and the mapping exercise. Focus groups were chosen for this phase as the interactive discussions are likely to explore and critique the psychological science framework from different perspectives that are not likely to happen in the individual reflective tasks during the intervention and later individual interviews, and complementing these other methods. Focus groups, a group of individuals with similar characteristics focusing their discussion on a given issue or topic (Cohen et al., 2011) , mainly involves dialogue means of communication and rely on the personal views and experiences of participants as they work together to build on and develop each other's ideas to jointly construct meanings (Mertens, 2015). Focus groups enable group interaction where different ideas can be put forward and discussed so multiple perspectives and realities can be gained (Stewart & Shamdasani, 2015). They have the potential to shape, change, debate and challenge each other's views, and refine their thinking through sharing ideas and articulating their thoughts.

At the start of each workshop, I was upfront about the key to the success of a focus group is for teachers to feel comfortable, able to candidly express their views and able to work together in a collaborative and open manner without getting trapped on a single idea. The success of a focus group is contingent on the groups interaction to stimulate ideas (Lichtman, 2010). The focus groups needs to be facilitated in a way where all participants can openly and honestly articulate their views, without one participant dominating or intimidating others or others being hesitant to express ideas (O'Toole & Beckett, 2010). Conflict between participants could impede further discussion, the discussions could go off task, or a groupthink situation could occur where all participants take on a particular angle and fail to see important alternative aspects (Mertens, 2015). From my perspective, both workshops appeared to run well, without any obvious issues identified by me or communicated to me during or after the workshops.

The teachers were given opportunities to individually reflect during and at the end of the workshop, as well as participating in the focus group discussions critiquing the framework. While it is important to establish the context for the focus group to allow participants to think about their experiences before being asked the focus group questions (Lichtman, 2010; Mertens, 2015), this was not possible because the introduction of the psychological science framework was part of the workshop. As the teachers had already participated in the online survey, they knew the focus was on teaching psychological science and further information was provided in the Phase Two explanatory and informed consent forms (Appendix E).

4.7.1 Workshop data collection tools.

The workshop was limited to one 2 ½ hour session. While the optimal length for a standard focus group interview is between 30 minutes and an hour (Lichtman, 2010), a longer time is appropriate for these sessions to allow the psychological science framework to be introduced and a mapping exercise to be carried out, intermingled with high level of discussion and critique amongst teachers about their perspectives on the framework.

Two workshops were conducted, each in a different location (urban Melbourne and rural Victoria). To get a better spread of views and minimise potential focus group issues mentioned earlier, more than one focus group is preferred (Mertens, 2015).

A total of 6 (urban) and 5 (rural) teachers participated in each workshop, with the hope that the different interactions between both groups offered different perspectives and built on each other's thoughts and ideas. Any smaller and the dynamics of the group may limit opportunities and bouncing of ideas; any larger and the groups may be difficult to manage and fragment (Mertens, 2015).

In Phase Two, the psychological science framework was introduced to a small group of psychology teachers and used to map their next topic in their curriculum. The teachers were asked to critique the framework at various times during the intervention, with their insights contributing to addressing research questions 2 and 3. This enabled multiple data collection techniques: individually written reflection tasks (Appendix F), focus group questions (Appendix G), open-ended questions, curriculum mapping exercise (Appendix H), curriculum documents, researcher field notes, other communication and audio digital recordings of the workshops.

The workshop was divided into three sections:

Section A: Introduce the psychological science framework

Section B: Curriculum mapping exercise

Section C: Next possible steps

As discussed, at two stages, end of Section A and end of Section B, an individual reflection task and focus group questions were undertaken. Data were collected throughout the workshop to capture the teachers' views and experiences with working with the framework, as summarised in Table 4.4. This included audio digital recording of the entire workshop.

Table 4.4

Phase Two workshop procedure and the data collection tools used in each step

Section	**Steps**	**Data collection tools**
All sections:	Encouraged to discuss and ask questions throughout the workshop	Audio digital recordings
Section A: Introduce the psychological science framework	1. Welcome and overview	
	2. Introduce framework (Intervention)	
	3. Complete written reflection task (individual task)	Plus, Minus Interesting (PMI) reflective task (Appendix F)
	4. Focus group discussion, reflecting on the framework (Focus group)	Focus group questions (Appendix G)
Section B: Curriculum mapping exercise	1. Introduce the mapping exercise (Intervention)	
	2. In groups of 2 or 3, use the framework to map the next VCE Psychology concept in their curriculum (Intervention)	Curriculum mapping exercise (Appendix H)
	3. Focus group discussion, reflecting on the framework and mapping exercise (Focus group)	Focus group questions (Appendix G)
	4. Complete written reflection task (Individual task)	Heart, Head, File Bin (HHFB) reflective task (Appendix F)
Section C: Next possible steps	1. Discussion, including distributing the insitu charts and individual interview questions.	Insitu chart (Appendix I) Interview questions (Appendix J)
	2. Thankyou	
Afterwards	1. My immediate reflections regarding teacher's views and use of the framework	Researcher field notes
	2. Ongoing reflections	Researcher field notes

First, the framework was introduced and questions and comments were welcomed during this explanation. This provided opportunities to raise and pursue ideas and understandings (Denzin & Lincoln, 2008). Then an individual written reflective task (plus, minus, interesting (PMI), refer to Appendix F) followed by a focus group discussion (Appendix G) on their initial impressions of the framework was undertaken. Written reflective tasks were designed so that participants could express their views individually and privately, with the questions very open-ended. For instance, the PMI asked teachers to give initial reactions on the psychological science framework: what they found Plus (value), Minus (limitation) and Interesting. The initial focus group discussion extended the PMI, where teachers discussed their initial ideas on what they initially found valuable, limiting and interesting about the psychological science framework. Open-ended questions, as non-directional probes, such as “what do you think?”, were asked to establish initial reaction. The written reflections (PMI) were collected and, as mentioned, the entire workshop was digitally recorded.

Second, a mapping exercise (Appendix H) was introduced, with teachers then splitting into groups of 2 to 3 to map the next topic they were going to teach onto the framework. They were asked to use examples to highlight want they wanted to teach students in terms of interweaving the psychological concept with the science practices, possible teaching procedures as to how they may go about this, possible challenges for teaching and student learning and highlight how this example could link to previous and future curriculum experiences. Participants were asked to bring in curriculum documents (unit plan) for the next VCE Psychology concept they were teaching, and were able to use these documents as a prompt here. The curriculum documents and completed mapping exercise were collected afterwards. Each of the smaller curriculum mapping groups were digitally recorded as they carried out the mapping exercise and the curriculum maps were collected at the end of the workshop. Researcher field notes were made in terms of the way they approached the mapping exercise, including how they discussed ways to connect their curriculum to the framework, the potential ways of using the framework to support their teaching, and the value and challenges in doing so.

The mapping exercise was followed by focus group discussion about their experiences and provide critical feedback, with some semi-structured questions used to frame the discussion (Appendix G). The discussions focussed on how they now viewed the framework, what it was like undertaking the curriculum mapping exercise including straight-forward aspects and challenges, highlights and lowlights from being involved in the workshop, and in what ways had the workshop got them thinking and whether they think they will use the framework in the future. This was followed by another individual written reflective task (heart, head, file, bin (HHFB) refer to Appendix F). In this task, teachers were asked to respond on what they liked about the framework (heart), what got them thinking (head), what aspects they plan to keep and use in the future (file) and what did not resonate with them (bin). The focus continued to be on collecting teachers' views on value and limitations of using the framework to support their teaching, as well as probing deeper into the potential ways of using the framework. Again, the written reflections were collected and the entire workshop was digitally recorded.

Finally, a discussion about the next possible steps, such as being invited to an individual interview and invited to note when or if they use the frame in next couple of months via an in-situ chart (Appendix I). They were told it would be a semi-structured interview and they would be given questions that it aims to address (Appendix J). They were told that they were not expected to change their curriculum but asked if they could make note when and if they do. The focus group provides an excellent way to explore participants' initial perspectives, as an overview of their thinking about the framework, and then information gleaned from these groups can then be followed up in more depth within individual interviews.

With the focus on the ways teachers viewed the framework, the value of the framework and how they mapped the curriculum, notes were written immediately after each workshop, doing my best to capture additional descriptions and behaviours observed during the workshops and my initial reflections. The focus throughout was on the teachers' views of the framework, its potential use and the value and limitations of using the framework to support their teaching of psychological science. These notes were maintained, jotting down further reflections, throughout the research, as researcher field notes can provide further ideas and insights to support data analysis (Creswell, 2013).

4.8 Phase Three: The Individual Interviews

This phase, the individual interviews, aimed to further explore teachers' views and experiences with the 'psychological science' framework since the workshop and into the future. The teacher's reflections on the psychological science framework can further develop or change over the course of time and with teaching of the curriculum they mapped in the workshop. An individual interview is a good way to capture these views and provide more detailed insights since the focus group. Individual interviews allow researchers "to hear what participants have to say in their own words, in their voice, with their language and narrative." (Lichtman, 2010, p. 101), in line with the constructivist paradigm. The data collected in this phase contributed to answering research questions 2 and 3.

Semi-structured interviews were conducted in this study, sitting between unstructured and structured approaches, offering some structure but not rigidity so that initial themes can be addressed with room for the introduction of new ones or follow up on interesting ideas within the parameters of the research questions overall (O'Toole & Beckett, 2010). This flexibility allowed for more probing or additional questions or deleting other questions if addressed already. It also allowed for checking understanding and confirming responses when needed, enhancing the trustworthiness of the data and again highlighting the dynamic processes in which both interviewer and interviewee develop new understandings and constructs. The questions were revisited after the first interview and it was decided that they were flexible and appropriate and no further changes were made.

4.8.1 Individual interviews data collection tools.

The individual interviews (30 to 45 minutes) took place in the teacher's own school setting at a time and place that suited them. Being conducted face-to-face in their school setting gave a better sense of their school context and hopefully this means more accuracy in reflecting their views. Teachers were given the Phase Three explanatory statement and informed consent forms (Appendix K) as part of the invite to this phase of the study.

The interview was semi-structured with questions (Appendix J) given to teachers in advance (at the conclusion of the workshop and via email) to allow participant to receive and think about the questions ahead of the interview and the interviewer to follow up on responses when required. These questions were open-ended and non-directional and flexible, focusing on the teachers' views (values and limitations) and (potential) use of the psychological science framework since the focus group and in the future. The questions (Appendix J) were checked around the 20 minute mark to ensure the main ideas within them had been addressed and the interview was then adjusted accordingly.

The interviews were audio-taped using a digital recorder and researcher field notes, in-situ chart (Appendix I) and any other documents (for instance, curriculum documents and teacher notes) used by participants were collected. Researcher field notes were written immediately after each interview, again to capture additional descriptions and behaviours observed during the interviews and my initial reflections. The focus throughout was on the teachers' views of the framework – its potential use and the value and limitations of using the framework to support their teaching of psychological science. I also maintained these notes, jotting down further reflections, throughout the research, as researcher field notes can provide further ideas and insights to support data analysis (Creswell, 2013).

4.9 Data Analyses

This study generated both quantitative and qualitative data. Data analyses consisted of analysing the quantitative and qualitative data separately, drawing from their respective methods of analysis in response to the research questions (Creswell, 2013). Phase One was analysed separately and Phase Two and Three were analysed together.

4.9.1 Phase One online survey analyses.

The demographic (Section A) data were summarised and used to describe the teachers' background, including psychology disciplinary education, teaching experience and current school context. The data were analysed using basic descriptive statistics and presented as totals and/ or percentages of either the total sample or the particular cohort discussed.

The teachers' views and ways of teaching psychology as a science (Section B and C) in terms of their responses to Likert scale items were summarised using descriptive statistics. It was decided not to employ Cronbach's alpha reliability testing, a measure of internal consistency in terms of how closely related sets of items are as a group (Mertens, 2005).

While it is not a statistical test, rather a test of reliability, the survey was not constructed with this dimensionality of scale in mind. Items could possess multiple underlying (perhaps latent) dimensions, and the additional comments and open-ended questions are deemed just as important. The items were graphed and displayed as percentages for each item. Additional comments by participants were carefully considered in light of the responses to the items and used to expand on and explore the meaning of the quantitative data.

The responses to the items provide starting points for further exploration and limitations of this survey, discussed earlier, were kept in mind during analysis. Since predetermined aspects guided the development of this online survey (Miles & Huberman, 1994), they also guided the analysis. Table 4.3, the mapping of the Likert scale items onto the selected views of science, was used as a guide to consider the teachers' views and teaching of psychology as a science. Each feature is interconnected and participants may hold a number, perhaps seemingly conflicting, of views about the same theme, which is difficult to identify with just the use of a restricted number of Likert scale items and additional comments. Therefore, it was difficult, if not impossible, to separate features completely. For example, 'peer review' may appear within different features, such as connected to tentativeness, theory dependence and cultural embeddedness. Similarly, 'the scientific method' may appear within the features of empirical basis and psychology as a science as both views and current ways of teaching.

The responses to the open-ended questions were imported into NVivo 11, a computer software program that facilitates open coding of data to systematically identify concepts or themes (called nodes in NVivo), for qualitative analysis. Data for each question were considered in turn. Content analysis is a common research method used to systematically analysing written messages, with the aim to describe the phenomenon (Lichtman, 2010). Content analysis was used, with the analysis focusing on the written responses without other (nonverbal) cues collected, therefore limited to analysing the manifest content (Hsieh & Shannon, 2005). Through content analysis, it is possible to classify words into fewer content-related categories although it is assumed that when classified into same categories, the words share the same meaning (Lichtman, 2010). Content analysis has its critics, some quantitative researchers seeing it as a simplistic technique without the use of statistical analysis while some qualitative researchers do not see it as sufficiently qualitative in nature (Hsieh & Shannon, 2005). For this research, it was deemed adequate and complex task, acknowledging that the purpose was identifying for valid categories to describe the online responses, supporting the descriptive nature of analysing the online survey. A directed approach to content analysis was used to interpret meaning from the content of the survey's three open ended questions data. Initial codes were developed from prior research, with these codes open to revision and refined during analysis. Directed content analysis is a more structured approach than most other content analysis approaches because initial coding categories are considered allowing codes to be defined before and during data analysis, rather than derived directly from the text data during analysis (Hsieh & Shannon, 2005).

The first question, 'what makes a discipline a science?', was in line with Rowley et al.'s (2008) survey question. Rowley et al.'s (2008) four categories were kept in mind during analysis (process, outcome, content and other), acting as guidance for initial codes. Data were read a number of times to ensure familiarity with it first. While Rowley et al (2008) did not identify sub-categories, a category can be divided into a sub-category (Lichtman, 2010). The responses were coded with care taken to identify sub-categories within each and being open to new categories rather than limiting the analysis to just these original ones. All responses were coded, with special attention (including discussion with supervisors) on the unclear responses to check if a new category was needed. No further categories were identified although mutually exclusive sub-categories within two of the categories became obvious. The number of teachers whose responses were coded into each category (and sub-category) was noted, with many responses addressing more than one category. Within each category, however, each response was found to be fall into only one sub-category. Reliability of coding was checked carefully and discussed at length with education researchers (my two supervisors). The categories for this question are listed in the following table (Table 4.5), and discussed in detail in Chapter 5.

Table 4.5

Category and sub-categories for teachers' responses to question 'what makes a discipline a science?'

Category	**Sub-category**
Research Process	Follows the scientific method, use of experiments
	Other aspects of research process, not limited to the use of experiments, including empirical research
	Unclear
Research Outcome	Prove facts, truth-seeking
	Other, including informing theories or models
Content it studies	Type of content it studies
Other	Unclear

Note. A response can apply to more than one category.

For the second question, 'why do you think psychology is important to teach?', directed content analysis was employed (Hsieh & Shannon, 2005). Initial codes related to possible purposes of psychology education and science education, drawing on ideas aiming for psychological literacy (Cranney & Dunn, 2011) and Roberts (2007) visions for scientific literacy. Data was read a number of times to allow familiarity with it before coding. The responses were carefully coded into categories, taking considerable time reading and rereading the data and coding into categories and revising the initial codes. Again, much consideration and discussion took place with my two supervisions. Coding was completed when no further categories could be identified and the assigned codes were consistent. Reliability of coding was checked carefully and discussed at length with education researchers (my two supervisors). Frequency tally counts for each category was undertaken. The categories are included in Table 4.6 and discussed further in Chapter 5.

Table 4.6

Categories for teachers' responses to 'why do you think psychology is important to teach?'

Categories
Interesting & Enjoyable
Beneficial for students' personal life
Beneficial for students' vocational life (career, study)
Beneficial for society
Unique place in the curriculum
Psychological, scientific thinking
Specific content areas
Unclear

Note. A response can apply to more than one category.

The responses to the third question, 'are you able to teach in ways that you think are important?', were divided into 'yes', 'no', 'yes and no', and 'unclear' and a frequency tally constructed (Table 5.3). Most responses were straight forward to categorise, usually because they were simply answered 'yes' or 'no' or 'yes and no'. The other responses were discussed and deliberated and in the end all data were able to be coded into one of the four categories. Again, the coding was scrutinised by supervisors and re-examined. The responses are discussed in the next chapter.

Trends and distributions were considered between both the Likert scale items and the open-ended questions, linking both the quantitative data with the qualitative data to get a better broad picture of teachers' views and ways of teaching of psychology as a science. Please refer to Chapter 5.

4.9.2 Phase Two and Three, the workshops and individual interviews, analyses.

As discussed earlier, multiple data sources were examined in Phases Two and Three of the study. The digital recordings of the workshops and individual interviews were fully transcribed. The reflections, completed worksheets, and researcher field notes were also transcribed. The use of these multiple sources of data allowed triangulation and cross-checking of emergent themes (Creswell, 2013). Transcriptions were analysed using NVivo 11 for open coding. Coding allows data to be disassembled or broken apart into fragments and then reassembled or rearranged to produce new understandings that explore similarities and differences across different responses (Ezzy, 2002). For consistency, the transcriptions and subsequent coding and analysis was completed by me, and reviewed and discussed with education researchers (my supervisors).

A thematic approach to analysis was taken here, and given the multiple sources of data, analysis was much more extensive than the open-ended survey responses. The analysis was an ongoing iterative process of gathering and processing the data (Lichtman, 2010), rather than a single and linear process. Lichtman's (2010) generic coding strategy, known as The Three Cs, consists of the following steps:

Step 1: Initial coding. Going from the responses to some central idea of the responses

Step 2: Revisiting initial coding.

Step 3: Developing an initial list of categories or central ideas.

Step 4: Modifying your initial list of categories based on additional re-reading.

Step 5: Revisiting your categories and subcategories.

Step 6: Moving from categories to concepts (themes). (Lichtman, 2010, p. 198)

Thematic analysis of the transcripts was undertaken to identify themes and cluster data, guided by Lichtman's (2010) process of coding, categorising and identifying concepts (The Three C's). Analysis began with close reading and reading of the data, and was a long iterative non-linear process, working through coding, questioning, discussing, modifying and rechecking. In this study, the terms 'themes' (and 'subthemes') represent the 'concepts' (and 'sub-concepts') identified in the data. The shift to 'themes' was a deliberate attempt to avoid confusion with psychological 'concepts', as the study is investigating whether the psychological science framework promotes the teaching of psychological concepts with science practices.

Themes were identified through careful reading and coding of data, then compared to reveal reoccurring categories (nodes) or themes. Statements were coded to multiple nodes if they related to multiple categories. Data were re-read and interviews listened to and scrutinised several times, in light of the research questions, to reveal a small number (4) of central and meaningful concepts about teachers' views and potential use of the framework. The themes and sub-themes are listed in Table 4.7 and explored in detail in Chapter 6. Links between these insights and the online survey were discussed in Chapter 6 and extended when answering the research questions in Chapter 7 and 8.

Table 4.7

Themes for teachers' views and (potential) use of using the psychological science framework

Theme	Sub-theme
Promoting the discipline of psychology	Diversity of psychology Deeper thinking Use of science practices
Connecting with intended curriculum (documents)	VCE Psychology Study Designs Victorian and Australian F-10 curricula
Supporting implemented curriculum (teaching)	Connect and build on curriculum experiences Planning for teaching
Conditions for teacher change	Professional learning and planning opportunities Intended curriculum change Teaching resources

4.10 Researcher Positioning and Trustworthiness of Research

The careful selection of each research method, including the advantages and limitations and reasons for selection, has been discussed throughout this chapter. This contributes to the purpose and transferability of the findings and importantly highlights the trustworthiness and my position in this research.

The construction of the online survey went through an elaborate process before it was finalised. It was constructed with the 'psychological science' framework and nature of science in mind, with each item mapped to an appropriate aspect (refer to Table 4.3). This assists content validity, showing that the survey fairly and comprehensively covers the themes "it purports to cover" (Cohen et al., 2011, p. 137). To further establish content (face) validity and clarity, critical feedback was given from three experts, all experienced secondary psychology teachers and two being registered psychologists and experienced tertiary educators. To help increase the reliability, validity and practicality of the survey, a pilot test was undertaken (Mertens, 2015) with seven psychology teachers and feedback informed the final version.

The participants who completed the online survey were self-selecting and may not be representative of the population of teachers of psychology. The interpretation of each item and responses are contingent on the participant's honesty, awareness and understanding of the question that is asked (Mertens, 2015) and, while opportunities are given on each page, opportunities are limited to provide in-depth answers or determine if the participants have understood the questions appropriately. The online survey aimed to capture a broad picture of views, and was not intended to be a diagnostic or evaluative tool or give a comprehensive and deep understanding of teacher's views and ways of teaching psychology as a science.

The interaction between teachers as they were introduced to the framework, mapped a part of their curriculum onto the framework and critiqued the framework as a support for their teaching were central to the research, in line with social construction of knowledge within a constructivist paradigm (Denzin & Lincoln, 2008). The teachers worked together to make meaning of the psychological science framework. They unpacked it together as they mapped it onto part of their curriculum. The presence of others affects the way we think, feel and behave, likely in ways we are not consciously aware. All teachers were encouraged to contribute to discussions and were asked for clarity on their views when needed, and all the teachers appeared to be actively involved. No-one appeared to dominate or remain silent in either workshop, at the time and in the transcripts, though this is impossible to fully guarantee.

In both workshops, there were two teachers that currently teach together, and in the rural group all the teachers knew each other. While power relationships and other issues may occur within a group that know each other, "some believe that it is better to have participants who do not know each other; others find that a discussion might go more smoothly if participants do know each other" (Lichtman, 2010, p. 155). The teachers continued in the research since they already have a positive working relationship although this was monitored in case it needed managing.

Similarly, as discussed, I have both a personal and professional stake in this study. I had a previous professional relationship with five of the participants. I was clear about these potential issues with teachers from the onset of both the workshops and individual interviews as the upmost "care must be taken not to steer the interviews too much towards the findings" (O'Toole & Beckett, 2010, p. 129). They knew I was seeking critical feedback and prepared to hear responses that could be "confronting, critical or simply disappointing" (O'Toole & Beckett, 2010, p. 129), and wanted them to avoid saying what they think I want to hear. I also used written reflective tools in the workshop, so they could write individual comments quietly. The advantage of already established "trust and confidence" (O'Toole & Beckett, 2010, p. 129) probably made the teachers more at ease opening up critical and constructive conversations and minimised the dangers of potentially swaying the data. Careful monitoring for any issues during the workshops and interviews took place, including closely monitoring my own responses so not to give approving or disapproving or disappointing signals which could shape their response. The workshops and individual interviews appeared to run well, without any obvious issues identified or communicated to me during or afterwards.

I decided to facilitate the workshops and individual interviews because I was familiar with the teachers' context and the 'psychological science' framework, and able to respond to specific comments and non-verbal cues, and probe for deeper understandings that address the research questions if or when opportunities arose.

The analyses of the qualitative data were my interpretations from the data. Every step was carefully documented as I reflected on my personal meanings of these findings. To further enhance the trustworthiness of the findings, a number of additional measures were taken. This included data triangulation between different sources of data (including focus group discussions, mapping exercise, individual written reflections, curriculum documents, researcher field notes, individual interviews) and several teachers (individual interviews, curriculum documents). Two workshops were run, and these were split into two further groups when undertaking the mapping exercise, further adding confidence since the data is drawn from a number of methods and sources. Coding of themes and descriptions used in the analysis were subjected to reviews and rechecks and critical discussions with my supervisors to prevent oversights or missing themes. A strong chain of evidence in transcriptions, including exact statements and responses, was provided when analysing the data. While the findings cannot readily be generalised to other contexts, the transferability of findings is enhanced through triangulation and may be applicable to some degree to other teachers' contexts.

4.11 Ethics

The research was designed to explore teachers' views on the 'psychological science' framework and how it may be used to support teaching of psychology. While the research, particularly the online survey, was designed to capture a broad overview of teachers' views and ways of teaching psychology as a science, the critique is on the framework rather than judging their teaching or viewpoints. The research was not designed to be intrusive, threatening or provoke emotional responses. Participation was limited to the inconvenience of filling in an online survey and minimal discomfort associated with being part of a workshop and the individual interview. Teachers were not asked to alter their curriculum – it was up to them to decide and what happen as a result of being part of this study.

Participation was voluntary and participants were informed and reminded of their withdrawal rights and written informed consent was obtained (Appendices C, E and K). The online survey could be completed anonymously and the results were aggregated and de-identified to protect their identity. Pseudonyms have been given to participants in Phase Two and Three to protect their identity. While participants in Phase Two were asked to maintain each other's confidentiality, it cannot be ensured, and anonymity is not possible. These workshops were carefully monitored so that all participants are offered a chance to contribute (without feeling forced) within a respectful and positive atmosphere that is open to different perspectives. Ethics approval was granted for this study by Monash University Human Research Ethics Committee (MUHREC) project number CF14/3927 – 2014002041.

4.12 Chapter Summary

This study focuses on teachers' views on using a psychological science framework to support their teaching of psychology. Guided by a constructivist (interpretivist) research paradigm, the methodology and methods described in this chapter have been selected to describe and explore of the teachers' views and experiences. Specifically, the data analyses provides a snapshot of teachers' current views and ways of teaching psychology as a science and insights into the ways the teachers view and (potentially) use the framework as a support for their teaching of psychology.

Chapter 5: Phase One (Online Survey) Data Analyses

5.1 Introduction

This chapter describes the results of the online survey, representing Phase One of this study, and in doing so primarily contributes to providing a baseline when later answering the following research question:

RQ 1: What are psychology teachers' views of psychology as a science and teaching psychology as a science?

As discussed earlier (Chapter 4), the online survey was designed to capture teachers' views of psychology as a science and their current teaching of the selected science practices within their psychology classes. It also asked about their formal psychology background, teaching of psychology experience, their other teaching methods and psychology's place in their school's departments and curriculum. The online survey was divided into 3 parts, and this chapter will now discuss each part in turn.

5.2 Organising and Analysing the Data

As discussed in Chapter 4, the Phase One Online Survey data were analysed with the use of descriptive statistics. The demographic data were summarised using descriptive statistics, as presented in the next section in this chapter. In terms of the views of psychology as a science, and views of science, the analysis drew inspiration from Matthews (2012) Features of Science (FOS). FOS advocates a more relaxed, heterogeneous and contextualised discussion around science, avoiding memorising a narrow list of nature of science (NOS) tenets. In this way, FOS resists labelling views as naïve if a view does not align with a NOS tenet, as sophisticated arguments may be given to justify this viewpoint. This possibility was seen as important here, especially since this survey used Likert scale items. The study, being constructivist (interpretivist) in nature, drew predominantly on qualitative methods to explore participants' views (Creswell, 2013). While teachers were able to give additional comments to explain each of their Likert scale responses, not many took up this opportunity, and the way each Likert scale item was understood and justified by the teachers was beyond the scope of this study. As such, descriptive statistics are used to describe these broad brush views, with the Likert scale items presented using graphs. The teachers' responses offer starting points for further explanation, rather than a comprehensive report on teachers' views and teaching of psychology as a science.

The responses to the first of open-ended question "what makes a discipline a science?" were imported to NVivo as a data set. Directed content analysis was undertaken (Hsieh & Shannon, 2005), with the data initially coded based on Rowley et al.'s (2008) codes while being open to new codes. Rowley et al.'s (2008) coded each participant responses to 'what makes something scientific?' into one of the following four categories: 'research process' (such as reference to research, measurement, or other aspects of scientific research process), 'outcome of research' (such as discovering something previously unknown, providing proof or correct answers), 'content' (such as simply mentioning specific domains of science like physics or chemistry) and 'other' (unclear or no answer given). After much deliberation and discussion, some changes were made in terms of coding and the categories. The first three categories were used, with the fourth ('other') split into two ('other' and 'did not answer') to differentiate between those who did not answer and others who gave an unclear answer. Many (23) teachers emphasised two of these categories, giving more detail beyond just one of the categories. Furthermore, the research process and research outcome categories were broken down into sub-categories to give more detail about the response. The responses were read and scrutinised, with the codes checked a number of times, with no further codes being identified. The coding was re-examined and scrutinised by my supervisors. The categories and sub-categories are explained and summarised later in the chapter.

The second open-ended question give insight into why teachers think it is important to teach psychology in schools. Data for this question were imported into NVIVO as a data set and directed content analysis was undertaken (Hsieh & Shannon, 2005). Initial codes related to possible purposes of psychology education and science education, drawing on ideas aiming for psychological literacy (Cranney & Dunn, 2011) and scientific literacy (Roberts, 2007). Iinitial codes were ‘psychology content’, ‘application of psychology’ (personal, local and global issues), ’beneficial for students and society’ and ‘psychological, scientific thinking’. There are many possible codes, but the decision was to limit to these four, with the view of opening up more if needed. For instance, ‘ethical and informed decision making’ making could fall under ‘application of psychology’. In answering this question, teachers gave a number of reasons for why they think it is important to teach psychology in schools. The responses were read a number of times to become familiar with the data. The initial codes were revised, and new codes made. Added codes were ‘interesting’ and ‘enjoyable’. Teasing apart ‘application of psychology’ and ’beneficial for students and society’ was difficult, with ‘application of psychology’ subsumed by ‘beneficial for students and society’. ‘Beneficial for students and society’ was split up into ‘beneficial for students’ personal live’, ‘beneficial for students’ vocational life (career, study)’ and ‘beneficial for society’ to reflect the different ways teachers responded. 'Unique place in the curriculum was added' and 'scientific thinking' was changed to 'psychology, scientific thinking' code. Specific content areas were often mentioned, and therefore 'psychology content' became 'specific content areas' and an 'unclear' category was added. At the same time, recurrent categories were noted, with many teachers mentioning more than one category in their response. Coding continued until coding was consistent and no further categories were evident. The coding was re-examined and scrutinised by my supervisors. The categories and the number of teachers who mentioned them, along with examples are discussed later in the chapter. Responses to the last question considered whether teachers think they are able to teach in the ways they think are important. The responses to this question were categorised in terms of 'Yes', 'No', 'Yes and No', and 'unclear' and a frequency tally account was undertaken. The coding was re-examined and scrutinised by my supervisors. The categories, with examples as exemplars, are discussed and summarised later in the chapter.

5.3 Demographics Data

As described in Chapter 4, 87 secondary school psychology teachers (72 female, 15 male) completed the online survey. All of the participants had teaching of Victorian Certificate of Education (VCE) Psychology experience and completed the survey via the Carter Downs Education Services (CDES) Psychology website link. This was a sample of convenience.

5.3.1 Participant's teaching experience and background.

The participants represented a wide spread of teaching of psychology experience, ranging from 0 (in their first year of teaching) to 33 years. They tended to have a strong background in psychology with the majority of participants (*N*=76) reporting a psychology disciplinary background. Almost half (*N*=37) of those with a psychology disciplinary background have a major undergraduate sequence as their highest psychology qualification and a further quarter (*N*=19) hold psychology or psychology-related forth year/honours or masters degrees. Another 11 teachers reported first year studies or a minor sequence in psychology, those with a minor sequence deemed teaching 'in-field', but it was not always possible to clearly distinguish between these two groups. A total of 11 teachers did not have formal tertiary background in psychology, including three stating secondary school psychology (VCE Psychology) as their highest psychology qualification. When psychology disciplinary background is considered with teaching of psychology experience (Figure 5.1), these 11 teachers without psychology disciplinary background are spread across the different years of teaching experiences. While the psychology disciplinary background of teachers has been questioned in the past (Hakala, 1999; Provost et al., 2012; Weaver, 2014), the overwhelming majority of teachers in this study have strong psychology disciplinary backgrounds, and are therefore deemed teaching 'in-field'.

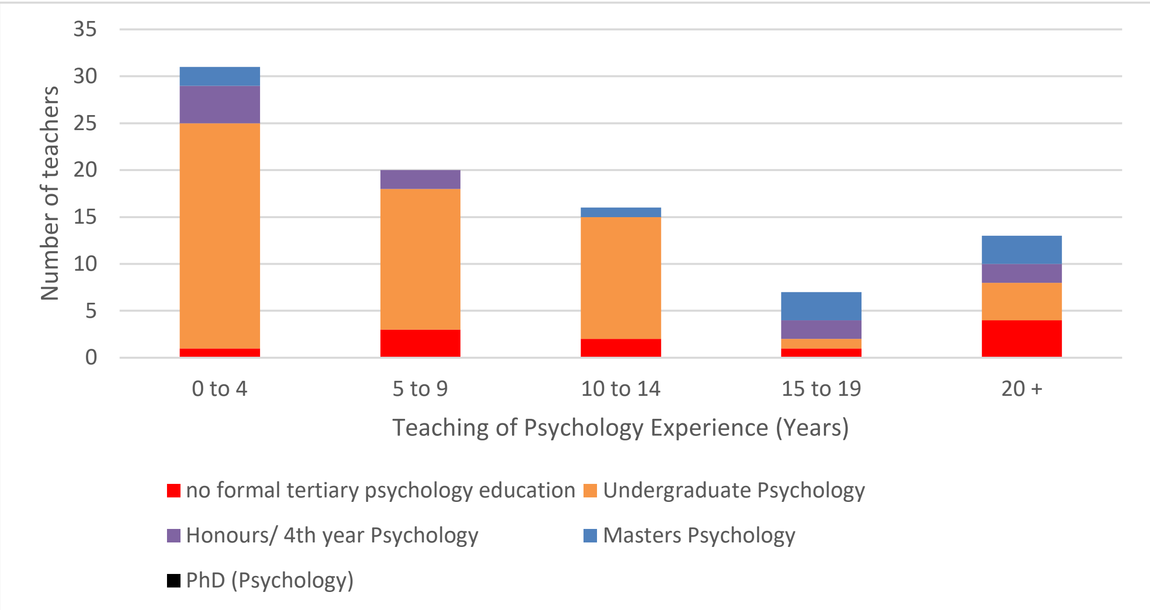

Figure 5.1. Teaching experience and psychological education background of participants (*N*=87).

The participants represented a diverse range of other teaching methods (besides psychology) that are placed across all the curriculum key learning areas (KLAs), rather than being mainly found in one key learning area such as science (Figure 5.2). The majority included methods in Humanities (34%), Science (33%) and English (30%) key learning areas. One teacher did not have any other secondary teaching methods. There have been studies that suggest differences in views of psychology and science depending on if they have studied other sciences or not (Rowley et al., 2008). The teachers who completed the online survey come from a broad range of tertiary backgrounds.

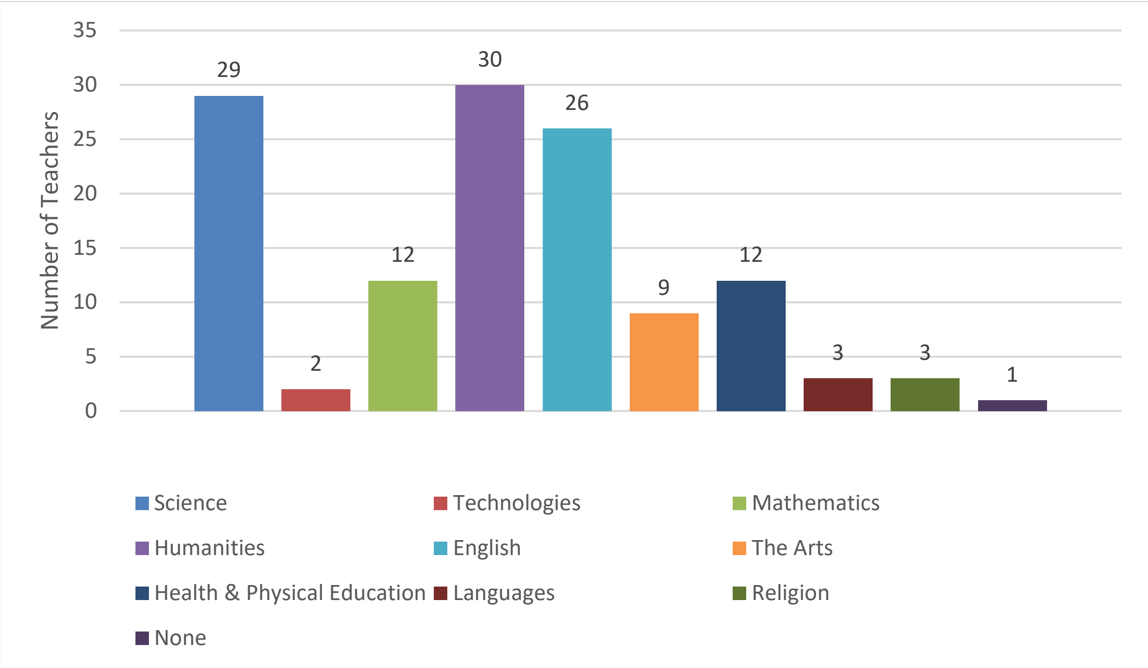

Figure 5.2. Other teaching methods (besides psychology) for participants (*N*=87).

All the participants had experience teaching VCE Psychology and over half (56%, *N*=46) have taught psychology at junior (Years 7-10) levels. The data shows that teaching of psychology in these younger years occurs mainly at Year 10 level (*N*=42), with the remaining four teachers not identifying the Year 7-10 level(s) (refer to Figure 5.3). This spread of experience across years 7-10 is interesting because schools have found room in their curriculum even though psychology is not explicitly named in the Victorian AusVELS F-10 and

Australian F-10 curriculum at these year levels. However, only 24 of these 46 teachers with Year 7-10 Psychology teaching experience are currently teaching at these year levels, although it is not clear whether or not the schools still have 7 -10 Psychology units in their curriculum or they have changed schools. The online survey did not delve further into the make-up of the Year 7-10 curricula so cannot comment on how psychology curriculum is being constructed and whether or not it is seen to progress and build on curriculum experiences to VCE Psychology.

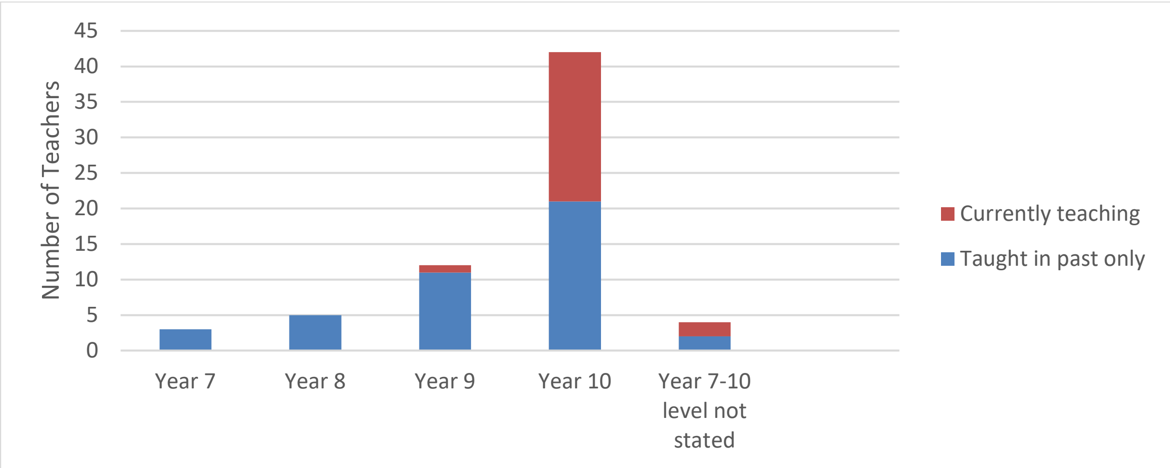

Figure 5.3. Teaching of Year 7-10 Psychology Experience (*N*=46).

For the teacher participants, exposure to other senior school psychology curriculum is limited. None of the teachers reported experience with interstate curricula and only eight teachers (9%) had international experience, as outlined in Figure 5.4. These international curricula covered International Baccalaureate Psychology (*N*=6), A-level Psychology (*N*=3) and Advanced Placement Psychology (*N*=3) with four of these teachers with experience teaching two of these international curricula. Therefore, the majority of teachers have only experienced VCE Psychology in schools.

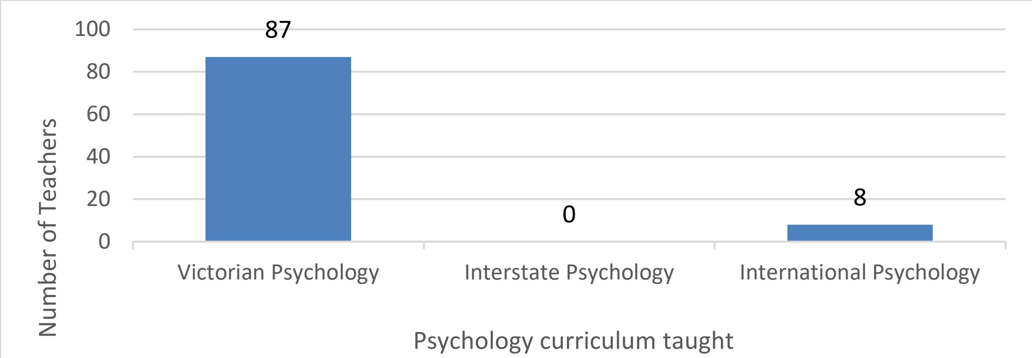

Figure 5.4. Victorian Psychology teachers' psychology curriculum experience (*N*=87).

5.3.2 Participants' current school details and psychology's place within these schools.

Nearly all of the participants (94%) were currently teaching psychology in secondary schools, with two teachers also teaching in other sectors (primary school or tertiary psychology) and the rest either not teaching (5%) or details not given (1%).

The participants currently teaching represent a mix from different schools within Melbourne (71%) and rural Victoria (28%) and one teaching in London, United Kingdom. Of these, just over half (55%) are working in government schools, a third (34%) in independent schools and the rest (11%) in catholic schools, as seen in Figure 5.5.

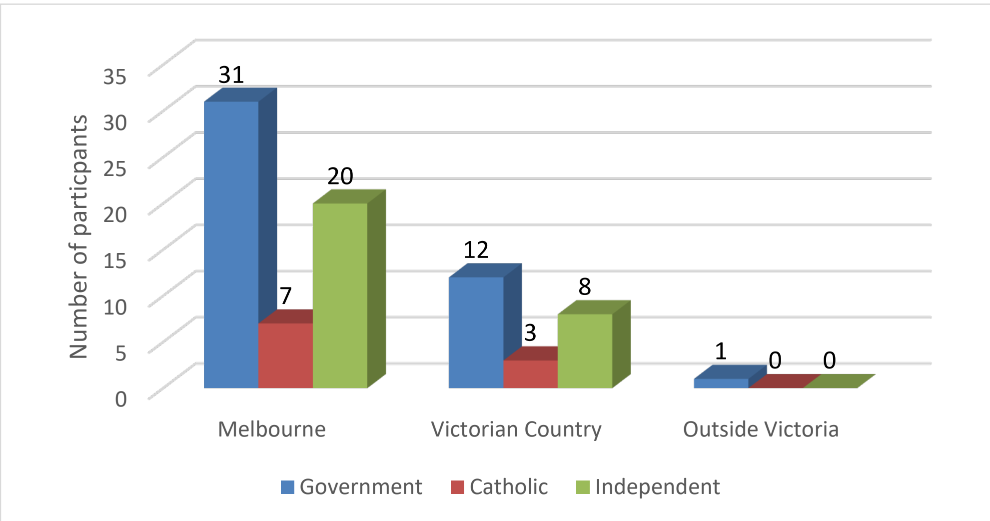

Figure 5.5. Psychology teachers' current school location and type (*N*=82).

Within the teachers' schools, psychology is overwhelmingly placed within the Science Key Learning Area (89%) (refer to Figure 5.6). This is in line with the Victorian Curriculum and Assessment Authority (VCAA) which places VCE Psychology within the Science Key Learning Area, and has done so since the introduction of VCE Psychology in the early 1990's. Psychology is not placed in a key learning area in eight schools (10%) and within Humanities in one school (1%), as indicated in Figure 5.6. The psychology teachers within these nine schools also teach subjects within Humanities (3 teachers), Science (3 teachers), Mathematics (1 teacher), English (1 teacher) and The Arts (1 teacher) Key Learning Areas, and therefore the placement of psychology do not look strongly tied to the other subjects the psychology teachers are currently teaching. The reasons why psychology is or is not placed in science in these schools is worth investigating further but beyond the scope of this study. In the past, Psychology has been isolated in the school curriculum (BPS, 2013; Hakala, 1999; Rees, 2013) but this is not the case in this study, although how psychology teachers work within the science key learning area is beyond the scope of this study. Overwhelmingly, these teachers are in schools where psychology is placed with the sciences.

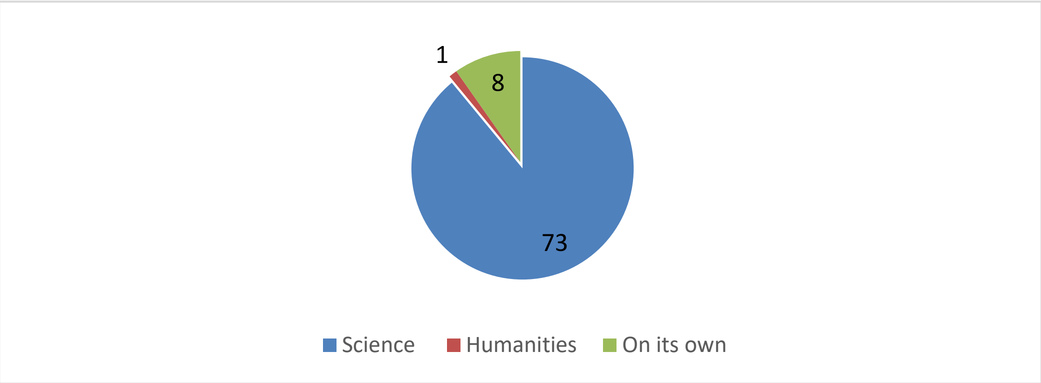

Figure 5.6. Psychology's place in the teachers' school (Key Learning Area/ Department) *(N=82).*

5.3.3 Demographics data summary.

In summary, the teachers who completed the online survey generally have a strong psychology disciplinary education background (are teaching ‘in-field’ rather than ‘out-of field’), cover a broad range of years of experience teaching psychology in schools and are teaching in a range of other key learning areas. The psychology teachers are mainly female, likely to be typical of teachers of psychology in secondary schools. Almost all of the teachers are currently teaching in a range of government, catholic and independent schools within Melbourne and rural Victoria.

Psychology is predominately placed in the Science Key Learning Area within the teachers’ schools. All of the teachers have taught VCE Psychology while just over half have also taught Year 7-10 (mainly at Year 10) despite psychology not being explicitly mentioned in the Victorian and Australian F-10 curriculum. Very few teachers have experienced international curriculum and none have taught psychology interstate, so their working knowledge of different curricula is limited.

While teachers’ psychology disciplinary background and psychology’s place in school curriculum has been questioned in the past (Hakala, 1999; Provost et al., 2012; Weaver, 2014), this is not the case with participants in this study. This is a sample of convenience. As such, these teachers were likely to feel willing and comfortable to report their views of psychology as a science and current ways of teaching psychological science. These teachers are likely to be open to a psychological science framework, especially given psychology’s place in the school science KLA and as a VCE science study and with a psychology tertiary education background.

5.4 Views of Psychology and Teaching Psychology as a Science

This section analyses the data for Part B (Views of psychology) and C (Current ways of teaching psychology) of the online survey. It begins with an overview of teachers' responses to the Likert scale items, related to teachers' views and teaching of psychology as a science, including the science practices that relate to the psychological science framework. Responses to the open-ended questions, related to teachers' views of what makes a discipline scientific and whether they are teaching psychology in ways they think are important, are then considered. These views are finally discussed in light of the Likert scale item responses.

5.4.1 Introduction to responses to the Part B and C Likert scale items.

Table 4.3 Mapping the Online Survey Items with some views of science including selected science practices, in the previous chapter, guided the analysis. The teachers' responses to the Likert scale items were often similar, although there was some variation for certain items, for both Part B Views of psychology (refer to Figure 5.7) and Part C Teaching of psychology (refer to Figure 5.8). Many of the teachers' responses for specific items tended to be similar across the board (for instance Fig. 5.7, Part B 1, 3, 4, 5, 7, 16, 17, 18 and Fig. 5.8, Part C 2, 3, 9, 11, 18). A spread of responses were found in some items (Fig. 5.7, Part B 9, 10, 12, 13, and Fig. 5.8, Part C 4, 5, 6, 7, 8, 13, 15, 20). Unfortunately, some items (Fig, 5.7, Part B 2, 9, 12) were treated with caution due to the ambiguity of the wording of the item. For instance, it is unclear whether teachers placed the emphasis on *diverse* or *unrelated* or both *diverse and unrelated* in Part B Item 2 Psychology consists of a *diverse* range of *unrelated* areas. In Part B Item 12, the item is also problematic because it is unclear whether teachers are agreeing or disagreeing to *psychology will never be a true science* or *predictions are seldom exact* or *both*. All items were answered by all 87 participants, with the unsure option rarely selected. Some additional comments were given, mainly related to Part B items, and these were also considered when analysing the results. The teachers' responses are now discussed further in relation to teacher's views and current ways of teaching psychology as a science, including the science practices related to the psychological science framework.

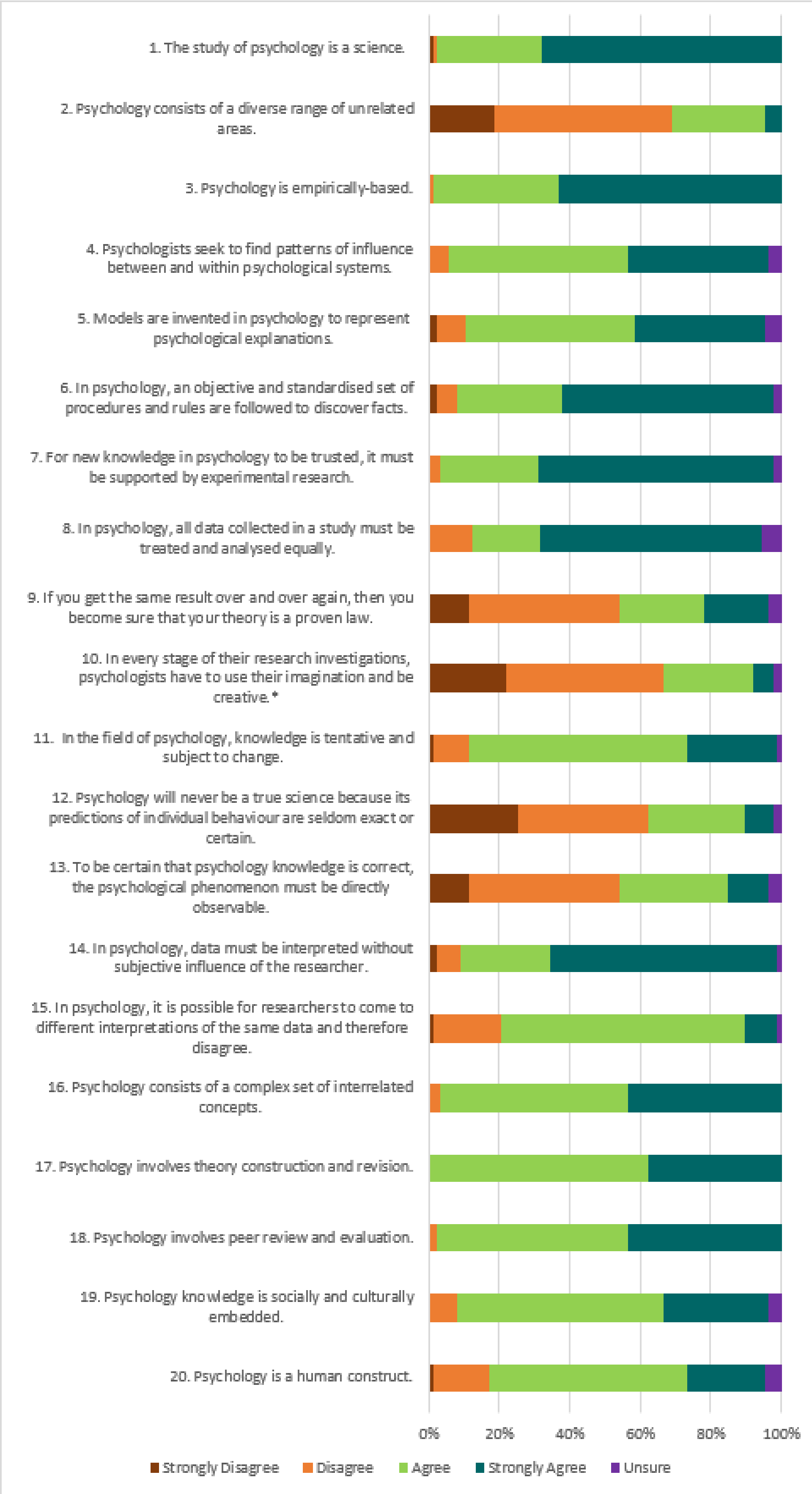

Figure 5.7. Participants' responses to Part B: Views of Psychology Likert scale items (*N*=87).

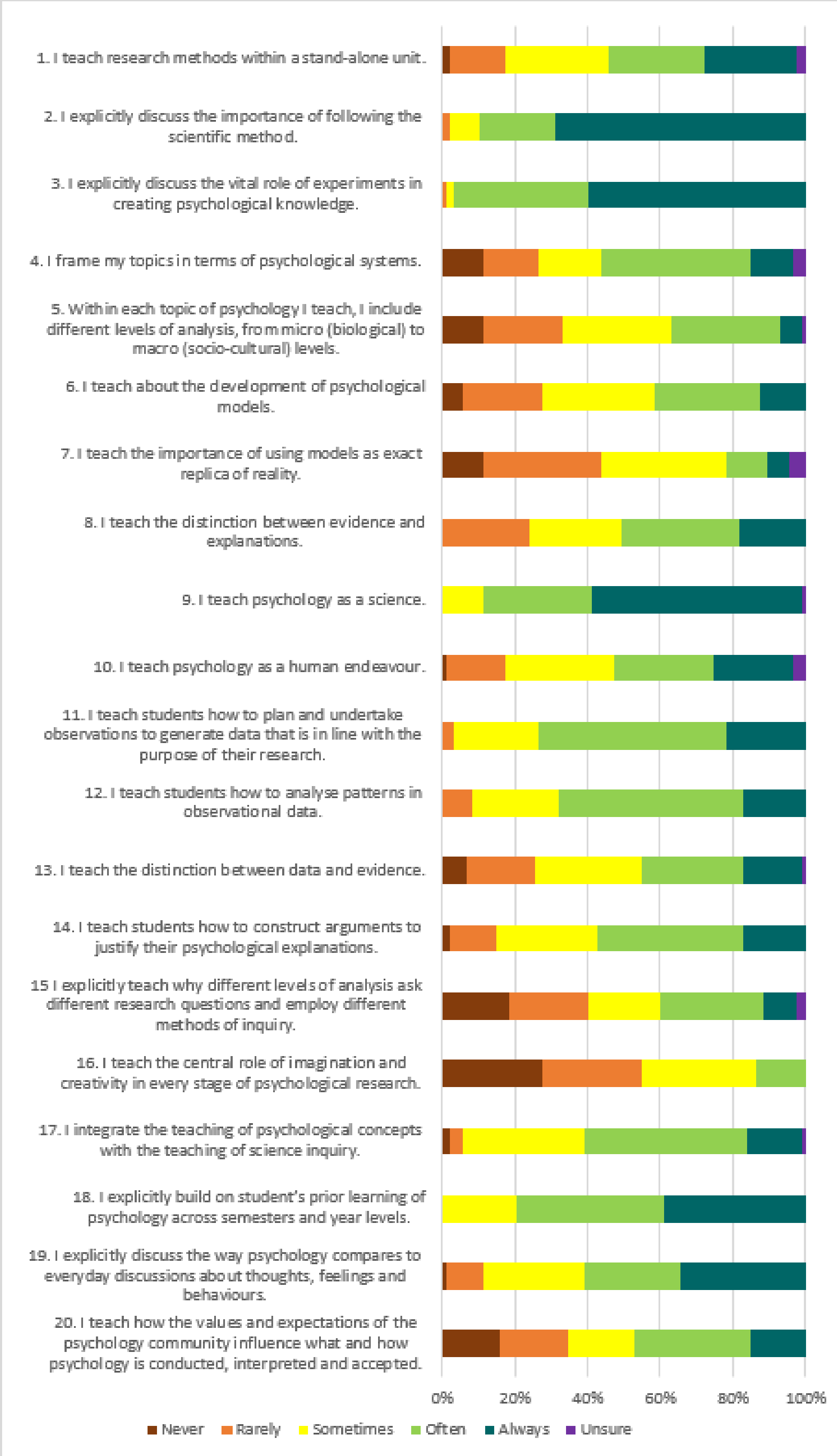

Figure 5.8. Participants' responses to Part C: Current ways of Teaching Psychology Likert scale items (*N*=87).

5.4.2 Views and teaching psychology as a science.

Psychology is viewed as a science (Fig. 5.7, Item 1) by 98% of the teacher participants, with only two teachers disagreeing, both with undergraduate psychology education but different discipline backgrounds (a science background and a humanities background). Psychology being viewed as a science is not completely surprising, given VCE Psychology has been labelled a science since psychology's introduction to VCE in the early 1990s, and it also fits with teachers reports that Psychology is placed within the science key learning area in the majority (89%) of their schools (refer to Figure 5.6). Three justifications for agreeing and disagreeing respectively to this item are given below, with the second stating that psychology is becoming 'more scientific' while the third viewing psychology as social science, something different to science.

> Psychology is a science because behaviour can be observed, experimented with and measured. (Participant 60)
>
> Most sciences deal with trying to prove the unproven, whilst some psychological theories are hard to test/gain empirical evidence for doesn't mean that we will never be able to. I feel psychology is moving more towards being a science than in previous years. (Participant 46)
>
> While Psychology is empirically based - this does NOT denote it as a science. Social science element of the humanities are equally weighted in empiricism, and this should not be downplayed or discounted. (Participant 33)

While the overwhelming majority of teachers view psychology as a science, comments such as these start to raise questions about how teachers view science, what it means to be more scientific and how teachers may differentiate between social science and science. For instance, 'proof' is commonly associated with mathematics while 'disproving' (it is possible until it is disproven) is part of science (Corrigan & Gunstone, 2007).

Similarly, teachers reported that they teach psychology as a science (Fig. 5.8, Item 9). However, some of their other responses question how they may go about teaching psychology as a science or what this could look like in their classroom. For instance, a variety of responses (from never to always) in terms of explicitly discussing the way psychology compares to everyday discussions about thoughts, feelings and behaviours (Fig. 5.8, Item 19) were given. To what extent are teachers discussing the reasons why and ways psychologists use science research to study and make decisions about thoughts, feelings and behaviours? Similarly, mixed responses for viewing psychology as a human construct (Fig. 5.7, Item 20) and teaching psychology as a human endeavour (Fig. 5.8, Item 10) suggest a range of views of science, and how psychology fits with their views of science as a human construct and human endeavour. Furthermore, these mixed responses are interesting given Science as a Human Endeavour (SHE) is one of the three strands within the Victorian AusVELS science curriculum (VCAA, 2015a). With psychology not included in Victorian AusVELS, teachers may not have considered or be given opportunities to learn about the SHE strand in the science curriculum. One teacher clarified their response to psychology is a human construct with the following statement:

> Arguably, all things are human constructs. The biological bases would be more scientific but that does not negate something like the "subconscious". That was a human construct, and still very worthy of consideration. (Participant 53)

Similar to an earlier comment, this teacher views psychology moving towards becoming more of a science and opens more questions in terms of viewing certain aspects of psychology, such as certain types of content, as science and what they mean as more scientific. To what extent do they view science, including biological aspects, as a human construct? The responses are unclear and suggest further investigation into how and why teachers understand these items. To what extent, if any, are teachers connecting psychology to SU (biological sciences) strand or the SHE strand in the Victorian AusVELS F-10 curriculum? What does this means for their teaching of psychology as a human endeavour and as a science?

Psychology knowledge is overwhelmingly seen to be empirically-based (Fig. 5.7, Item 3). However, similar responses by all teachers to some items (Fig. 5.7, Items 6, 7, 8, 14 and Fig. 5.8, Items 2, 3) suggest that teachers equate empirical to meaning *the* scientific (experimental) method. The way they understand empirical could be limited to undertaking experiments, rather than open to non-experimental methods. This could explain the variety of responses to teaching different levels of analysis and the different research questions and research methods within these levels (Fig. 5.8, Items 5 & 15). Furthermore, views such as psychology develops its knowledge by following a well-structured, objective and standardised experimental method, where all data must be treated and analysed equally were reported. Such an approach could also suggest psychology knowledge is seen as fact, especially when these responses are considered in light of similar overwhelming agreement to 'data must be interpreted without subjective influence of the researcher' (Fig. 5.7, Item 14); although this is contradicted with 80% agreeing that researchers can come to different interpretations of the same data and therefore disagree. Teachers may hold a range of views about the role of both theory and empirical research in psychology at the same time.

The role of creativity in psychological science is also questioned by the mixed responses in their views in Part B Items 6, 8, 10, 13 (Figure 5.7) and teaching Part C Item 16 (Figure 5.8). This again could relate to the way teachers view the roles of experiments and the scientific method, and if they view these as following a standardised and objective method.

Unclear is whether teachers are teaching the distinction between observation and inference, which is discussed further in the next section. Comments such as the following raise further questions:

> Psychology is studied scientifically, but there is much to be said for Psychology being studied as an art - not all of the complexities of the human mind can be measured scientifically. (Participant 48)

What does this teacher mean by study psychology as an art? To what extent do they view the role of creativity and imagination in science? This view could be similar to the earlier comment about psychology becoming more scientific and could be suggesting that some areas are more scientific than others. On the other hand, this could be suggesting that the way psychology works and studies the complexity and diversity of people is more looking at the whole person rather than a reductionist approach that many associate with science in breaking this down into individual parts in order to provide explanations.

While some of these responses suggest teachers may view psychology as truth-seeking or fact-finding (as discussed above), similar responses by teachers to items such as Part B Items 11, 17, 18 (Figure 5.7) also suggest teachers view psychology as tentative, durable and theory laden. Further comments from two teachers connect both the tentative and durable aspects of psychology understandings, holding a range of views depending on the knowledge in question:

> I believe that psychological knowledge is open to change - that the nature of psychological inquiry and research means that we are capable of reaching new understandings (like the mapping of the human brain, we should expect that we will learn new things); at the same time, I also believe that there is a well-settled basis for so many psychological theories. (Participant 61)

> These blanket assumptions are not set in concrete. Some things are open to modification in light of new findings, and some basic biological structures are scientifically/medically proven. (Participant 54)

Interestingly the second teacher supported psychology knowledge as being subject to change although viewed some knowledge, in this case biological structures, as fixed and able to be proven. The notion of proven is pervasive even though it is counter to science.

The teachers agree that psychology is socially and culturally embedded (Fig. 5.7, Item 19) and subject to peer review (Fig. 5.7, Item 18), although a range of responses to teaching these aspects (Fig. 5.8, Item 20). It is unclear the extent psychology is socially and culturally embedded, and the role of peer review is understood or taught or feel they have opportunities to teach this in their curriculum. It is not apparent given comments about proof and a demonstrated lack of appreciation of the value of peer review process in generating acceptable psychology knowledge that these science values are understood. Again, it is possible that teachers hold a range of views that may exist at the same time and further investigation is required.

Teachers report that they build on psychology curriculum experiences (Fig. 5.8, Item 18). Almost all (95%) teachers report that they integrate the teaching of psychological concepts with the teaching of science inquiry (Fig. 5.8, Item 17), with most (80%) also teaching research methods as a stand-alone unit (Fig. 5.8, Item 1). This suggests that teachers value teaching research methods alone; important psychology content that must be taught independently. Unfortunately it is not clear about what science inquiry means to the teachers – incorporating the teaching of research methods when teaching concepts, teaching science inquiry as what scientists do, teaching experiments as what psychologists do, or inquiry as in a pedagogical approach for teaching content. These responses could reflect the structure of the VCE Psychology Study Design, with research investigations as assessment within each area of study, promoting the interweaving of the Key knowledge, Key skills and Research methodology sections, while the examination has a separate research investigation section. The assessment, particularly in examinations, may have unintentionally made the distinction between important content to learn and research investigations.

Summary.

In summary, the teachers view psychology as a science and report that they are teaching psychology as a science. The teachers are likely to hold a number of views of why psychology is a science and what it means to teach psychology as a science. Some of these views may be contradictory or change depending on the psychology context. Teachers agree that psychology is empirically-based and involves theory construction, peer review and evaluation and is socially and culturally embedded. However, many appear to equate 'empirical' with 'experimental' and research consists of a standardised and objective set of procedures and rules, and data interpretation must be without subjective influence from the researcher. It is unclear how they understand and teach psychology as a human endeavour, the distinction between observation and inference and the role of creativity and imagination in psychology, and the use, value and limitations of range of research methods, beyond experiments.

Teachers accept that psychology is a science and claim to teach psychology as a science but do not fully appreciate the features and values of science. What they believe and what they do in their teaching may be different. Given that teachers of psychology are likely to hold a range of views, introducing the psychological science framework and discussing how psychological science works to develop knowledge and what this looks like in different areas of psychology may challenge some teachers. Equally, the framework could generate rich discussions and possible new ways of teaching psychology as a science. Teachers' views of the psychological science framework are explored in the next chapter.

5.4.4 Views and teaching of science practices in psychology.

This section is related to and extends on the previous discussion around teachers' views and teaching of psychology as a science. The ideas are related to the teaching of the selected science practices within the psychological science framework.

Organising knowledge into systems and systems thinking is an important element of science and its practice. In terms of systems, starting points for teaching this practice exist with over half of the teachers (53%) stating that they frame the topics they often or always teach in terms of psychological systems (Fig. 5.7, Item 4). Teachers view psychology as a diverse discipline made up of interrelated concepts (Fig. 5.7, Item 16) and almost all teachers (91%) state that psychology seeks to explore patterns between and within psychological systems (Fig. 5.7, Item 4). The ways teachers frame their topics this way is not explored in this survey but it does suggest that teachers are familiar with the term 'systems' but their responses could be due to some systems listed in the VCE Psychology Study Design (VCAA, 2012). A similar response was found with 'models'.

Science practices can generate a range of different types of models which can be used to represent explanations. Teachers agree that models are invented in psychology to represent psychological explanations (Fig. 5.7, Item 5). Some teachers (41%) say they often or always teach about the development of models (Fig. 5.8, Item 6) while others rarely or never do (28%) and the rest (31%) sometimes do. A range of responses were also given for teaching the importance of using models as exact replicas of reality (Fig. 5.8, Item 7) and this could indicate different views as to how models are used in psychology, some viewing models as exact replicas (which science models can never be) and others not. The responses could indicate different views of understanding how models are developed and used in practice and/ or lack of opportunities to teach about the roles of models.

There seemed to be a lack of clarity about teaching the differences between data, evidence and using evidence in arguments to support explanations. While 78% of teachers agreed that it is possible for different researchers to come to interpretations of the same data and disagree (Fig. 5.7, Item 15), there were varied responses to teaching the distinction between evidence and explanations (Fig. 5.8, Item 8) and teaching arguments to justify explanations (Fig. 5.8, Item 14). Teachers may not be teaching about the ways explanations are generated and used in science, or the relationship between explanations and arguments. Similarly, almost all teachers (92%) reported they teach students to analyse patterns in observational data at least sometimes (Fig. 5.8, Item 12) and at least sometimes (92%) teach students how to plan and undertake observations to generate data that is in line with the purpose of their research (Fig. 5.8, Item 11). In contrast, most teachers (83%) state that all data collected in a study must be treated and analysed equally (Fig. 5.7, Item 8), and a range of responses are given for teaching the distinction between data and evidence (Fig. 5.8, Item 13). In addition, 43% of teachers viewed to be certain that psychology knowledge is correct, the psychological phenomenon must be directly observed (Fig. 5.7, Item 13). These responses raise questions about how teachers distinguish between data and observation, and observation and explanation, and whether they see this as an important part of psychology. It also raises questions about the extent teachers feel they have opportunities or need to teach science practices in their classrooms.

Summary.

In summary, teachers are familiar with the terms ‘systems’, ‘models’, ‘explanations’, ‘patterns’ and ‘observations’ and are likely to hold a range of views related to each science practice. The ways they currently teach each practice is unclear and the online survey raises questions around the extent to which they are teaching the complexities of each practice. This includes distinguishing between observation and inference, data and evidence, evidence and explanations, and the use of models and systems in psychology. Some teachers may view psychology as developing its knowledge by following *the* scientific (experimental) method: a well-structured, objective and standardised experimental method, where all data must be treated and analysed equally, to determine the facts, and may overlook the complexities of each science practice, including the important decision making and theoretical assumptions. In these cases, the psychological science framework may not offer support for their teaching unless they are open to new ways of thinking about psychological science. On the other hand, given the range of different views, teachers may be open to thinking about how the science practices work in psychology. Familiarity with the terms, desire to build on curriculum experiences within and across semesters, and interweave the teaching of psychological concepts with science inquiry is likely to provide starting points for teachers to use the psychological science framework to support their teaching.

5.4.5 What makes a discipline a science?

A total of 68 teachers (78%) answered the open-ended question “what makes a discipline a science?” These responses were initially coded based on the way Rowley et al. (2008) coded responses to “what makes something scientific”, while remaining open to the use of new codes, as explained earlier in this chapter and in Chapter 4. The four categories (research process, research outcome, content it studies and other) and sub-categories are explained in the following paragraphs and summarised in Table 5.1.

Table 5.1

Teachers' responses to question 'what makes a discipline a science?' (N=68)

Category	**Sub-category**	**Example**	**Number of participants**	
Research Process	Follows the scientific method, use of experiments	*Science uses the scientific method which is a sequence of orderly steps to test hypotheses.* (Participant 80) *The fact you can experiment makes a discipline a science in my opinion.* (Participant 71)	42	66
	Other aspects of research process, not limited to the use of experiments, including empirical research	*Use of empirical research.* (Participant 35) *The proper use of empirical methodology, including but not exclusively experiments, to gather and analyse data to support theories - explanations are based on the evidence available at the time, subject to review both by peers and when new ways to gather evidence become available. (Participant 52)*	17	
	Unclear	*Planning, conducting and reporting research.* (Participant 4)	7	
Research Outcome	Prove facts, truth-seeking	*Having experiments conducted to prove or disprove concepts and facts within the discipline.* (Participant 83)	7	20
	Other, including informing theories or models.	*Use of evidence-based data to inform theories.* (Participant 25)	13	
Content it studies	Type of content it studies	*Considers biological basis of the brain.* (Participant 26) *It needs to be something which can be empirically researched.* (Participant 79)		4
Other	Unclear	*Because VCAA says it is!* (Participant 33)		1

Note. A response can apply to more than one category.

Almost all teachers (97%) who responded emphasised the research process in their explanations for what makes a discipline a science. This is not surprising since research investigations are part of the VCE Psychology assessment, both internal assessment and external examination (a section of the Unit 3 and 4 Psychology), and therefore taught by these teachers.

The breakdown of the ‘research process’ responses into sub-categories shows that most of the teachers (62%) emphasised the use of the scientific method/ experiments as what makes a discipline scientific. This could reflect the emphasis and priority of experimental method over other research methods within VCE Psychology. Half of these teachers gave brief responses, such as “*it follows the scientific method*” (Participant 72) or “*it employs the experimental method”* (Participant 69). The other half elaborated further by discussing this method is objective, valid, reliable, rigorous, standardised and/or must be replicated. Only four teachers (6%) wrote about data interpretation and subjective elements involved in the scientific research process, such as in the following extended response:

> Sciences should, at their core, be studies into topics with an unbiased view, devoid of prejudice. While this is in actual fact impossible as all researchers come to the table with a lifetime of experience and thus expectation behind them, the use of non-human instruments assist in disconnecting at least the gathering of data from human bias. Of course, there is still prejudice connected to both the initial set up of an experiment, and the interpretation of the results once collected by the instruments.
> I believe that sciences should:
> - adhere to the test-retest methodology wherever possible to support hypotheses
> - be willing to adapt and change their models when new information is brought to the table, with the ability to discuss competing theories open-mindedly
> - admit their current limitations and understandings of the concepts they are studying
>
> I believe that psychology achieves all three points, and thus should be seen as a science. (Participant 14)

A further quarter (24%) of the teachers’ responses were coded into the ‘other aspects of research process (not limited to use of experiments), including empirical research’ sub-category, giving brief answers such as “*empirically-based research*” (Participant 70) or “*must be supported by empirical not experimental*” (Participant 20). A final 12% of teachers mentioned the research but it was unclear what they meant by research, for example “*research methodology*” (Participant 64). Only two teachers (3%) discussed finding new ways to carry out research for what was previously thought of as impossible to research or ‘prove’, though it is unclear why they thought this (such as due to new research techniques or methodologies or technology or theories or models). Another two teachers (3%) mentioned aspects such as peer review but this reference was not extended to working in a science community or teamwork. No-one mentioned the role of argumentation, problem-solving, scientific reasoning, critical thinking, creativity and other science-related dispositions in the research process. With such limited responses, the teachers' views tend to describe a discipline as scientific if it follows a technical procedure of carrying out experiments for following the scientific method. This suggests that the myth of 'the scientific method' (McComas, 1998) exists within this cohort of teachers. The responses also open up questions over whether teachers view science as able to use non-experimental methods.

A number of teachers (29%) emphasised both the research process and the outcome of research, such as the example of an elaborated response by Participant 14 given earlier. These teachers referred to science as more that the research process, mentioning (at least) what the research process is aiming to do; creating an important link between process and outcome. Perhaps this is also a link between VCE Psychology Key knowledge and Research methodologies sections that are meant to be intertwined. However, the responses in terms of the research outcome were typically brief, such as 'supporting theories, proving facts or finding knowledge', with very few giving more sophisticated responses (such as Participant 14) or tapping into the potential benefits or use of these outcomes.

The 'outcome of research' category was divided into two sub-categories: 'proving facts, seeking truth' and 'others such as informing theories or models'. Examples are given in Table 5.1. It is interesting that a handful of teachers (10%) emphasised proving facts/ seeking the truth ideas, and perhaps this is an extension to the use of the scientific method, as highlighted in the process discussions, as an objective way to prove the facts. That said, slightly more teachers (19%) commented on other outcome aspects, such as informing theories or models, such as Participant 14, viewing this development as part of what makes a discipline scientific. No one went further to discuss the potential personal and societal benefits and use of the science research as an outcome of the research.

The type of content a discipline studies was not mentioned in making a discipline a science by the majority of teachers within this study. Only four teachers emphasised the 'type of content it studies' deems it to be science, for instance '*biological basis of the brain'* (Participant 26), with three of these teachers also discussing the research process. Interestingly, no one mentioned content related to personal or societal issues, and perhaps this is an indication that these are not defining factors that makes a discipline 'scientific' as other disciplines also contribute to this knowledge.

Summary.

In summary, teachers expressed a range of views as to what makes a discipline scientific. Their views emphasised the research process, with many centering their views on technical procedures for carrying out experiments, or following the scientific method. Science-related values and dispositions relating to scientific reasoning, critical thinking, creativity, problem-solving and argumentation were overlooked by teachers in this survey. Responses that linked science to research outcomes were more likely to give a brief mention to testing a theory, or providing proof of the facts, with roles of theory and data interpretation often overlooked. Perhaps teachers did not see the role of theory or models in science, although others, such as those linking science to proving facts, could have 'atheoretical' views of science and not understand the current acceptable views of science. Engagement with contemporary socio-scientific issues, supporting personal and societal issues, or enhancing wellbeing were not mentioned. Except for four teachers, the content a discipline studies was not a reason for what makes a discipline scientific.

It is interesting what is missing or overlooked in the responses and this could be due to a number of factors. Teachers may not consider these aspects as unique to science, but important in a range of disciplines. Also, teachers may have not had opportunities to engage with ideas around their views of science, or how psychology links with science and some may view science as limited to experimental research. Since the teachers view psychology as a science, this could reinforce ideas raised earlier that some teachers view psychology as developing its knowledge by following *the* scientific (experimental) method: a well-structured, objective and standardised experimental method, where all data must be treated and analysed equally, to determine the facts. The psychological science framework is designed to embrace contemporary science practices and is likely to offer new ideas and ways of thinking about psychology as a science to the majority of teachers.

5.4.6 Are teachers able to teach in ways they think are important?

A total of 61 teachers (70% of participants) responded to the final item (Item 12), consisting of two open-ended questions: “Consider why you think psychology should be taught in secondary schools and the related aspects you feel are important to teach. Why do you think psychology is important to teach? Are you able to teach psychology in the ways you think are important? Please explain”. Overall, teachers were very enthusiastic about teaching psychology. The teachers’ responses gave insight into why they think it is important to teach psychology in schools and whether they are able to teach in the ways they think are important. Responses to both parts of the question are explored here.

Why do you think psychology is important to teach?

In answering this first part of the question, teachers gave a number of reasons for *why they think psychology is important to teach.* The categories and the number of teachers who mentioned them, along with examples, are displayed in Table 5.2.

Table 5.2

Teachers' responses to 'why do you think psychology is important to teach?' (N=61)

Category	**Number of teachers**	**Example**
Interesting & Enjoyable	17	*The topics are fascinating and fun for students. (Participant 22)* *We need subjects in schools that spark students' interest and get them excited about learning, and this is what psychology does. (Participant 50)*
Beneficial for students' personal life	31	*I feel Psychology is an extremely relevant and important subject area that can help students in their lives. (Participant 83)*
Beneficial for students' vocational life (career, study)	7	*It keeps students engaged and it is important to understand foundational theories of human behaviour for a number of career pathways. It also supports students who move into tertiary education involving psychology. (Participant 76)*
Beneficial for society	7	*An awareness of our own behaviour and that of others can lead to a more accepting, kinder and more creative and productive society. (Participant 5)*
Unique place in the curriculum	8	*It accounts for an understanding of human psyche that is invaluable and not taught in any other subject. (Participant 71)*
Psychological, scientific thinking	15	*The insight into human behaviour is important to foster and psychology opens this discussion up. The teaching of research methods establishes an objective and critical approach to our understanding, along with the power of the imagination to observe human behaviour and to question (Participant 34)* *Critical thinking skills and real world connections - applying knowledge and skills to develop informed opinions and views of the world (Participant 29)*
Specific content areas	11	*Psych is extremely important to teach in school. Specifically, social psychology in how we interact with others and also how our brain functions in the way that it does. (Participant 77)*
Unclear	9	*It should be taught because the ideas that psychology explores are important. (Participant 3)*

Note. A response can apply to more than one category.

Teachers thought psychology was important to teach for a number of different reasons. Almost two thirds (64%) of those teachers who responded to this question commented on psychology as helpful and relevant for their students to learn about themselves. They discussed these relevant and applicable aspects of learning psychology, in terms of benefits for students' personal life (51%) and professional life (12%), and benefits for society as a whole (12%). Interestingly, while 'what makes a discipline scientific' was limited to technical aspects associated with experiments, this was not the case here. Skills and dispositions and value for students' life were mentioned here. A quarter of teachers (25%) went further to discuss the value of learning to psychologically or scientifically think and reason with comments such as:

> I believe that in teaching students to think psychologically (scientifically) we equip students with the skills that they need to navigate the world and to critically evaluate information that is presented to them. (Participant 81)

Psychology is seen to be both interesting and enjoyable for students to learn, and has a unique place in the curriculum with useful connections to other subjects. Over a quarter (28%) of teachers noted that their students found psychology interesting and enjoyable. Some (13%) mentioned the unique place in the curriculum for psychology, something not taught elsewhere or having the unique ability to connect to all other subjects in the curriculum.

The teaching of specific content areas was also seen as important, with some (18%) teachers mentioning at least one specific content area they viewed as valuable for students to learn. Most of these content areas are taught in VCE Psychology (for example, memory and the brain) though some are not (for example, emotions and positive psychology). It was obvious in the teachers' responses that they viewed psychology as an important subject to teach in schools.

Are you able to teach psychology in ways you think are important?

In terms of the question *Are you able to teach psychology in the ways you think are important? Please explain*., teachers seemed reasonably comfortable with the way they are teaching psychology. However, many commented on some areas that limited their capacity to always teach in the way they think are important. While 20% of teachers stated that they are able to teach in the ways they thought were important, 15% said both ‘yes and no’, and a further 28% gave an unclear answer, addressing why they think psychology should be taught in secondary school but not whether they are able to teach it this way. While these teachers appeared enthusiastic about the teaching of psychology, they did not state whether they are able to teach that way, highlighting an issue with the framing of this question, and/ or the posing of a question that they needed more time to consider. A worrying 38% of teachers stated that they were not able to teach in ways they felt were important. A summary, with examples, is displayed in Table 5.3.

Table 5.3

Examples of responses to the Item: "Are you able to teach psychology in the ways you think are important? Please explain. (N=61)

Response	Number of teachers	Example
Yes	12	*Yes, I think Memory, Learning and Mental Health are important aspects of the secondary school experience and Psychology provides students with further insight that they can apply to their own lives in relevant and meaningful ways. (Participant 4)*
Yes & No	9	*Yes and no. So far as possible, I want students to take from psychology lasting understandings, the ability to think and reason scientifically - to see the world through the lens that is psychology. But there are obvious limits: course demands, how psychology is taught by other teachers within the school, what students expect from the subject (especially in Year 12, with an emphasis placed on what is assessed, what is measured). That being said, I have found teaching psychology immensely rewarding, something that has been mirrored in student feedback. I guess that, as a relatively new teacher, I have plenty of time to adapt my approach, to keep aspiring to create a better psych classroom. (Participant 61)*
No	23	*No, too much info to rote learn (Participant 82)* *No, I do not think I am able to teach in ways which match why I think it is important. The Year 12 course is structured around the exam, which is basically testing a student's ability to memorise and then regurgitate information. Psychology is so much more than that and I think that students often miss out, because there's so much they have to remember and we as teachers have to ensure little things like how correct their definitions are. (Participant 55)*
Unclear	17	*I think I am competent in teaching psychology as it stands currently. (Participant 63)*

Reasons why teachers reported that they could teach the ways they thought were important were in line with the reasons why psychology is important to teach in secondary schools, as summarised earlier in Table 5.2.

Just over half of the teachers (53%) who responded felt that they were not able to teach psychology in the ways they feel are important, giving 'No' (38%) or 'Yes and No' (15%) answers. A number of reasons were given. These included limitations based around the VCE Psychology Study Design (VCAA, 2012) (28%), including the strong examination focus (15%) and labelling it as content-heavy. For example:

> No, too much to memorise for the exam, which is now too long and covers too much. (Participant 49)

> I can't really teach the way I want to all the time. I would like to spend more time integrating things like psychological research skills into classes but there is so much content required to be covered that there is little time left over to do this. (Participant 38)

Other limitations included the omission of psychology in the pre-VCE curriculum (10%), highlighting the teachers' frustration that psychology is not part of Victorian AusVELS or Australian F-10 curriculum, for example:

> Psychology and its principles are a vital subject that should be taught in all secondary schools. Unfortunately, it is limited to VCE in most schools which is disappointing as I strongly believe it has a major place within all levels of our education system. The very nature of the discipline, behaviour and mental processes, are valuable areas of study that should be embedded within the national curriculum from bullying and aggression right through to learning and memory. Unfortunately, to the heavy content of the course means that students aren't given enough of an opportunity to practically examine many of the areas within the course that could offer students a greater understanding and apply this knowledge to real world applications. (Participant 53)

Further limitations included one teacher citing school constraints, and another claiming that psychology was too complicated for secondary school students to understand. One teacher saw the "*constant shoehorning of it into just the science field*" (Participant 33) as stopping them from embracing psychology's diversity, again raising the idea about differences between science-related and other disciplines and areas within psychology itself. Furthermore, some teachers (16%) commented that they would like more emphasis on a number of specific content areas, such as contemporary research topics, the brain, positive psychology and emotions.

Summary.

In summary, teachers enjoy teaching psychology and think their students enjoy learning psychology. These teachers saw psychology as beneficial for the individual student in terms of enjoyment, relevance and applicable to their personal and vocational life. They also viewed psychology as beneficial to society. The teachers acknowledged a diverse range of content areas that they felt important too, and under-riding many of the teachers' comments was a commitment to scientifically thinking and reasoning to navigate through one's life. Therefore, the teachers' views should not be seen as ignoring the science base of the discipline, if anything they embrace it. This also comes out when they justify whether they are teaching in ways they think are important, with many viewing the VCE Psychology Study Design (VCAA, 2012) as content bound and exam-driven and limiting the ways they would like to teach. These views could provide starting points for the psychological science framework, one that could shift the emphasis away from rote learning content, could be used with a range of content areas, and fits with a contemporary science approach.

5.5 Summary of Online Survey Data Analyses

The Victorian teachers of psychology in this study represent a range of experience teaching psychology and teach in a range of schools in urban and rural areas. Most have a tertiary psychology background, teaching in their field ('in-field'), with Psychology placed in the Science key learning areas (department) in their schools. The teachers come from a range of discipline backgrounds, with teachers in this study covering all key learning areas, with English, Humanities and Science equally most common. All have VCE Psychology experience, and just over half with Year 7 to 10 Psychology experience, although experience teaching in interstate or international psychology curricula is very limited.

Teachers were very positive about the importance of teaching of psychology in secondary school. The reasons why teachers think this way are varied, but mainly linked to relevance and benefits for their students (personal and professionally) and society. They feel psychology occupies a unique place in the curriculum and facilitates a number of thinking skills and dispositions including scientific reasoning, critical thinking, perspective taking and application. Some are happy with the way they currently teach, others want to move away from what they see as a content-bound curriculum.

Teachers view psychology as a science and report that they teach psychology as a science. They are likely to hold a range of views of science, with many viewing a discipline as a science when research involves the use of experiments or following the scientific method. Those who expanded on their answers tended to discuss more technical aspects such as the importance of replication, objectivity, validity and reliability. Some of the teachers' views may be contradictory or change depending on the psychology context. It is unclear how they understand and teach psychology as a human endeavour, the distinction between observation and inference and the role of creativity and imagination in psychology, and the use, value and limitations of a range of research methods, beyond experiments. Teachers are familiar with the terms 'systems', 'models', 'explanations', 'patterns' and 'observations' and are likely to hold a range of views related to each practice. The ways they currently teach each practice is unclear, although the online survey raises questions around the extent they are teaching the complexities of each practice. This includes distinguishing between observation and inference, data and evidence, evidence and explanations, and the use of models and systems in psychology. These aspects would be useful for teachers to contemplate when discussing views of psychological science and introducing the psychological science framework.

While the survey does not delve deeper into the teachers' reasoning or contextual elements, it does provide useful starting points for discussing contemporary science practices. These teachers are likely to be open to a psychological science framework, especially given psychology's place in the school science KLA and as a VCE science study and just over half teaching psychology pre-VCE, and they view and teach psychology as a science. Many teachers want to move away from teaching a content bound and exam driven course and it is clear that they enjoy teaching psychology, as do their students. Teachers report that they build on curriculum experiences within and across semesters and interweave teaching concepts with science inquiry, and learning about the psychological science framework may open up discussions into what this could (or does) look like in their classrooms. Teachers are likely to have multiple views, and these could provide starting points to introduce the psychological science frame, and allow them to reflect and challenge ways of teaching psychology as a science and the image of psychological science they present in their classrooms.

5.6 Chapter Summary

This chapter explored the data from the first phase of this study: the online survey. It described the demographics of the Victorian teachers of psychology and gave a snap shot of their views of psychology as a science and the ways they are teaching psychology as a science. Data analyses suggests that teachers have good intentions for teaching of psychology, beyond getting students to pass the high stakes VCE Psychology examination, and are likely to hold a range of views of psychology and science and reported ways of teaching psychology as a science, sometimes conflicting views.

Chapter 6: Phase Two (Workshop) and Three (Individual Interview) Data Analyses

6.1 Introduction

This chapter considers the data from Phase Two and Three, and in doing so contributes to the following research questions:

RQ 2 What are teachers' views on using the psychological science framework as a support for their teaching of psychology?

RQ 3 In what ways does this psychological science framework shift teachers' views for teaching psychology?

The focus within Phase Two, workshops, and Phase Three, individual interviews, was on the teachers' views and experiences with using the psychological science framework as a support for their teaching.

The chapter first describes the participants who completed these two phases. It then discusses the four central themes arising from the Phase Two and Three data based on the analyses described in Chapter 4. The themes arising from the analyses are identified, and each theme and the related subthemes are discussed in detail, outlining the range of teachers' views, including any changes between initial views within the workshops and later in the individual interviews. In Chapter 8 all three phases are discussed in light of the research questions and literature review.

6.2 Phase Two and Three Participant Demographics

As discussed in Chapter 4, 11 teachers participated in Phase Two, the workshops, and nine continued to Phase Three, the individual interviews. Two workshops were held, with six psychology teachers (five female, one male) participating in Melbourne (urban workshop) and five (all female) in a rural setting (rural workshop) during the months of March and May 2015 respectively. The participant demographics are summarised in Table 6.1, using pseudonyms.

Table 6.1

Demographics of teachers participating in Phases Two and Three

Participant (pseudonym)	**Gender**	**Highest psychology qualification**	**Years teaching psychology**	**Psychology teaching experience**	**School setting**	**Other key learning areas (KLAs)**	**Phase Two: Workshop**	**Phase Three: Individual Interview**
Anne	Female	Masters	2	VCE	Urban Government	English, Mathematics	Urban Attachment	Yes
Bianca	Female	U/G Minor	2	VCE, Year 10	Urban Government	English, Humanities, Languages	Urban Attachment	Yes
Chris	Male	U/G Major	1	VCE, Year 8, 9, 10	Urban Government	English	Urban Attachment	Yes
Danielle	Female	U/G Major	9	VCE	Urban Independent	The Arts,	Urban Memory	Yes
Edwina	Female	U/G Major	5	VCE, A level, Advanced Placement	Urban Catholic	The Arts, Health & PE, Religious Education	Urban Memory	Yes
Fiona	Female	U/G Major	12	VCE Year 10	Urban Government	Science, Mathematics	Urban Memory	No
Lucy	Female	U/G Major	8	VCE, Year 10	Rural Government	English, Humanities	Rural Attitudes	No
Marissa	Female	U/G Minor	4	VCE, Year 10	Rural Independent	English	Rural Attitudes	Yes
Nina	Female	U/G Major	1	VCE Year 9, 10	Rural Independent	Science	Rural Attitudes	Yes
Olivia	Female	U/G Minor	20	VCE, Yr 7,8, 9, 10	Rural Government	Science	Rural Learning	Yes
Pippa	Female	U/G Major	4	VCE	Rural Government	English, Languages	Rural Learning	Yes

In both workshops, there were sets of teachers who teach together in the same school (Anne and Bianca; Lucy and Olivia). The teachers in the rural setting already knew each other via an informal psychology teacher's network in the region. Except for the sets of teachers who teach at the same school, the urban group did not know each other.

All teachers had a tertiary psychology background, with 64% within their first five years of teaching psychology. All had VCE Psychology teaching experience, with seven of the 11 having taught Psychology in Years 7 to 10. Only one teacher (in the urban workshop) had experienced teaching other (non-VCE) senior psychology curricula. Teachers were currently working in both government and non- government schools and taught in a range of key learning areas (KLAs) besides psychology, with some with more than two KLAs. Psychology sits within the Science Department in each teacher's school. The selection of participants and demographics are reasonably similar in both workshops and for purposes of this study, the data are treated the same.

A total of nine teachers (eight female, one male) were available and participated in follow up individual interviews conducted in the teachers' school setting at a time that suited them during June and July 2015. Interviewed were five teachers from the urban workshop and four from the rural workshop. One teacher (Chris) had not taught psychology since the workshop. Table 6.1 indicates the participants who completed Phase Three of the study, showing a similar representation from both groups.

6.3 Organising and Analysing the Data

As discussed in Chapter 4, multiple data sources were used in Phases Two and Three of the study. These included the workshop meetings, individual interviews, the completed mapping exercise, reflective tools, curriculum and other supporting documents, and researcher notes. The analysis was an ongoing iterative process of gathering and processing the data (Lichtman, 2010), rather than a single and linear process. Lichtman's (2010) generic approach, The Three Cs, to processing of coding, categorising and identifying concepts, to draw findings from the data was followed. In this study, the terms 'themes' (and 'sub-themes') represent the 'concepts' (and 'sub-concepts') identified in the data. The shift to 'themes' is a deliberate attempt to avoid confusion with psychological 'concepts', as the study is investigating whether the psychological science framework promotes the teaching of psychological concepts with science practices. This lengthy and iterative process is outlined in this section and summarised in Figure 6.1.

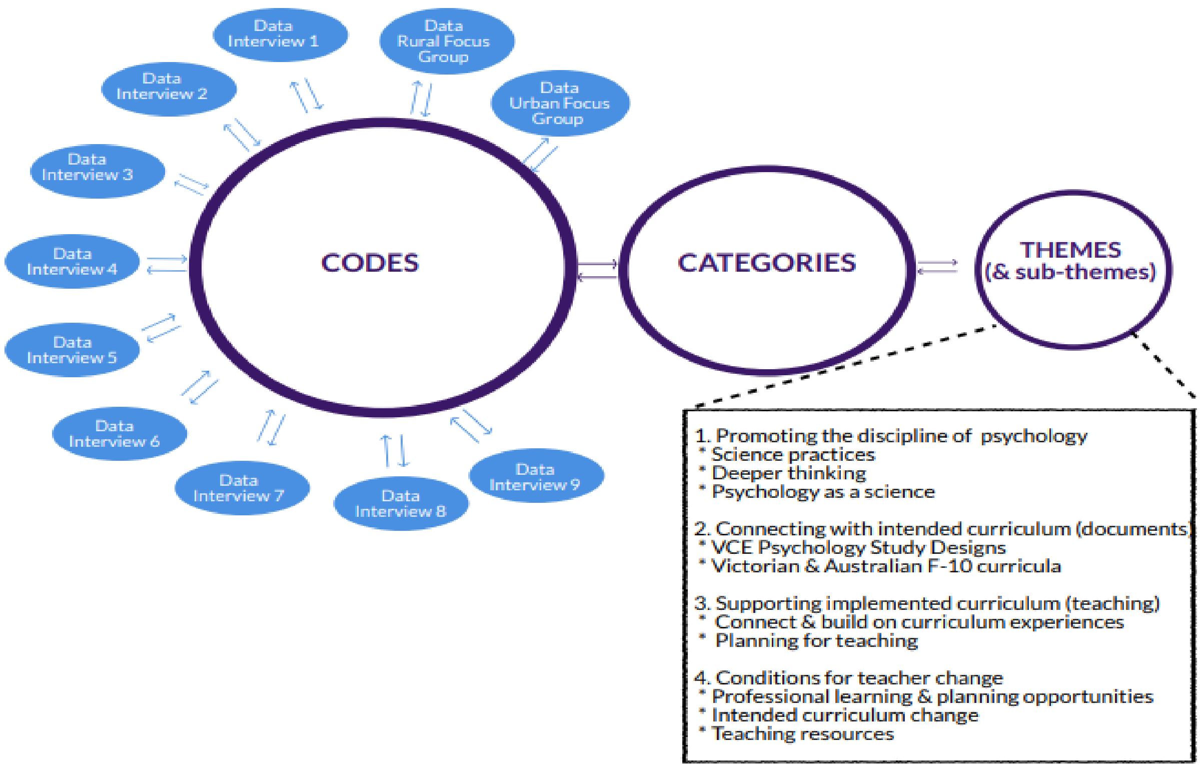

Figure 6.1. Three Cs of data analysis (codes, categories and concepts (themes)) for Phases Two and Three of this study.

The processing of the data began soon after the first workshop and continued for a long period after the final interview. With the research questions in mind, each transcript (including associated data) from the workshops and individual interviews were carefully considered in turn and classified into initial codes. These initial codes were based on their relationship with the data at the time, rather than proposed codes before the analysis. A large number of initial codes (45) were created.

The initial codes were revisited and reviewed for consistency, modification or deletion. Importantly, the data analysis was open to identifying new codes. Data were re-read and interviews re-listened to and scrutinized several times, in light of the research questions. In the end, 16 codes existed at the end of the analysis.

Working from the codes rather than raw data, these codes were organised into categories. Over time, decisions were made in terms of modifying this initial list of categories, with some being combined or seen as subsets of another.

Finally, a small number of central and meaningful themes were identified from the categories. Eventually there were enough commonalities to be confident of the themes, and their sub-themes. After reaching the stage that felt like "saturation point" with sufficient data and not creating new themes, the transcripts (raw data) were re-checked to ensure the themes were supported. At many points during the analysis process, the codes, categories and themes were examined and discussed with my supervisors, both experienced qualitative education researchers. The themes appeared to be a rich and powerful reflection of the data.

6.4 Themes Arising From Data

Four themes (promoting the discipline of psychology, connecting with the intended curriculum, supporting the implemented curriculum and conditions for teacher change) were identified with each containing sub-themes (see Figure 6.1), with examples of each sub-theme given in Table 6.2, and will be discussed in detail in this chapter.

Table 6.2

Themes and sub-themes for teachers' views and (potential) use of the psychological science framework

Theme	Sub-theme	Example
Promoting the discipline of psychology	Science practices	*"The practices, it was an awakening to think the fit of the evidence with the model, and recognise assumptions with it." (Danielle, UW)*
	Deeper thinking	*"With the framework, I think the focus is having your students come into classes as questioners. If the focus is on that 'why are we doing this', 'how could we do this', and creating opportunities for them to question and then, 'how do we experiment'. 'Why don't we do something else?' And having them think about other ways should fit in the frame.* (Chris, II)
	Psychology as a science	*"The framework is getting them [students] in that mind-frame, like this [psychology] is a science, and this is why."* (Bianca, II)
Connecting with intended curriculum (documents)	VCE Psychology Study Designs	*"Difficult to explore the idea of observations in such depth when we are limited within the Study Design, but very good for Year 7 to 10. Patterns can lead to new domains of thought which again, can take time and steer you off into a great conversation, but Study Design limitations means this isn't always ideal."* (Edwina, UW).
	Victorian and Australian F-10 curricula	*"I'm excited that this framework fits in very well with what 'science' is currently conceptualised as by ACARA. I think this provides a valid argument to include psych as a 7 to 12 subject; particularly as this framework coincides with curriculum priorities."* (Anne, UW)
Supporting implemented curriculum (teaching)	Connect and build on curriculum experiences	*"The frameworks new way of thinking about teaching psychology that is more interconnected and will help link Year 11 and Year 12 and middle school psychology."* (Lucy, RW)
	Planning for teaching	*"Yes, for sure, [use the framework] as I said, we have just done lifespan and then next term we will be looking at social psych. I have been focussing more on application tasks, its given ideas." (*Bianca, II).
Conditions for teacher change	Professional learning and planning opportunities	*"Perhaps it is just managing that workload as well. It may be that and with more experience, I sort of, will be much more flexible and relaxed and open [to new ideas]. An opportunity to then speak with others during the course [within this study], how they are finding the framework and using it, would have encouraged me further to use it and effectively use it."* (Pippa, II).
	Intended curriculum change	*"Well it just depends, it would require I feel like the text book to do the same thing. We use those, the text book refers to things as theories and not models. It must be in the Study Design."* (Nina, II).
	Teaching resources	*"I need more of a visual. The table [of the framework] for me didn't work, um but as soon as I started to put it down into my mind maps form, for me that was where I was really able to see themes and how everything linked together.* (Olivia, II)

The teachers are identified via pseudonyms as listed in Table 6.1, and occupying each quote, the source of the participant data via the urban workshop (UW), rural workshop (RW) or individual interview (II) is also identified.

Shifts in teachers' views between workshops and individual interviews.

This chapter considers the data from both the workshops and the individual interviews which took place 2 to 3 months after the workshops. The one-shot workshops introduced the framework and asked teachers to work in groups to map their next teaching topic. In the later individual interviews, teachers were asked to reflect back on the time since the workshops as well as consider their future teaching. While teachers were not told that they needed to incorporate the framework into their teaching, the workshops got teachers thinking about teaching of psychology and some used aspects of the framework, as shown in Table 6.3. The individual interviews therefore tap more into the teachers' practice and their views of the psychological science framework as a support for their teaching over time.

Table 6.3

Teachers reported change in teaching of psychology after workshop, N=9

Reported change in teaching		**Number of teachers**	**Teacher Demographics** **Pseudonym (KLAs they teach besides Psychology in Science KLA)**
Change in teaching:	Explicit use of aspect(s) of the framework	4	Anne (English, Maths) Bianca (English, Humanities, Languages) Danielle (The Arts) Olivia (Science)
	No explicit use of framework but changed approach to integrating research and research methods into teaching Key knowledge	2	Edwina (The Arts, Health & PE, Religious Education) Nina (Science)
No change in teaching		2	Marissa (English) Pippa (English, Languages)
Has not taught psychology since workshop		1	Chris (English)
Total		**9**	

Interestingly, there does not seem to be a strong representation regarding the KLAs the teachers teach besides Psychology in Science KLA in the three different groups regarding reported change (or no change) in teaching, although the two reported no change also taught English. Different perspectives from different discipline backgrounds did not seem to make a difference. All of these teachers had studied psychology at tertiary level to at least a minor qualification. Importantly, Anne and Bianca teach together and spent some time planning for teaching psychology with the framework. However, Marissa, Nina and Pippa are the only teachers of psychology within their schools. Perhaps informal and formal opportunities to collectively plan and reflect on their teaching within their school setting may have made teachers more likely to change their teaching.

The teachers who changed their practice typically said *"I was more clinical in the way we integrated research scenarios and research methods"* (Danielle, II). Half of the teachers (four) who had taught psychology since the workshop had explicitly incorporated aspects of the framework in a number of ways, discussed later in this chapter. Another two teachers changed their approach to integrating research methods into teaching Key knowledge, without explicit use of the framework. For instance, *"I think it has made me focus on linking the theories to past research in a more concrete kind of way"* although only *"in my mind I have used the framework, but when I am actually teaching out loud, I probably have not referred to the framework."* (Nina, II). The other two teachers said they would like to use it because they thought it was valuable but "*still getting my head around it"* (Marissa, II) and felt they needed more support in how to use it to support their teaching. The teacher not currently teaching (Chris) seemed to have a good grasp of the framework and hoped to use it as a support when teaching psychology in the future, as it provided *"a more useful way of approaching psych teaching, especially in the sense that it can make new ideas more coherent"* (Chris, II).

Within this chapter, the teachers' views on the use (or potential use) of the framework are discussed in relation to each theme. Any changes in their views between the workshops and individual interviews are noted, along with shifts in their views for teaching of psychology in general.

6.5 Theme: Promoting the Discipline of Psychology

This section focusses on the teachers' views and experiences of (potentially) using the psychological science framework to promote an understanding of the *discipline of psychology.* The *promoting the discipline of psychology* theme relates to teachers' views about the way the psychological science framework fits with their views of psychology as a discipline. This theme was discussed by teachers in different ways. As a result, this theme is broken down into three sub-themes to highlight the key aspects that support this central theme (see Figure 6.2): *science practices* in psychology, *deeper thinking* in psychology*,* and *psychology as a science.* Underlying this theme are the teachers' views of psychology as a science and their views of science.

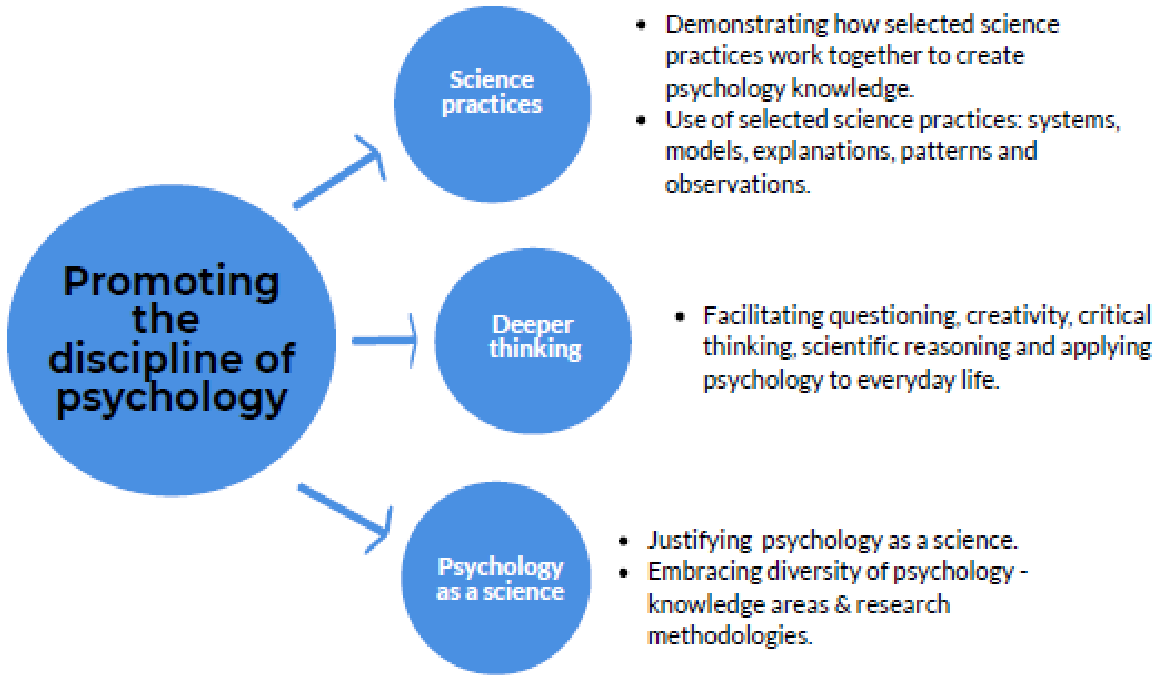

Figure 6.2. The 'representing the discipline of psychology' sub-themes.

A range of views existed in terms of using the psychological science framework to represent the discipline of psychology, with some shifts in views between the workshops and individual interviews, as noted in Table 6.4. Each sub-theme will now be discussed.

Table 6.4

Range of teachers' views in relation to using the psychological science framework to promote the discipline of psychology theme

Sub-theme	Range of teachers' views in the workshops	Shifts in range of teachers' views between workshops and individual interviews
Science practices	The framework:	
	• represents a new overarching approach to teaching psychology, leading with the science practices rather than content.	• Still seen as an overarching approach by most teachers but was not always viewed as a complete framework, with teachers tending to overlook at least one science practice.
	• initially resonated with teachers because they felt familiar with psychology's use of the selected science practices.	• Varied in terms of familiarity with psychology's use of science practices. Some teachers viewed the science practices are more complex than initially thought in the workshops while still viewing the framework as promoting psychology; others simplified the science practices to fit with their current way of teaching with some not explicitly referring to the framework to promote the discipline.
	• was understood to promote psychology in different ways, with some science practices more favoured and easier to use for teaching than others, and this varied between teachers.	• More pronounced. Difficult to integrate some science practices for teaching of psychology, with some science practices preferred more than others (this varied between teachers). Issues with science practice terms (terminology confusion) and difficulty identifying opportunities for use of framework in the classroom.
Deeper thinking	The framework:	
	• moves focus away from rote learning content towards understanding the bigger picture of psychology and therefore promoting deeper thinking and learning of psychology.	• No shift for most teachers, with a desire to focus on the bigger picture to promote deeper thinking. Some feeling more constrained or unable to move the focus of their teaching. More support to learn about using the framework wanted to avoid teaching in limited, if not shallow, ways.
	• could encourage strategic thinking in psychology, offering scope for higher order thinking tasks. Framework opens up lots of opportunities, perhaps too many, potentially could be overwhelming for teachers.	• No shift. The ways framework was used to promote strategic thinking was often limited to asking questions, mainly in class discussion situations. Some teachers discussed framework in terms of promoting how psychology applies to personal, social and global issues. Some found it difficult to identify opportunities in class to use the framework for strategic thinking.
	• could inspire curiosity and encourage students to want to know how psychology works, although a couple of teachers thought that students may not be interested.	• No shift, still seen as interesting although a number of constraints present, including time for student-led activities and student interest.
Psychology as a science	The framework:	
	• justifies psychology as a science, making it easier to understand the science base of psychology. Highlights how science knowledge is constructed beyond narrow views of science (such as limited to use of experiments and biological psychology).	• No shift, although many keen to learn more about ways to use the framework to support psychology as a science and a couple of teachers modified their understandings of the framework to fit with their understanding of science.
	• embraces the diversity of psychology (psychology's broad range of content areas and research methodologies).	• Less emphasis in terms of relating the framework to a broad range of content areas beyond what they were teaching. No shift for most teachers in terms of the range of research methodologies, although a couple of teachers limited discussions to promoting the experimental method.

Note. No shift = view was still present in the individual interviews

6.5.1 Sub-theme: Science practices.

Teachers perceived the framework's inclusion of 'science practices' as promoting the relationship between psychology and science, leading to this sub-theme use of *science practices* in psychology. They spoke about the selected practices in a number of ways including:

- promoting a new overarching approach,
- familiarity with psychology's use of the selected science practices, and
- some science practices more favoured and easier to use than others.

The teachers' views did not seem to alter depending on the other KLA subjects they taught, whether within science KLA or non-science KLAs. These views are now discussed, starting with views in the workshops and then shifts in views between the workshops and interviews.

Teachers views in the workshops.

The ways the teachers viewed the framework's inclusion of 'science practices' in the workshops are now outlined.

Promoting a new overarching approach. The teachers viewed the framework as providing an overarching theme that *"gives an overview of why psychology is important and relevant"* (Olivia, Rural workshop (RW)). The framework represents a new approach to teaching psychology, leading with the science practices rather than content knowledge, to promote how psychology develops its knowledge, as stated *"These practices tie it all together, in a way that makes sense. An interconnected approach to the framework that is logical."* (Lucy, RW). They liked the focus on the processes of developing psychological knowledge rather than only content knowledge. Comments such as *"it was an awakening to think about explanations with the fit of the evidence with the model, and recognise assumptions with it"*

(Danielle, UW) highlight that the framework offered new ways of thinking about psychology's relationship with the selected science practices, such as creating explanations, and how the practices work together to construct knowledge.

The teachers were initially very positive about each of the selected science practices and the way they worked together to build psychological understandings**.** Olivia sums up their thoughts:

> I think it [framework] is good. It is from observations and patterns that you really make the inferences in the explanations. Relationships are here, in patterns, and then explain why it happened. And that is where we use classical conditioning model, part of learning systems. You challenge what you do. You get those relationships and then infer and challenge what you do as you create arguments for explanations. (Olivia, RW)

Olivia's comments show how the teachers tended to view the science practices as iterative and connected to each other and the psychology concepts, viewing the framework as offering an overarching approach to teaching how psychology constructs its knowledge.

Familiarity with psychology's use of the selected science practices. The framework initially resonated with the teachers because they felt familiar with each of the selected science practices. *"The framework's practices, while we do these already, they embed the research methods we have to teach, which then assists teachers in embedding the practices into our teaching."* (Bianca, UW). The teachers were confident that the science practices represented the discipline and could be used to support their teaching, likely due to the familiar names of each practice. For instance, when first introduced to systems in the workshops, the teachers referred to systems stated in the Study Design (VCAA, 2012) or commonly used in science, such as memory systems, learning systems, perceptual systems, social systems, biological systems, brain and nervous systems, and other body systems. They had already thought about the overlap between different areas, such as links between memory, learning and the brain, and liked the way systems reinforced such relationships, as Marissa comments:

> I like the succinct, specific way of thinking about systems and I always teach how psychological concepts are interrelated, so to say that systems are interrelated makes the broad spectrum of psych easy to understand. (Marissa, RW)

Similarly, the term ‘model’ also initially resonated with the teachers. In the workshops, they referred to models mentioned within the Study Design (VCAA, 2012), for example: model of a neuron, tri-component model of attitudes, models for explaining human memory, three-phase model of operant conditioning and the biopsychosocial model of mental health. They viewed the other selected practices (intentionally carrying out observations, looking for patterns in this observational data, and forming explanations) as part of what it means to carry out research and construct psychology knowledge. Therefore they saw these science practices as an important part of psychology and ones that are incorporated within the Study Design (VCAA, 2012). For instance, this urban workshop mapping group discussed the link between the framework and their teaching, viewing the science practices in the framework to promote how psychology knowledge is constructed and support their teaching in more explicit ways:

> Fiona: It is more important to understand data. So they do the observations, or at least discuss studies. They do it themselves or an experiment that is already done and discuss the data. Interpret the data. These practices bring the experimental methods into it. Observation, patterns, explanations.
>
> Danielle: Yes, we want kids to make their observations in relation to an existing model and just get their own thoughts to actually get them thinking about the data. This is what I have done.
>
> Edwina: I guess it is opening up that opportunity for the type of research that has been done previously, and then what they are about to do, so we are integrating those aspects of research with this [framework] so the science practices have skills and understandings and we are more explicit. (Unit 3 memory mapping exercise group, UW)

The teachers viewed the framework as promoting much more than the skills required to carry out research, especially understanding why and how psychology knowledge is constructed.

Some science practices more favoured and easier to use than others. While the teachers felt familiar with the science practices, and saw them as promoting psychology as a discipline, they also viewed the science practices in different ways for teaching psychology. In the workshops, integrating the framework for teaching took time during the mapping activity, showing that the framework representing new ideas for teaching psychology. For example, each mapping group took time to identify and put a boundary around an open system, demonstrating how it was not straight forward to identify how systems could promote psychology as a discipline and fit with their teaching. Two mapping groups struggled more than the other two, as acknowledged "*In the end we called attachment a system. We have models, Ainsworth is a model of attachment. Attachment systems interact with emotional systems, developmental systems and others* (Chris, Unit 1 attachment mapping exercise group, UW) and "*We needed more time to understand systems & models approach but we think we got there eventually.*" (Lucy, Unit 2 attitudes mapping exercise group, RW). Consequently, each mapping group considered all the selected science practices but preferred different ones. The Unit 1 attachment mapping exercise group preferred observations; Unit 2 attitudes preferred explanations; Unit 3 memory were fond of patterns in data; and systems and models resonated most with Unit 4 learning group. These differences were surprising and did not seem to be related to the psychological content they were mapping at the time.

Surprisingly, while the teachers remained positive in the workshops in terms of using each science practice to represent the discipline of psychology, the ways the science practices were preferred and understood varied not only between the mapping groups but also between individual teachers within the mapping groups. For instance, in the Unit 3 memory mapping group, Fiona states that *"Defining the system was what I found the most difficult…patterns in data is very important and what is best here, and considers understanding and interpreting the data."* (Fiona, UW) while Danielle "*I like models and can link this framework in my work. I can link Sherriff's work, models that consider discrimination, here. And so could use the framework."* (Danielle, UW). In the Unit 2 attitudes mapping group, Lucy comments on her preferences "*I am particularly fond of the argumentation aspect of explanations…models is difficult, the model or the theory, and when is a model a model?*" (Lucy, RW) with Marissa's preferences: *"Observations is a plus. Learning about how and building upon observations and making connections to concepts."* (Marissa, RW).

The teachers may have heard of the science practices before, but their responses to the mapping exercise suggest that for many of the teachers this was a new way of thinking, with comments such as "*It's interesting that it* [the framework] *seems simple but is actually a quite complex way of thinking.*" (Edwina, RW). Such variations in views and preferences are likely to have different impacts on the ways the teachers view and use the framework to support their teaching in the future.

Shifts in teachers views between the workshops and individual interviews.

In the individual interviews, the framework was still viewed positively in terms of supporting teaching with the science practices to provide an overarching approach to promote the discipline of psychology. The teachers' views were similar to those in the workshops although it was more evident in the individual interviews that the teachers understood the science practices and the ways they represent the discipline of psychology to support their teaching in different ways. Some science practices were favoured more than others and again this varied from teacher to teacher. For instance, "*It was more about the models and the patterns in data that I found that I used the most*" (Edwina, II) as opposed to *"Model is a word I have not been using with the students." (Pippa, II)* and *"A word I have started using is systems. That was not a word I used previously, and getting them to mind map the possible systems involved"* (Olivia, II) with "*The practice of systems that is still something that I am still trying to get my head around. I like the idea but I am not sure."* (Marissa, II). These variety of understandings had implications for the ways the teachers viewed the framework to support their teaching, with the shifts from the workshops summarised as follows:

- Differences between teachers' understandings of the selected science practices were more pronounced, making it difficult for many teachers to use one or more of the science practices within the framework for their teaching.
- The selected science practices were not as familiar to some teachers as they thought in the workshops, while others still felt they were familiar, with some teachers modifying their understandings of the framework to fit with their current ways of teaching.
- The framework was still seen as an overarching approach by most teachers but was not always viewed as a complete framework, with some teachers overlooking or omitting some science practices.

Some teachers recognised that the science practices were more complex than they thought in the workshops, especially when they began to think about implementing the framework into their teaching. Some teachers, such as Danielle, worked hard to understand more about the ways each of the selected science practices work together to promote the discipline of psychology. Others, such as Pippa, understood that they needed to know more about the science practices before using the framework in the classroom. Interestingly, all the teachers wanted more opportunities to learn and many noticed missed opportunities for using the framework while teaching.

For many teachers, the science practice terminology was problematic as they tried to fit it in with what they already understand and teach. These teachers worried that the names of the science practice would confuse students, as Nina justifies not explicitly referring to the science practices in the framework: *"Yes, so I just feel like I need to be consistent with their textbooks, a little bit in this language*." (Nina, II). Two teachers felt the difference between 'the practice of observation' and 'observational versus experimental research' is confusing, and preferred not to introduce this practice, as Edwina explains:

> When I talk about observations, I talk a lot about observational studies, but I don't talk about observations. But in my head, I don't have the link between just the observation part being about observational studies, and only observational studies. I kind of made the understandings of the link in my head being as what we observe in studies that we can link, and that's how I think of it rather than that is an observational study, and that is why I probably did not use the word as much. (Edwina, II)

Others decided not to use science terms because they felt they already used terms that worked well in their teaching. For instance, Olivia explains that introducing the term 'model' is unnecessary:

> Model is a word I have not been using with the students. A word I have been, and I am not sure if I am actually using a correct alternative, but I have been using is theories. So that is something that the students seem familiar with. So rather than introducing a new concept or term, I have been using theories with them. Um, which again I think has worked with the students. And learning again really allows for comparisons of different theories and looking at similarities of different theories. (Olivia, II).

A couple of teachers still viewed the science practices as working together to create knowledge, but limited the science practices to representing specific and orderly steps to writing up a research investigation report. These teachers simplified the science practices, and overlooked models and systems when discussing the framework to promote psychology with their teaching. They did not feel the need to explicitly refer to the science practice terms, as Nina explained when she spoke about using the framework for teaching a classical conditioning research investigation:

> Data and analysis would be terms that I currently use, not observation or patterns or explanations. I feel like we do all of this in class and we refer to them as different terms. Our research method are observations, our data are patterns, our discussion are explanations. (Nina, II)

In this manner, the complexities of each science practice, such as intentionally deciding what to observe and how to observe and generate data to suit the purpose of the research was downplayed, if not overlooked.

Overall the teachers saw the science practices within the framework as supporting their views and teaching of psychology and promoting the discipline of psychology in new ways. However, the different understandings of the science practices and how they promote psychology meant that the teachers tended to overlook one or more of the science practices when thinking about how to use the framework as a support for their teaching. The teachers tended to modify the science practices in the framework to fit with their current ways of teaching, picking the science practices that resonated with them and ignoring the others. They either did not want to confuse the students with additional terminology or saw their current ways of teaching, including the different terms they use, as adequate and equivalent to teaching the science practices within the framework. In turn, these different views of teaching the science practices impacted on the extent to which the teachers viewed the framework as supporting their teaching of psychology. As a result, the framework was not always viewed in its entirety by all the teachers, with often one or more science practices not considered for their teaching. The intended aspects of the framework, including the way the science practices work together to create knowledge, was downplayed.

6.5.2 Sub-theme: Deeper thinking.

The teachers viewed the framework as a support for thinking about psychology in more complex and interesting ways, representing *deeper thinking* associated with the discipline of psychology. Discussions around this sub-theme, promoting *deeper thinking*, tended to centre on the framework:

- Shifting teaching towards understanding bigger picture of psychology
- Encouraging strategic thinking
- Inspiring curiosity and motivation to learn how psychology works

Again, no noticeable differences were found between teachers who taught other science KLA subjects or non-science KLA subjects. These views are now discussed, starting with views in the workshops and then shifts in views between the workshops and interviews.

Teachers views in the workshops.

Discussions around this sub-theme, promoting *deeper thinking*, were particularly evident in the workshops.

Shifting teaching towards understanding bigger picture of psychology. All teachers valued the framework as offering a bigger picture of psychology, with comments such as the following:

> The notion of teaching psychology through frameworks such as OPEMS [the name the teachers created for this framework: Observations, Patterns, Explanations, Models and Systems] provides students with a much richer understanding of psychology which can be transferred and utilised beyond the classroom and within everyday life experience. Also allows students to explore different ways of thinking for future learning. (Anne, UW)

They saw the framework as offering a bigger picture of how psychology knowledge is constructed and building conceptual understanding, rather than learning content in isolation. For instance, "*The framework is an integrated approach which emphasises a process for understanding rather than 'chopping up' knowledge into bits which often feels unnatural."* (Pippa, RW) and "*I like how it* [the framework] *helps link the course content, that can be difficult to link conceptually, to engage a more meaningful understanding.*" (Danielle, UW). The teachers viewed teaching with the framework as moving the focus away from rote learning content towards understanding the bigger picture of psychology and therefore promoting deeper thinking and learning of psychology.

Encouraging strategic thinking. In the workshops, the teachers viewed the framework as emphasising strategic ways of thinking, by *"providing scope for more challenging tasks and promoting higher order skills"* (Olivia, RW), *"aiming for psychologically literate citizens"* (Lucy, RW) and "*lends itself to cultivating a psych classroom that is nourishing, promotes a way of thinking that is useful, relevant and likely to transfer and be useful in the future.*" (Chris, UW). They discussed the framework as encouraging a number of strategic ways of thinking, often calling these higher order thinking (HOT), such as creativity, critical thinking, decision making, scientific reasoning and applying psychological understandings to personal, social and global issues. Although teachers liked the flexibility of the framework, they worried about its implementation, as Danielle states "*we have a number of time constraints, so how do we not be overwhelmed by its [the framework's] use and the possibilities for more relevant and meaningful thinking? How do we overcome these?*" (Danielle, UW). Such comments reflect that the framework represents a new approach for teaching, as discussed earlier, but an approach not always compatible with their teaching.

Inspiring curiosity and motivation to learn how psychology works. The teachers thought using the framework could inspire student curiosity and encourage students to want to know how psychology works. "*So we make the students feel positive. I can change this with the frame, so they take responsibility, supporting students to feel ownership, to be curious, to ask questions, to think how to do psychology*" (Chris, UW) and "*this framework is a richer way of thinking, and we do try to do that where possible but what we find the students' ability to do this study, we would have to lead it a lot, and what has let us down is the assessments.*" (Anne, UW). While teachers were positive, some teachers did not see this as realistic for their teaching because "*students are not really interested in 'how do we know what we know', but they just want to 'know what they need to know' for the exam.*" (Nina, RW). Such comments reinforce that the framework represents a new approach for teaching, as previously discussed.

Shifts in teachers views between the workshops and individual interviews.

The teachers viewed the framework as promoting deeper thinking in psychology in similar ways in the individual interviews. Shifts from the workshops tended to be in terms of feeling unable to make the shift in teaching to promote deeper thinking including:

- Some teachers feeling more constrained or unable to move the focus of their teaching from rote learning to bigger picture to promote deeper thinking in psychology. More support to learn about using the framework and wanting to avoid teaching in limited, if not shallow, ways.
- The ways teachers viewed promoting strategic thinking was often limited to the teacher asking questions, mainly in class discussion situations. Some teachers discussed the framework in terms of promoting how psychology applies to

personal, social and global issues. Some found it difficult to identify opportunities in class to use the framework for strategic thinking.

- A number of constraints were discussed in terms of using the framework to promote student curiosity and motivation to learn about how psychology works, including time for student-led activities and student interest.

In the individual interviews, all but one teacher highlighted the value of the framework to promote deeper thinking. Five of the nine teachers provided more details about how they viewed or used the framework to promote deeper thinking via asking questions related to each practice. Questions such as *"How do you know? What can you see? And what can't you see? And what is implied? And then what does that behaviour indicates and that stuff?"* (Edwina, II). These teachers viewed the framework as providing a vehicle to go beyond rote learning the Key knowledge as *"students can delve further into those interesting things that we don't always get to do, because we are focussing on the dot points only."* (Edwina, II). Again, they praised the shift from rote learning information to deeper conceptual understanding and thinking in psychology. Similarly, the framework was viewed as promoting students questioning and scrutinising of ideas, as Chris explains here:

> With the framework, I think the focus is having your students come into classes as questioners. If the focus is on that 'why are we doing this?', 'how could we do this?', and creating opportunities for them to question and then, 'how do we experiment?', 'Why don't we do something else?' And having them think about other ways should fit in the frame. (Chris, II).

The emphasis on interweaving the Key knowledge (psychological concepts) with science practices within the framework was seen to present opportunities to engage in deeper learning within the context of learning the psychology concepts in ways they had not considered before. This emphasis was viewed as more than just learning the Key knowledge, but having a great appreciation of how the psychology knowledge is or could be developed. Unlike the workshops, only a couple of teachers discussed the framework in terms of application to personal, societal and global issues. Some teachers raised concerns with using the framework this way, with such comments as "*we don't have time to teach the HOT skills in VCE*" (Edwina, II), "*these HOT skills are great, but my students would struggle unless we start this in younger years*" (Anne, II), "*students only want to learn what is on the exam*" (Nina, II) and "*I would love to do this, it is richer way of thinking, but not sure how*" (Pippa, II). Although the teachers recognised that the framework can be used for deeper learning, they wanted more time to consider how to shift their teaching to use the framework to promote deeper learning.

In summary, the psychological science framework offered new ways for teachers to consider what deeper thinking in psychology may look like, different from current ways of teaching psychology, through emphasising the teaching of psychology concepts together with science practices. They view the framework as potentially enabling their teaching to avoid a shallow understanding of the Key knowledge to one that focusses on deeper thinking and learning of psychology, one that encourages students (and themselves) to think more deeply about how knowledge is created. However, not all teachers were convinced that students will be able or motivated to learn at this deeper level. This shift will require more support for teachers to enable them to understand how to use the framework in their teaching and navigate a number of school system issues that they see as blocking this shift.

6.5.3 Sub-theme: Psychology as a science.

The focus on teaching psychology concepts with the science practices was seen as favourable by teachers because the use of science practices promotes the connection between psychology and science. Most of their discussions about the framework promoting psychology as a science centred on the following:

- justifying psychology as a science, and
- embracing the diversity of psychology as a science (psychology's broad range of content areas and research methodologies).

The views were seen across all teachers, not limited to those who teach other subjects within or outside Science KLA. These views are now discussed, starting with views in the workshops and then shifts in views between the workshops and interviews.

Teachers' views in the workshops.

Discussions around this sub-theme, promoting *psychology as a science*, were particularly evident in the workshops.

Justifying psychology as a science. Teachers viewed the framework as presenting "*a richer and more sophisticated way of understanding what psychology is and offering a science working frame for all levels*" (Fiona, UW) and "*supports a scientific approach to psych allowing clear processes for students.*" (Bianca, UW). The framework was not merely stating that psychology is a science but importantly provided a way to justify psychology as a science, as Chris outlines here:

> Potentially this alters the place of psych within schools: it can be perceived as justifiable scientific, though we are transforming our definition of science. (Chris, UW)

Chris implies that psychology may not be fully accepted or understood as to why it is considered a science, and his comments were supported by others in the urban workshop. Furthermore, they were curious in *"how this would alter students' and teachers' perceptions of what is meant by subject Psychology."* (Olivia, UW). The responses suggest that the psychological science framework got teachers thinking about the discipline of psychology in different ways to how psychology is currently represented and viewed in their classrooms. Like other comments, this suggests the framework got teachers thinking about how they view science, including how psychology uses science practices to build knowledge and making it easier to understand the science base of psychology. Being involved in this study gave teachers an opportunity to reflect on the way they understand psychology and the way psychology can be and is currently represented in curriculum.

Embracing the diversity of psychology as a science (psychology's broad range of content areas and research methodologies). Teachers recognised the 'psychological science' framework as embracing the *diversity of psychology* in terms of representing a diverse range of content (knowledge) areas of psychology and a diverse range of research methods. The framework highlights how science knowledge is constructed beyond narrow views of science such as limited to the use of experiments or biological psychology.

In terms of content, teachers felt that a broad range of knowledge areas of psychology can fit within the framework, such as microscopic (neurotransmitters) to macroscopic (socio-cultural aspects) levels of analyses in memory; biological, cognitive and socio-emotional development across the lifespan; positive psychology; a range of theoretical models that consider emotions and motivations; and emerging areas of psychology such as neuropsychology. Some of these knowledge areas are not in the current Study Design (VCAA, 2012), with teachers viewing the framework as offering opportunities to explore and compare different perspectives. Considering a range of knowledge areas was seen as a positive aspect *"making the broad and diverse spectrum of psych easier to understand and how they can connect"* (Marissa, RW), addressing "*topics like emotions and cultural aspects that are* *overlooked*" (Bianca, RW) and *"offering the big picture of psych"* (Pippa, RW), as Chris comments here:

> More it is a shift in planning and thinking about psych. By seeing psych from different perspectives we're giving students a better way of understanding the joy and relevance and diversity. Our emphasis can be in both how we think and on psychological interconnections. Also encourages a deeper, wonderfully confusing study of psych that is ripe for untangling. (Chris, UW)

Similarly, allowing for a diverse range of research methodologies was also viewed as a strength of the psychological science framework. In the workshops, the teachers discussed working with different research questions, qualitative and quantitative data, different data collection techniques and ethical considerations that guide observations. Embracing a diverse range of research methodologies was also linked to the practice of patterns, "*good to highlight ways to recognise and display patterns and graphs in quantitative and qualitative research*" (Fiona, UW). However, some also recognised constraints in terms of limited opportunities within the Study Design (VCAA, 2012) to focus on non-experimental methods and going beyond teaching research in multiple ways, as Edwina highlights:

> We focus on experimental method. We are less able to focus on research, interesting and relevant new discoveries and what they mean for our understanding of the world as we are bogged down in content and dot points that must be taught. (Edwina, UW)

Shifts in teachers' views between the workshops and individual interviews.

In the individual interviews the teachers viewed the framework in similar ways in terms of promoting psychology as a science. Shifts in teachers' views tended to be in terms of using the framework to support:

- teachers' understandings of psychology as a science

- embracing a range of content areas and research methodologies, outside what they currently teach

Similar views to the workshops were mainly held by the teachers who used the framework during this time, seen as *"getting them in that mind-frame, like this is a science, and this is why"* (Bianca, II) but also seen with others who did not use the framework, such as Pippa "*I see that learning and using this [framework] is important to facilitate the grounding in science and richness and importance of psychology"* (Pippa, II). Learning about the framework reinforced, if not enhanced, their understanding of psychological science and got them thinking about what this could mean for their teaching.

Interestingly, while teachers were positive about the framework in the workshops, most of the teachers did not elaborate on how they were using or could use the psychological science framework to promote a range of knowledge areas of psychology in the individual interviews. The shift in planning and thinking about psychology in terms of acknowledging a range of different areas of psychology did not occur. Similarly, teachers could not think of an area of psychology that did not fit within the framework, or support their teaching of a range of different content knowledge areas outside the Study Design (VCAA, 2012). Comments were limited to very short acknowledgement that the framework could be used to teach a range of knowledge areas without giving more detail on how it could be used to support their teaching. Again, differences were seen between how the teachers view psychology fitting into the psychological science framework and how they currently teach psychology. While they commented that the framework can be used to add a range of content knowledge areas, there is a difference between what they say and how they teach, which is not surprising given that the use of the framework in this way will require a shift in their teaching of psychology.

They did not explicitly connect to other Key knowledge areas of psychology not taught in the Study Design (VCAA, 2012), nor did they address emerging areas of research in psychology.

While all teachers discussed this subtheme in the workshops, only four teachers elaborated on this idea in terms of supporting their teaching in the individual interviews, suggesting that while they may recognise the value of teaching a range of research methodologies, it is not necessarily part of their current teaching. Those who discussed this sub-theme in the individual interviews were very positive: *"I think it (the framework) has scope for catering to those different types of research besides experiments as well."* (Anne, II) and commented that she had been drawing on more case studies since learning about the framework. Bianca incorporated observation via the use of YouTube clips related to attachment, asking students to create ways to observe and consider use of non-experimental studies. This 'scope' includes different ways to observe psychology phenomena and recognise patterns in data, and goes beyond the strong experimental focus currently within the Study Design (VCAA, 2012). Danielle states some of these ideas when discussing what the practice of 'observations' means:

> To try to see different ways to observe, a broad term, yeah, I can see that. Not to narrow just to experiments, but observing within different research methods. What do we know? Or the ways to know? Not necessarily leading to the experiments. What can we observe? How can we observe? Why? (Danielle, II)

Another couple of teachers referred to the framework as possibly embracing other types of research, for instance "*maybe use it, in terms of stories about a case study*" (Pippa, II) but did not expand on this further. Three teachers did not mention diverse range of research methodologies in the individual interview, including a couple of teachers limiting the conversation to experiments only. In some ways, the limited depth in such responses is not surprising given the Study Design (VCAA, 2012) offers limited opportunities to focus on non-experimental methods.

While the framework inspired some of the teachers to think further about how they view psychology's use of a range of research methodologies, this tends to be different from their current ways of teaching. The teachers' responses suggest that many view and teach experiments as essential to creating new psychology knowledge and may account for the limited discussions around diverse range of research methodologies in the individual interviews. Using the framework to support the teaching of a range of research methodologies requires a shift in their teaching.

Overall, learning about the framework helped teachers' view psychology as a science, legitimising and cementing their original ideas about psychology as a science, prior to being involved in this study. As discussed in the previous sub-themes, however, the ways the teachers' view the psychological science framework to support their teaching varied depending on their understandings of science. No obvious differences were seen between teachers who also teach other science KLA subjects and those who teach in non-science KLAs. Interestingly, no-one commented on psychology's place within other learning areas or understanding it to be a learning area in its own right, even though they taught a range of subjects across different key learning areas.

6.5.4 Summary of the 'promoting the discipline of psychology' theme.

This section of the chapter considers the teachers views on the psychological science framework as a support for their teaching in terms of the theme '*promoting the discipline of psychology*'. The teachers discussed the framework as teaching psychology in richer and important ways in terms of embedding psychology's *use of science practices,* promoting *deeper thinking in psychology,* and *justifying psychology as a science*.

The teachers viewed the framework as offering a bigger picture of psychology and its relationship with science. The focus on teaching concepts together with science practices represented new ideas and an overarching approach for teaching of psychology. While the teachers immediately felt familiar with the selected science practices, using the framework to support their teaching was not as straight-forward as they first thought. Different preferences and understandings for teaching the selected science practices varied between teachers. The teachers thought the framework provided scope for teaching more strategic and challenging tasks by facilitating questioning, creativity, critical thinking, scientific reasoning and applying psychology to everyday life. They viewed the framework as justifying psychology as a science, making it easier to understand psychology's science base and fitting a broad range of knowledge areas and research methodologies. The teachers were in favour of changing the emphasis from teaching content bound curriculum ('dot-points' of Key knowledge) to teaching the science practices and how the practices work together to produce knowledge, beyond use of experiments. They saw using the framework as a way to move away from rote-learning heavy content to facilitating deeper learning and embracing the diversity of psychology, including social and cultural aspects and humanness of the discipline.

While similar views were seen in both workshops and individual interviews, there were interesting shifts in the ways the teachers thought about teaching with the framework in terms of promoting the discipline of science. While teachers discussed the framework in positive ways and thought it had great potential to enhance their teaching of psychology, often their responses were limited in detail and not used to support their teaching, especially in the individual interviews. On many occasions teachers found it difficult to provide more detail or discuss specific ways and reasons for using the framework to represent the discipline of psychology in richer and important ways. Some science practices were favoured and understood more than others, and these views varied between the teachers, therefore impacting on the ways teachers viewed using the framework as a support for their teaching. Some teachers recognised that the science practices were more complex than they originally thought and some recognised that they had difficultly using the framework to support their teaching. Some teachers noticed missed opportunities to incorporate the framework into their teaching during their classes, most were unsure about their understandings of at least one of the science practices. Many teachers seemed to favour (pick and choose) science practices that resonated with them and some may have changed the ways they understood the science practices from the workshops to the individual interviews and reverted back to the ways they were already teaching. Therefore, most teachers tended to assimilate the framework into their current views and ways of teaching, rather than accommodating large changes and exploring the complexities and iterative aspects of the selected science practices and the ways the framework can promote the discipline of psychology. The analysis suggests that the framework offered new ways of thinking about psychology and highlights the difference between knowing about the framework and using it to support their teaching. The teachers wanted more time to learn, explore ideas, reflect upon and consider the potential consequences for their teaching. The teachers were positive about the framework although this did not necessarily transcend into their teaching of psychology. More support for teachers is required if they are to use the psychological science framework as a complete framework in the future.

6.6 Theme: Connecting with the Intended Curriculum (Documents)

Teachers discussed the framework in terms of its alignment with the relevant curriculum documents: VCE Psychology Study Designs (VCAA, 2012, 2015b), the Victorian AusVELS F-10 (VCAA, 2015a) and Australian Curriculum F-10 (ACARA, 2015). Two sub-themes were created to support this '*connecting to the intended curriculum (documents)*' theme: *VCE Psychology Study Designs*, and *Victorian and Australian F-10 Curriculum* (see Figure 6.3).

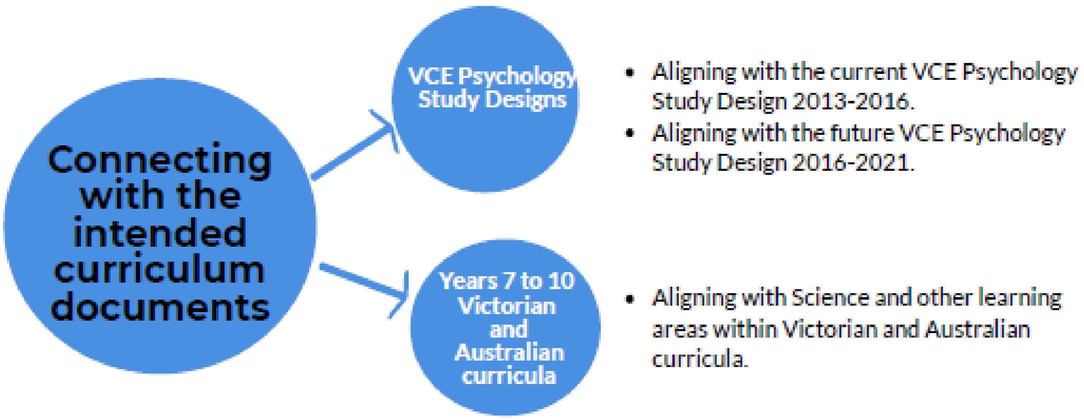

Figure 6.3. The 'connecting with the intended curriculum documents' sub-themes.

Teachers generally viewed the framework as connected and workable with the current VCE Psychology Study Design 2013-2016 (VCAA, 2012), especially since they felt familiar with the science practices although some recognised these were more complex than originally thought, as discussed in the previous theme. Teachers spoke about connections to the high stakes assessment in different, sometimes contradictory, ways. A range of views were presented in the workshops in terms of using the psychological science framework to connect with the intended curriculum, with some shifts in views highlighted in the individual interviews and summarised in Table 6.5.

Table 6.5

Range of teachers' views in relation to using the psychological science framework to connect with the intended curriculum documents theme

Sub-theme	Range of teachers' views in the workshops	Shifts in range of teachers' views between workshops and individual interviews
VCE Psychology Study Designs	The framework: • fits with the VCE Psychology Study Design (VCAA, 2012), with examples of systems and models already in Key knowledge, and practices of observation, patterns and explanations able to fit with research investigation.	• No shift for some teachers, others not sure, and some now saying that the science practices are not explicit within the VCE Psychology Study Design.
	• offers a new way of understanding the VCE Psychology Study Design, including connecting discrete sections of study design together (Key knowledge, Key skills and Research methodologies) and opening up opportunities to bring in socio-cultural aspects and qualitative research, often missing in the study design and their teaching.	• Less pronounced. Teachers could see the potential but some did not want to use framework without explicit focus on interweaving concepts with science practices in the VCE Psychology Study Design, and most wanted to learn more about ways to use the framework for their teaching. Little acknowledgement of socio-cultural aspects and qualitative research.
	• could aid high stakes assessment (research investigations and examination) as it moves away from rote learning Key knowledge to deeper learning, potentially helping students grasp bigger picture of psychology, especially if introduced before Units 3&4 VCE Psychology. However, its use could be restricted because of this high stakes environment, with pressure to inevitably teach to the exam, with no extra time to learn the framework.	• More pronounced. Should aid VCE assessment but only if introduced to the science practices in the earlier years. Some teachers do not want to use framework unless explicitly included within the VCE Psychology Study Design assessment, especially the examination, others could see the potential but wanted more opportunities to learn how to use the framework to support their teaching.
	• supports changes in the new VCE Psychology Study Design 2016-2021 (VCAA, 2015), although too earlier to tell.	• No shift (similar views as in workshop)
Years 7 to 10 Victorian and Australian curricula	The framework: • justifies Psychology's place within Victorian and Australian Science F-10 curricula. • supports current Years 7 to 10 Psychology curricula, and progress to VCE Psychology. • encourages communication and collaboration with science teachers.	• No shift (similar views as in workshop)

6.6.1 Sub-theme: VCE Psychology Study Designs.

Teachers viewed the framework as potentially working with both the current and future VCE Psychology Study Designs (VCAA, 2012, 2015b). In the workshops, they spoke about connections between the framework and the Study Designs (VCAA, 2012, 2015b) in the following ways:

- fits with the current Study Design (VCAA, 2012)
- offers new ways of understanding the current Study Design (VCAA, 2012)

- potentially aids the high stakes assessment in Unit 3 and 4 VCE Psychology
- supports changes in the future Study Design (VCAA, 2015b)

Some slight shifts in teachers' views were seen in the individual interviews. The workshop and individual interview views are now discussed in turn.

Teachers' views in the workshops.

Discussions around this sub-theme, connecting with the *VCE Psychology Study Designs*, in the workshops are explored in this section.

Fits with the VCE Psychology (VCAA, 2012). In the workshops, as discussed in the 'promoting the discipline of psychology' theme, the teachers initially felt familiar with the science practices because examples of psychological systems and models are given in the Key knowledge section, and observation, patterns and explanations are able to fit with research investigation. Therefore, the teachers immediately viewed the framework as connecting with the curriculum documents. While their understandings of the science practices varied between teachers, and some teachers recognising the science practices as more complex as originally thought, they still were overwhelmingly positive about the frameworks' fit with the Study Design (VCAA, 2012).

Offers new ways of understanding the VCE Psychology Study Design. As discussed in the last theme, the framework represented new ways of thinking about psychology and teaching psychology for the teachers. In turn, this represented news ways of understanding the VCE Psychology Study Design 2013-2016 (VCAA, 2012). They viewed the framework as connecting the discrete sections within the Study Design (VCAA, 2012) together, including Key knowledge, Key skills and Research methodologies. As exemplified in the following passage, the teachers discussed a desire to connect segments of the intended curriculum and provide a bigger picture of psychology that goes beyond learning psychology for the examination:

> Pippa: This framework supports as an integrated whole, rather than, well, it [the Study Design] feels a bit chopped.
>
> Olivia: And I think, um, I think, surely one of the skills we are trying to teach our kids is not just to teach for the exams but to teach for life skills. So by being able to teach kids that life is about a lot of interrelated and integrated type of things, I think that is a better life skill, and I think that is where this frame helps them to see what all of those linking things are.
>
> Nina: Yes, linking it [the Study Design] together.
>
> Olivia: It sometimes worries me just about teaching to exams, that is, that it just seems. It [the Study Design] is all very discrete and it doesn't link. Yes, definitely. And I like the way this [framework] links the theory with the research, um, much more than teaching the skills and dot points. (RW)

In this way, they viewed the framework as offering a new way to connect the curriculum together to support teaching in ways they think are valuable (teaching more than for the exam) in line with what was expressed in the online survey. Olivia states that using the framework is likely to promote *"learning that is going to better prepare our students for future, for exams, for beyond exams."* (Olivia RW). As discussed in the previous theme, they viewed the framework as opening up opportunities to promote deeper thinking and bring in important areas that are often missing in the Study Design (VCAA, 2012), including social and cultural aspects (macroscopic levels of analysis) and qualitative research beyond use of experiments), into their teaching. In opening up opportunities to teach in new and important ways, the teachers acknowledged limitations with the Study Design (VCAA, 2012).

Potentially aids VCE Psychology assessment, although some reservations. The teachers viewed the framework as encouraging a shift in teaching that moves away from rote learning Key knowledge to deeper learning, potentially helping students grasp bigger picture of psychology, especially if introduced before Units 3 and 4 VCE Psychology, as discussed.

Teachers viewed the framework as supporting Unit 3 and 4 VCE Psychology assessment. The framework potentially aids preparing students for the external examinations, particularly research type of questions including the VCE Psychology Study Design 2013-2016 (VCAA, 2012) Examination Section C Research extended response question, with Fiona giving this example:

> If they are thinking about how to observe and how it was carried out and what research method was used and how you created the patterns and how meaningful they are, that will help with Section C in the exam. (Fiona, UW)

While teachers felt the framework connected to the intended curriculum, they were very aware of the pressures teaching Unit 3 and 4 VCE Psychology and disruption any change may cause. Consequently, there were reservations about teaching beyond the examination, as Nina states:

> I also like the 'how do we know what we know' idea (in the framework). A lot of my students even, and it might because of the way the exam is set up, that they are not really interested in 'how do we know what we know', but they just want to 'know what they need to know' for the exam. They want to know this bit and that bit but they want to know for the exam. (Nina, RW)

While teachers felt the framework was a support for teaching the intended curriculum, some also thought there were aspects that went above and beyond what was required for the Unit 3 and 4 VCE Psychology external examination and students may not view this as relevant for their learning. For instance:

> Difficult to explore the idea of observations in such depth when we are limited within the Study Design, but very good for Year 7 to 10. Patterns can lead to new domains of thought which again, can take time and steer you off into a great conversation, but Study Design limitations means this isn't always ideal. (Edwina, UW)

The use of the framework to support teaching of psychology could be restricted because of this high stakes environment in VCE Psychology, with teachers feeling immense pressure to inevitably teach to the examinations, with no extra time to learn the framework or willing to teach beyond the examinations.

Supports changes in the new VCE Psychology Study Design (VCAA, 2015b). The teachers initially viewed *"great connections to new Study Design"* (Edwina, UW), in line with the next VCE Psychology Study Design 2016-2021 (VCAA, 2015b). Teachers recognised that the examination has been changing over the past few years, and expect it to change again with the new study design. As discussed earlier, they viewed the use of the framework as promoting deeper thinking and the use of science practices in psychology will support this change. Consequently, they saw links to the new VCE Study Design 2016-2021 (VCAA, 2015b), including research investigations (internal assessment), as Marissa states *"It may help with the posters [research investigations], as they do them in the new study design"* (Marissa, URG). For some teachers, it was a 'wait and see' situation, since the new study design examination specification and sample examination were not published at the times of the workshop and interviews.

Shifts in teachers' views between the workshops and individual interviews.

The teachers held a variety of views in terms of the framework connecting with the VCE Psychology Study Designs in the individual interviews, but in line with those in the workshops, with comments such as:

> The frame is kind of more in line with the new Key skills and new Study Design stuff. It definitely has a place in shaping how we display material and I guess how you get students to think further about it. (Edwina, II)
>
> The way the new study design is going, I think this [framework] will be really helpful next year when we are nutting out that study design and breaking it down for the students, because it will see them with a lot more opportunities within their own scientific inquiry, as you know that new Outcome 3 they are going to undertake their own research will link into this for sure." (Anne, II)

The teachers praised the links between the framework and the curriculum and offering new ways to understand the Study Designs (VCAA, 2012, 2015b). Some shifts in the strength of these views were seen, however, including the framework's:

- connections to Study Design were not as obvious as first thought
- potential to connect sections of the Study Design together but some did not want to use the framework without explicit mention within the Study Design
- potential to aid VCE assessment but only if introduced to the science practices in the earlier years.

The shifts are not surprising given the different ways the teachers understood the framework as a support for their teaching, as discussed in the previous theme. As such, some teachers felt bound to the ways they already teach and the ways they saw the material represented in the Study Design and the textbooks. Without explicit mention in the Study Design, these teachers did not want or feel the need to teach with the framework, and these views were more pronounced in the individual interviews. For instance, the Study Design (VCAA, 2012) emphasises 'experimental' rather than 'descriptive' or 'observational' research, and the science practice of observation is not explicitly outlined, and therefore has the potential to confuse students if teachers use the framework, as outlined in the previous theme. Additionally, the teachers limited responses reported earlier such as teaching beyond teaching of experiments and encouraging deeper thinking could reflect the limited scope within the Study Design (VCAA, 2012). Teachers also wanted more support to learn how to teach the VCE Study Design with the framework, as Pippa states:

> Yes, I can definitely see it, interweaving those practices with your psych concepts that would fit throughout the VCE curriculum. I think definitely it would work really well, like it would be a fantastic approach but I need more sessions. (Pippa, II)

The different views of each of these practices raises more questions about the way the science practices are mentioned in the Study Design (VCAA, 2012) and the difficulties associated with using the psychological science framework in class when the selected science practices are not explicitly outlined in the Study Design (VCAA, 2012). Equally, the different views highlight issues with connecting the discrete areas of the Study Design together, teaching in a high stakes environment and using both the Study Design and framework to teach in ways the teachers deem important.

6.6.2 Sub-theme: Victorian and Australian F-10 curricula.

One of the most exciting aspects about the framework was the connections with the Victorian AusVELS (VCAA, 2015a) and Australian (ACARA, 2015) F-10 curricula, especially in terms of being able to help overcome issues with psychology's omission. In terms of this sub-theme, connections with *the Victorian and Australian F-10 curricula*, the teachers viewed the framework:

- justifies Psychology's place within Science F-10 curricula.
- supports Years 7 to 10 Psychology curricula, and progress to VCE Psychology.
- encourages communication and collaboration with science teachers.

Interestingly, no differences were detected between those who teach in other KLAs and those who teach other science subjects. The later may have had opportunities to learn more about and teach Victorian AusVELS (VCAA, 2015a) and Australian (ACARA, 2015) F-10 science curricula. These views are now discussed, starting with views in the workshops and then shifts in views between the workshops and interviews.

Teachers' views in the workshops.

Discussions around this sub-theme, connections with *the Victorian and Australian F-10 curricula*, were particularly evident in the workshops.

Justifies Psychology's place within Science F-10 curricula. Psychology is not formally recognised in the Victorian AusVELS F-10 (VCAA, 2015a) and Australian F-10 and Senior (ACARA, 2015) curricula and this omission created some discussion in both workshops. Teachers viewed the framework as providing an important link to Australian Curriculum, as Fiona sums up the feelings with *"It is advantageous if this frame improves the 'standing' of psych amongst VCE subjects and gets ACARA interested."(*Fiona, UW). Teachers were pleased with the links to the Science Curriculum, again seeing this connection as *"able to justify teaching of psych in Australian Curriculum"* (Chris, UW), as Anne states:

> I'm excited that this framework fits in very well with what 'science' is currently conceptualised as by ACARA. I think this provides a valid argument to include psych as a 7-12 subject; particularly as this framework coincides with curriculum priorities like SHE [science strand]. (Anne, UW)

Supports Years 7 to 10 Psychology curricula, and progress to VCE Psychology. The teachers felt that the framework could support their Years 7 to 10 Psychology units, with comments such as:

> If you are lucky enough to have Year 10 elective, you do not want to just repeat what they do in unit 1 in their year 10 unit, you start to wonder what to do. Here, with this [framework], it fits with Year 10. You can start to get that idea how psych works, focus is on how psych works before VCE. It is all fantastic. (Olivia, RW)

The teachers felt that the framework would fit with the preVCE Psychology units and also offer opportunities to create learning scope and sequence charts for students to progress to VCE Psychology. They were very excited about this sense of progression, and justification for their units in these earlier years, as already explained.

Encourages communication and collaboration with science teachers. The teachers were quite enthusiastic about the links between the Victorian AusVELS science curriculum and framework, seeing this as offering important opportunities to communicate with other (non-psychology) teachers, as discussed in the previous theme. This communication could lead to collaboration, especially in terms of creating curriculum in their schools. "*We are on the edge of science subjects and humanities. Where does psychology fit? This shows it fits with the science curriculum…and we can work together on scope and sequence charts."* (Anne, UW). The teachers of Year 7 to 10 science could see the framework supporting the teaching of Year 7 to 10 science classes, for instance in AusVELS "*we try to get Year 7's to think about what a model is*. *Yes, I could actually use this framework in science as well." (*Fiona, UW*)* and "*Even through ACARA, there are models in the science curriculum." (*Edwina, UW*).*

Teachers also saw possible connections to other key learning areas, beyond psychology and general science, tying psychology's connection with a range of different key learning areas, with comments such as *"Love the links to ACARA and the possibility it has to other areas, disciplines. Ties together multiple areas which allows great, deeper thinking.*" (Danielle, UW) and "*I can see it in English and links to Psych and ways of creating knowledge" (Chris, UW).*

Shifts in teachers views between the workshops and individual interviews.

Similarly, in the individual interviews the teachers viewed the framework in similar positive ways in terms of connecting with the Victorian AusVELS (VCAA, 2015a) and Australian (ACARA, 2015) curricula. In the individual interviews, it was still quite evident that the teachers felt dismayed about psychology being absent in the Victorian AusVELS (VCAA, 2015a) and Australian Science Curriculum (ACARA, 2015), especially at Years 7 to 10. Many had unsuccessfully tried to fit their pre-senior psychology units with the Victorian AusVELS F-10 curriculum (VCAA, 2015a), and found this processes frustrating, as Edwina explains here:

> We have been redoing this course [Year 10 Psychology] for years. We try to make it fit with AusVELS, and it doesn't necessarily fit the way we would like it to, and we are under-resourced with it, but to have a framework like this that we could put subtopics and things into to make links to VCE there, I think would really work. You know. Teachers are relying on resources and so if you give them a resource and that fits something into it, they don't have to think about it themselves. And you could be able to build something a bit more structured. Yes, definitely Year 10 it would fit. Thinking about it like this, it looks easy. Trying to fit what we have currently with what we have to fit in AusVELS we feel like we are tearing our hair out. But whereas when you have it explained to you such as this framework and you are doing it all, then it is not so hard. You are just enabling us. (Edwina, II)

Edwina's comment "*you are just enabling us*" (Edwina, II) is interesting and could suggest that prior to the workshop the teachers were only looking for Psychological Science in the SU Strand. While they still want psychological science to be explicitly acknowledged in the Victorian and Australian curriculum, since the workshop they can now understand how to connect psychology with the science curriculum, particularly the SHE and SIS strands.

New learnings around the science curriculum, as a result from learning about the framework, helped in other ways. In terms of communicating with other science teachers, the teachers again highlighted communication issues and saw the framework as helping open up conversations, as Danielle states:

> They [other science teachers] often say psych teachers teach scientific methods far better that they ever do. That's interesting, as they don't think we are science. And this framework, these science practices, will help all science teachers. It makes us on the same page. (Danielle, II)

In line with earlier discussions, she saw the framework being applicable in the science classes she was currently teaching (topics: buoyancy and forces) and more valuable if introduced in earlier years rather than Unit 3 and 4 Psychology: *"I think it would be different from Year 10*

Psychology, if you introduce this framework then, but I have not had the opportunity to do that yet." (Nina, II).

Importantly, the framework's focus away from leading with the content knowledge when teaching psychology allowed the teachers to think differently about how to link psychology with the intended curriculum documents, understanding areas such as SHE and SIS strands, and overarching ideas within science that emphasise the science practices. Teachers remained enthusiastic about these links to justify psychology's place in the F-10 curriculum in the individual interviews.

6.6.3 Summary of the 'connecting with the intended curriculum (documents)' theme.

In summary, teachers viewed the framework as providing an overlay to connect segregated sections of the intended curriculum within the VCE Psychology Study Design 2013-2016 (VCAA, 2012) and possibly the VCE Psychology Study Design 2016-2021 (VCAA, 2015b). While the framework could support the teaching of the assessment (especially research investigation and poster), there were concerns centred on the Unit 3 and 4 VCE Psychology high stakes external examination, making some teachers reluctant to introduce the framework at this year level but all keen to introduce it in earlier years. Some teachers did not want to use the framework without explicit mention of the science practices within the Study Design, especially explicit links to the high stakes external examination and internal assessment. Although these teachers praised the framework for connecting the curriculum and moving the focus away from teaching rote learning of the dot points, they felt constrained to teach due to the current assessment.

The teachers viewed the framework as providing important links to justify psychology's place in the Australian and Victorian F-10 Curricula (ACARA, 2015; VCAA, 2015a), especially within the science curricula. The framework opens up opportunities to establish psychology's place in the curriculum. The focus on the ways psychology develops its knowledge and why this is valued allowed teachers to consider psychology's connection to the curricula documents in new ways, such as the SHE and SIS strands and the overarching ideas in science that emphasise the science practices. These new insights were across all the teachers, not just limited to those who teach or do not teach other science KLA subjects, indicating that the ones who do had not thought about how the SHE and SIS strands may look like when teaching psychology. The teachers viewed the framework as already fitting with their Year 7 to 10 Psychology curriculum, which is interesting given the different understandings of the framework, as discussed in the 'promoting the discipline of psychology' theme.

The analysis suggests the framework gave the teachers new ways of understanding the intended curriculum documents, and while teachers had different views and wanted more time to learn and use the framework to support their teaching, they were encouraged and enthusiastic about the possibilities for communicating with other science teachers in their school.

6.7 Theme: Supporting Implemented Curriculum (Teaching)

Teachers viewed the psychological science framework in regards to *'supporting their implemented curriculum (teaching)*'. For this theme, supporting implemented curriculum (teaching), two sub-themes were identified: the using the framework to *'connect and build on curriculum experiences*' and '*planning for teaching*' (see Figure 6.4). Overall the teachers tended to see the framework as supporting their current teaching, rather than extra work, and therefore did not think its use would overcrowd their curriculum and be over prescriptive if introduced before Year 12.

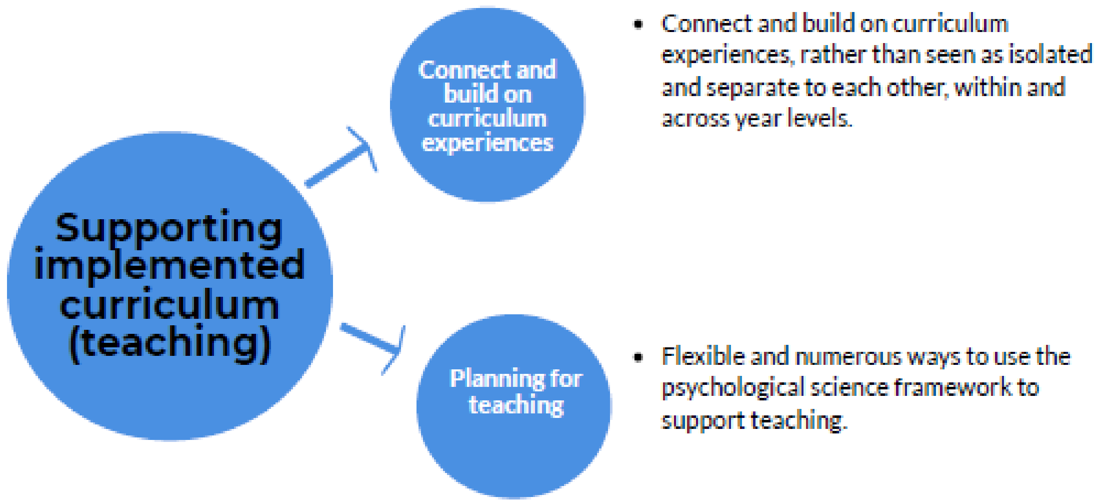

Figure 6.4. The 'supporting implemented curriculum (teaching)' sub-themes.

A range of views were presented in the workshops in terms of using the psychological science framework to support their implemented curriculum (teaching), with some shifts in views highlighted in the individual interviews (see summary in Table 6.6). The two sub-themes for this theme are now discussed.

Table 6.6

Range of teachers' views in relation to using the psychological science framework to support implemented curriculum (teaching) theme

Sub-theme	**Range of teachers' views in the workshops**	**Shifts in range of teachers' views between workshops and individual interviews**
Connect and build on curriculum experiences	The framework: • Opens opportunities to consider progression of student learning of psychology within and between year levels, from Years 7 to 10 Science to VCE Psychology. These opportunities start with the use of explicit and consistent terminology across year levels of science.	• No shift, but not all teachers used the terminology consistently, explicitly or at all. Too early to consider connecting curriculum experiences and monitoring the impact on student learning
Planning for teaching	The framework: a. offers flexible and numerous ways to plan and support teaching.	b. No shift, not always recognising opportunities or having time to plan, too early to consider impact on student learning

Note. No shift = view was still present in the individual interviews

6.7.1 Sub-Theme: Connect and build on curriculum experiences.

Teachers viewed the framework as a support for their implemented curriculum (teaching) in terms of providing avenues to connect and build on curriculum experiences in both psychology and science classes, leading to this sub-theme use of *'connect and build on curriculum experiences'*. They discussed these connections in terms of ways the framework:

- opens opportunities to consider progression of student learning of psychology within and between year levels, from Years 7 to 10 Science to VCE Psychology.

No differences were seen between teachers who teach in other KLAs within their schools and those who teach other Science KLA subjects. These views are now discussed, starting with views in the workshops and then shifts in views between the workshops and interviews.

Teachers' views in the workshops.

Opportunities to consider progression of student learning of psychology within and between year levels, from Years 7 to 10 Science to VCE Psychology. Incorporating the selected science practices across units and year levels was very appealing to teachers. As discussed earlier, many teachers thought the current curriculum was in isolated segments and connecting the curriculum was *"really important to promote connections within the discipline rather than keeping each area explicitly separate"* (Edwina, UW). They viewed the framework as offering a *"new way of thinking about teaching psychology that is more interconnected and will help link Year 11 and Year 12 and middle school psychology."* (Lucy, RW). The framework was viewed as a way to keep 7 to VCE Science inclusive of Psychology, teachers and students, on the same page to build skills, research and conceptual understanding, and as Nina says *"Would be a fantastic tool to ensure links are made between research and theories by using these science practices with concepts across all psychology and science years"* (Nina, RW).

Learning about the psychological science framework encouraged the teachers to rethink how they build on previous curriculum experiences over the year levels, which "*we should be doing this already but we are not. It is about making this explicit." (Edwina, UW).* Many spoke of the ideal situation where students would enter Unit 3 and 4 VCE Psychology with sophisticated understanding of the science practices, including how they work with the psychology concepts. The idea of creating scope and sequence charts that complement a unit of work was raised in both workshops and very appealing to teachers, recognising that they have struggled to create these charts in the past. While they thought the framework *"could be understood by Year 12s but they don't have time for extra material."* (Fiona, UW), it could be incorporated in the younger years, as Danielle explains:

> One of the big things, I think the blocks we came up to, is with Year 12, the time to be able to implement, it is something that needs to maybe come in earlier within the school, within the whole school concept of science or a faculty because we found some of the stuff like [the practice of] explanations and things like that. By the time they get to Year 12, we should be building on this, not teaching for the first time. Time to do it. But I definitely see a link to this whole framework as a starting point, building it in the junior years, and because this will make it easier to teach. (Danielle, UW)

Again, this shows some tension between what the teachers think is valuable for their students to learn and experience and what they think the students need in order to go well in the high stakes environment, with not all seeing connections between both.

Teachers particularly liked the use of explicit and consistent terminology, in terms of the names of the science practices. Bianca refers to the practices as 'buzz words' to support their students learning and create a connected curriculum *"use these 'buzz words' to continually link this, as they struggle to link content to the research"* (Bianca UW). She thought they were student friendly, especially for students with low literacy skills.

Surprisingly, both workshops suggested the framework be called OPEMS (or perhaps SMEPO or SMOPE), an acronym to represent each science practice within the framework, and for use in Science and Psychology classes across the year levels. Fiona captures this idea with her comment:

> If it could be made into a jingle OPEMS like TEEL is for English essay writing or BOLTSS for map drawing then it can be taught from Year 7 in basic form and developed through [Years] 7 to 10 so it isn't extra for VCE classes to take on. OPEMS as a science working frame for all levels. (Fiona, UW)

While understandings and preferences for each science practice differed between teachers, and using the terminology is just a starting point to connect and build on curriculum experiences, the teachers strongly praised a consistent approach that links all the science subjects together.

Shifts in teachers' views between the workshops and individual interviews.

The teachers' views were very similar in the individual interviews which is interesting given the different understandings of the science practices within the framework and the ways the framework can be integrated into their teaching. Given that not all the teachers used the science practices terminology and that they wanted more opportunities to learn about ways to use the framework for their teaching, as discussed in the *promoting the discipline of psychology* theme, it was not surprising that the teachers felt it was too early to consider the impact on student learning.

Bianca found the terminology to be very student friendly, especially for students with low literacy skills, although acknowledged that she needed more experience teaching with the framework to explore the impact on student learning, *"it looks student friendly, but too early to tell"* (Bianca, II). Anne and Bianca incorporated science practice terms into their teaching, and plan to continue next semester:

> Yes, I think the future planning we will go back to this [framework] and so we are looking at doing another bit of mental health next term, and then going into intelligence etc. so I think to sit down and reengage in that for planning, and then, you know, actually write down how we are deliberately going to use the language of science practices so we get used to it, and also get the kids used to it as well. So well, that will be my plan at this stage. Yeah. (Anne, II)

Teachers were very certain that the framework could apply to Year 7 to 10 science, in both workshops and individual interviews, with the teachers who currently teach science reinforcing this, with comments such as:

> I actually think it is definitely a model [the framework] that I personally would be able to apply to Year 10, 11 and 12 and even, not that I am teaching junior classes at the moment, but I think easily it could also be used for junior classes as well. Because any science unit has you know belongs to a system, has a range of different models within that system, and then explanations and patterns and observations then fit in with this as well. (Olivia, II)

Danielle summarises her experiences:

> Yes, I have used the framework and it worked at each of the areas in classical conditioning and operant conditioning. It worked really quite well and I can see the potential in it in the junior area, in the junior sciences as well. Putting things into the framework, connecting them to the science practices, helps 'cause they need scaffolding to help them. Then use the ideas again and again, so supporting students that little bit further, and using this frame as setting them up for the year. So yes, it has worked really well. (Danielle, II)

In the workshops and individual interviews, the teachers thought the framework's science practices provide explicit terminology and explicit links between research and theory to do this, as well as shifting the focus of their teaching from heavy content to developing skills and knowledge over time. To start at the earlier year (7 to 11) levels would make using the framework to support teaching and student learning easier at Year 12. However, often their discussions were limited to names of the science practices, or OPEMS, rather than deeper exploration of what these links could look like, probably because they were still learning about the framework. Importantly, going beyond the surface of the terminology requires deeper understanding of the framework and purposeful planning for its use as a support for teaching in class.

6.7.2 Sub-theme: Planning for teaching.

Teachers thought about the framework in terms of '*planning for teaching*'. Most of their views were related to the framework:

- offering flexible and numerous ways to plan and support teaching.

These insights started to be explored in the workshops but were more noticeable in the individual interviews. There did not seem to be any patterns of difference between those who teach in other KLAs within their schools and those who teach other Science KLA subjects.

Teachers' views in the workshops.

Flexible and numerous ways to plan and support teaching. Using the framework to plan for teaching centred around one key point. The teachers praised the framework for being *"good for connecting and planning next learning experiences"* (Nina, RW) with *"applications for developing future units"*(Lucy, RW), and *"useful for cooperative planning and sharing ideas. A useful focus for research methods and a means of better integrating research methods."* (Olivia, RW). As discussed already, teachers viewed focussing on 'science practices' as enabling a shift from teaching content-driven curriculum, with a comment such as:

> I think that [using this framework] would help in my own teaching practice, maybe starting in this way would pull me away from just delivering the theory, and say and look here, look at this where it came from." (Pippa, RW)

Similarly, others also commented on the value of *"starting topics with observations and linking to theory, instead of other way."* (Olivia, UW). Most understood flexible nature of the framework, that it was not directing just one approach to teaching psychology as it *"it can be used in many ways, it is opening up a range of possible activities and approaches for teaching in richer ways"* (Chris, RW).

A highlight for some of the teachers, was the inspiration they got from learning about the framework and the planning for teaching immediately following the workshop. For instance, Anne and Bianca, teachers at the same school used the framework as a starting point for planning their next unit of work in psychology:

> Anne: We are staying back to plan for term 2, as felt inspired for today. We will do it now.
>
> Bianca: We will keep going we are explosive with ideas. As soon as we got into it a bomb exploded and then we had to go, come back, and probably a challenge as well, as this is, this and this is, this and you just keep going. So you need to stick with it. It is a good thing about the framework. It's working, it is inspiring thought, and getting to bring that in, then it's good, it's awesome. It is also about us going, so where do you put those parameters in? (UW)

Interestingly, all the mapping exercise groups struggled with identifying possible challenges for teaching and student learning. The comments made were brief and general without exploring the challenges related to the particular practice in light of the concept being taught, such as "*prior knowledge of numeracy skills, avoid assumptions when working out patterns"* (Unit 1 attachment mapping exercise group, UW), "*this approach hinges on able and motivated students for creating explanations"* (Unit 3 memory mapping exercise group, UW), "*maintaining a respectful caring environment because attitudes can be confronting for some students for learning about systems"* (Unit 2 attitudes mapping exercise group, RW). This is likely to reflect the teachers' different views on each practice, as discussed earlier. Limited comments are expected when ideas represent new ways of teaching that they have not experienced or taught before, and therefore suggests that the framework represents new ways of teaching psychology.

Shifts in teachers' views between the workshops and individual interviews.

As discussed at the start of this chapter, four teachers used the psychological science framework in their classes and the two who didn't found they paid more attention to the way they teach, while the two others wanted to but didn't know how. The framework was used or planned to be used in a number of different ways, highlighting its flexible approach, as indicated in the summary provided in Table 6.7.

Table 6.7

References to the psychological science framework during teaching or planning to teach in the future

Ways the psychological science framework was used to support teaching of psychology	**Examples**
Integrate research and research methods with Key knowledge	Use of case studies, research scenarios, experiments while teaching range of content areas (including theories and models).
Incorporated in range of content areas (Key knowledge)	Developmental psychology, the brain, social psychology, mental health and biopsychosocial model, intelligence, visual perception, sleep, learning and memory.
Support assessment tasks	Research investigations, research poster and annotated folio of activities.
Range of learning activities and pedagogical approaches	Flipped classroom, concept mapping, application to everyday life, asking questions, encouraging creativity and other deeper thinking tasks.
Planning	Scope and sequence charts. Future units of work.

The overwhelming value and use of the framework was seen to be better integration of research into their teaching Key knowledge, whether they explicitly used the framework or not. "*The focus group [workshop] has heightened my awareness of why this is so important to integrate as part of my teaching.* (Anne, II).

Most teachers understood the flexible nature of the framework, that it was not directing just one approach to teaching psychology as it *"lets the teacher decide which* *approach to take"* (Danielle, II). Danielle outlines two different approaches when she taught learning systems with her Year 12 class. First starting with the practice of observations by carrying out an experiment in class and asking questions about what they observed, and later starting with models before undertaking an experiment:

> It [the framework] is dynamic. It works different ways, you can do it [teach] many different ways, many different topics will obviously allow for different flexibilities. (Danielle, II)

Again, like the other teachers who used the framework, it was adopted in a way to ask lots of questions, How could you observe? What did you observe? What do you think happened? Why?, to facilitate discussions around 'how we know what we know'. *"It is having that idea that 'this is your theory' and 'this is how it is developed' with the framework."* (Bianca, II) and importantly, they planned to continue to use the framework.

The teachers used the framework to teach a range of areas of studies (Key knowledge) and support assessment tasks. Some teachers also reported using the framework for different pedagogical approaches including flipped classroom, concept mapping, application to everyday life and deeper thinking tasks. Others could see the framework supporting the creation of scope and sequence charts and planning new and future units of work.

One teacher (Bianca) viewed the framework as "*encouraging a bit more creativity, and I guess their [students] independence a bit more and apply explanations to everyday life*." (Bianca, II). In addition, Bianca liked how the framework was getting her to think more broadly on socio-cultural aspects that are often not considered within the VCE Psychology Study Design 2013-2016 (VCAA, 2012) and she plans to incorporate this more into her teaching next semester:

> Just getting the students to consider factors that do influence anything, um, whether it be gender or the society or their culture, or just the methodology in the first place. I think they find that really interesting, it is definitely something we should plan more in our teaching. (Bianca, II)

In the individual interview, when asked whether Anne and Bianca referred to the unit plan they created after the workshop when teaching, Anne explained:

> Yeah, we did. We ended up doing pretty much everything we wrote there. Because from memory we actually stayed back and planned that whole straight after [the workshop]. It was really good. But one thing that was significantly different to the first term was how we embedded research methods. In teaching attachment, we had shown them, we read the Jim twins case studies and showed them the Romanians orphans clip. So we watched them, they had to answer, probably using them a bit of this actually. What are the patterns in the data? What is the data suggest[ing]? What can this data explain about attachment? Without using the word model, we probably did say, without saying, and them um what are your observations from watching this? What do these observations suggest in terms of the models? Yes. (Anne, II)

Also worth noting was that there were instances where teachers recognised links to the psychological science framework while teaching (in the moment) in addition to those considered and planned for beforehand. These instances were largely inspired by a key term incorporating a science practice, for example a reference to biopsychosocial model (Anne) or memory systems (Olivia). Teachers wanted more time to plan teaching activities related to using the framework and shifting their focus to teaching psychology concepts together with science practices.

6.7.3 Summary of 'supporting implemented curriculum (teaching)' theme.

Teachers viewed and used the psychological science framework in terms of '*supporting their implemented curriculum (teaching)',* one of the four main themes arising from data analysis. The framework offered ways to '*connect and build on curriculum experiences'* rather than teaching isolated and separate lessons within a unit and over the year levels, leading to the first sub-theme. The framework provided new ideas to explicitly and consistently connect and build on curriculum experiences within their classes, over units of work and year levels, from 7-10 Science and pre-VCE Psychology units to VCE Psychology, something they had struggled to do previously. Interestingly, while all the teachers were strongly in favour of using the framework to connect and build on curriculum experiences, the teachers' discussions tended to be limited to use of the terminology (names of the selected practices) rather than exploring the complexity of each practice and how they work together to build the psychology concepts they are currently teaching. This could relate to their varied understandings of the science practices and consequently limited the depth of discussions around how to connect and build on curriculum experiences.

The teachers felt the framework could support their planning for lessons, leading to the second sub-theme '*planning for teaching*'. The teachers who used the framework to support their teaching discussed using it in various and flexible ways. They discussed a shift in their focus to connecting research with psychological concepts, rather than focussing on rote learning the content 'dot points', and saw this as a richer and more important way of teaching. This shift in focus is in line with previous themes, giving opportunity to rethink their approach to embedding research methods into their teaching, and integrating the Key knowledge, Key skills and Research methodologies sections within the VCE Psychology Study Design 2013-2016 (VCAA, 2012). These teachers were very enthusiastic and planned to continue using it to connect and build on curriculum experiences, especially interweaving the science practices that they felt most comfortable with and wishing to learn more about all of the selected science practices within the framework. While their understandings of the science practices and the framework varied, so did their discussions around using the framework to plan for teaching.

Teachers' views were positive but discussions were limited in terms of their students' learning as a result of using the framework. Limited discussions around student learning are not surprising given that teachers were still unfamiliar with the framework and had various views and preferences about the selected science practices and how it could work and link with the VCE Psychology Study Design. The teachers' views did not seem to depend on the other subjects they teach, where within Science KLA or not, suggesting that all the teachers had not had opportunities to learn about ways to teach psychology in light of the Victorian AusVELS (VCAA, 2015a) and Australian (ACARA, 2015) science curricula. It is too early to explore how and why it was used, or impact on student learning.

Beyond the use of terminology and brief overview, using the framework is not likely to happen naturally or automatically during a class. Using the framework requires a shift in thinking about knowing and teaching of psychological science and will not just be naturally incorporated into a teacher's lesson without more support for understanding the complexities of the selected science practices and planning to purposely use it must occur beforehand. This is discussed further in the next theme.

6.8 Theme: 'Conditions for Teacher Change'

The teachers were excited about the ways the framework supported the discipline of psychology, connected with the intended curriculum and, for most, had the potential to support their teaching in the future. While the teachers could see the value of the framework and its potential use, they also identified conditions that could encourage further use of the framework. Consequently, this theme considers the teachers views on conditions needed to support *teacher change*. The 'conditions for teacher change' consists of three sub-themes, as indicated and summarised in Figure 6.5: ‘professional learning and planning opportunities’, ‘intended curriculum change’ and ‘resources to support use of the framework’.

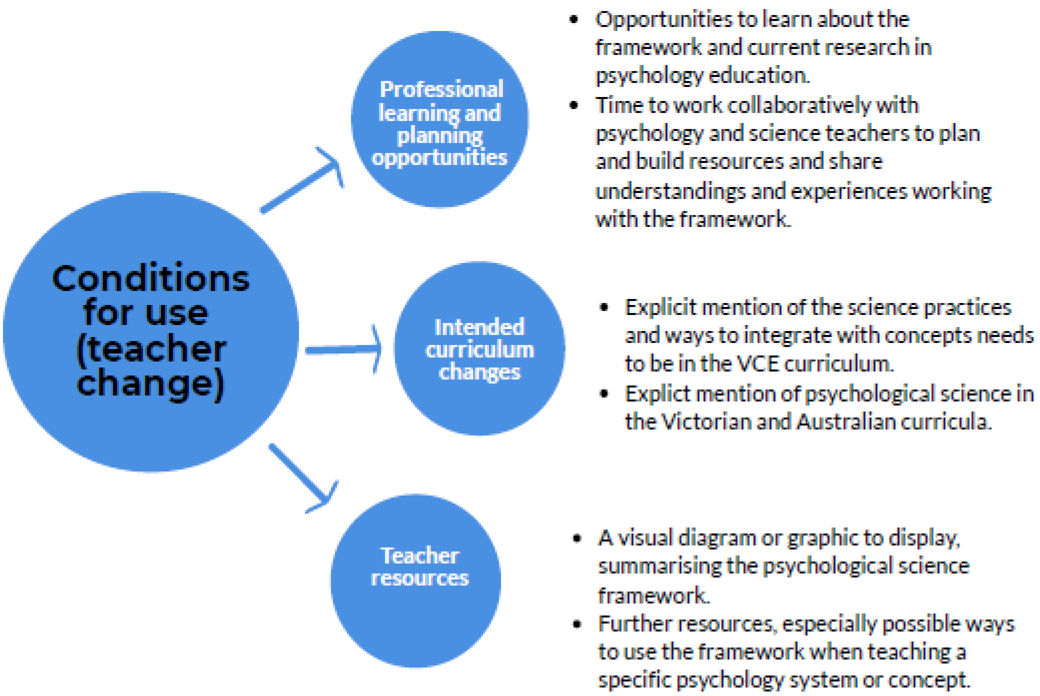

Figure 6.5. The ‘conditions for teacher change’ sub-themes.

A range of teachers’ views were presented in the workshops in terms of using this framework to support teaching of psychology for the theme ‘conditions of teacher change’, with some shifts in views highlighted in the individual interviews (see Table 6.8). The three sub-themes for this theme are now discussed.

Table 6.8

Range of teachers' views in relation to conditions for using the psychological science framework (teacher change) theme

Sub-theme	Range of teachers' views in the workshops	Shifts in range of teachers' views between workshops and individual interviews
Professional learning and planning opportunities	The framework: • provided professional learning opportunity directed at teaching of psychology, exciting as it is rare to learn about psychology education research • was thought-provoking and challenging but need more opportunities to learn, create, collaborate and reflect on the possible ways to integrate it into their teaching.	• No shift • More pronounced, they are excited about the framework and want to learn more about ways to use it to support their teaching.
Intended curriculum changes	The framework: • depends on intended curriculum change first needed to drive curriculum resources, including textbooks.	• More pronounced
Teacher resources	The framework: • depends on teacher 'frame-friendly' resources.	• More pronounced

Note. No shift = view was still present in the individual interviews

6.8.1 Sub-theme: Professional learning and planning opportunities.

The teachers were very positive in terms of having the opportunity to focus on their teaching of psychology, working with other psychology teachers and reflecting on their teaching of psychology, leading to this sub-theme 'professional learning and planning opportunities'. The teachers' views centred on the ways the framework:

- provided professional learning opportunity directed at teaching of psychology, exciting as it is rare to learn about psychology education research, and
- was thought-provoking and challenging but they require more opportunities to learn, create, collaborate and reflect on the possible ways to integrate it into their teaching.

Like the other themes, these trends were across all teachers, not limited to those who only teach other Science KLA subjects or those who teach subjects in other KLAs. These views were seen in both workshops and individual interviews and are now discussed in turn.

Teachers' views in the workshops.

In the workshops the teachers discussed this sub-theme in a couple of main ways, firstly as providing professional learning opportunity directed at teaching of psychology, exciting as it is rare to learn about psychology education research.

Provided professional learning opportunity directed at teaching of psychology, exciting as it is rare to learn about psychology education research. The teachers talked about the way learning about the psychological science framework and being involved in this study provided an opportunity to reflect on their teaching of psychology and their views of psychology as a science. They were excited to have professional learning opportunities that focused on the teaching of psychology, with a number of comments such as "*finally psychology-specific PD*" (Fiona, UW), and "*I feel energised. Always appreciate opportunities to re-evaluate teaching processes, especially since this looks at psychology which I haven't had before*" (Pippa, RW). Being involved in this study represented a professional learning opportunity that focused on research into the teaching of psychology, something they rarely, if ever, had experienced before.

Thought-provoking and challenging but they require more opportunities to learn, create, collaborate and reflect on the possible ways to integrate it into their teaching. The second main way the teachers discussed this sub-theme was in terms of the new ways of thinking about teaching of psychology. A key message from the teachers, as seen in all the themes, was that learning about the framework was "*thought-provoking, challenging and made me think about doing some things in a different way*" (Olivia, RW). They wanted (and felt they needed) more opportunities to learn, create, collaborate and reflect on the possible ways to integrate the framework for their teaching, as discussed in the previous themes.

While the teachers desired more professional development, they equally recognised the need for other teachers (psychology and science teachers) at their school to learn about the framework. They saw professional learning for teacher change as much more than attending a workshop but learning with and from each other in the school context. However, some also saw restrictions. Fiona points out that without this time to learn, adopting the framework will not happen: "*Retraining staff is difficult, need to spend their time on it or lose class time to learn it! Sad but true*." (Fiona, UW). This is an interesting view of what it means to be a professional teacher, especially in terms of feeling guilty being away from the classroom without considering how the experience may support their future teaching and their student learning. The teachers recognised school constraints in allowing them both time and opportunities to collaborate with other teachers within and outside their schools.

Shifts in teachers' views between the workshops and individual interviews.

The teachers' views were similar but more pronounced in the individual interviews. The teachers hoped there will be future opportunities for professional development around the teaching of psychology, including using the framework as a support. While not originally intended, the individual interviews ended up being a stimulus for more clarification on different aspects of the framework, depending on the teacher interviewed. The teachers acknowledged that more time for learning about this framework is required in order to use it to its full potential, as Pippa states: "*I just need more sessions [workshops]".* (Pippa, II).

The teachers desired more time for planning and curriculum development, recognising that purposeful planning to use the framework is required, as Nina states *"I have not had the opportunity to plan and introduce this frame"* (Nina, II). The teachers desired opportunities and time to collaborate with other teachers, including teachers within their own school and in other schools. They wanted to share ideas and reflect with others, as well as opportunities for planning psychology and science units, as Pippa explains:

> Perhaps it is just managing that workload as well. It may be that and with more experience, I sort of, will be much more flexible and relaxed and open [to new ideas]. An opportunity to then speak with others during the course [within this study], how they are finding the framework and using it, would have encouraged me further to use it and effectively use it. (Pippa, II)

Many teachers felt the need to communicate this framework to other teachers within their school *"want to work with science and psych teachers to incorporate the science practices into our units"* (Olivia, II). Again, they felt if teachers are offered these opportunities, a consistent approach can then be made across the units and year levels, so that in the future teachers can be *"explicit with the terms and the students are using them regularly, and that the students adopt the terms as well" (Nina, II)* and *"work together to create scope and sequence charts"* (Bianca, II). Without these professional learning opportunities, the framework would be difficult to incorporate across the curriculum.

In summary, for teacher change, the teachers desired more professional development specifically targeted to psychology education and the psychological science framework, more professional learning opportunities and more time to learn, plan, reflect, share ideas and collaborate with psychology and science teachers.

6.8.2 Sub-theme: Intended curriculum change.

As discussed in the intended curriculum theme, teachers thought the framework would be more likely to be used if the science practices were clearly incorporated into the VCE Psychology Study Design, and also easier to identify within both the Australian and Victorian

AusVELS F-10 Science curricula. According to most of the teachers, conditions for teacher change to use the framework as a support for their teaching:

- depend on intended curriculum changes first needed to drive curriculum resources, including textbooks.

This view was seen in both the workshops and the individual interviews, and across all teachers, despite what other subjects (science or non-science) they teach.

Teachers' views in the workshops.

Intended curriculum changes first needed to drive curriculum resources, including textbooks. In the workshops the teachers discussed this sub-theme in terms of needing the intended curriculum to lead the change first. Once the intended curriculum incorporated the framework, the inclusion in the high stakes assessment and other supporting materials, such as textbooks, will follow. Some of the teachers saw this as a requirement before they would use the framework, or their students would be more motivated to learn about the framework. For example, *"How can this [framework] assist with exam preparation? I hate exam focus but we still have it in the back of our minds."* (Edwina, UW) or as Chris puts it, *"Students will resist it, if it is not on the test or the exam, they will resist."* (Chris, UW). For VCE Psychology teachers, the assessment was never far from mind, even when they viewed the framework as potentially enhancing teaching and student learning.

Shifts in teachers' views between the workshops and individual interviews.

Similar views were seen in the individual interviews, and for many, the need for the intended curriculum to change first was emphasised more strongly than in the workshops. As Chris summarises:

> My hope would be that something like this (framework) could change the nature of psych, it might have to be how psych is mandated from above. That expectation that it can lead to something. (Chris, II)

Many teachers viewed changes to the intended curricula will lead to further endorsement of the science practices and use within the textbooks, as Nina replies when asked about the extent she will use the framework in the future: "*Well it just depends, it would require I feel like the text book to do the same thing. We use those, the text book refers to things as theories and not models. It must be in the Study Design.*" (Nina, II). Nina's comments shows how heavily reliant the teachers are on the textbook materials and the important for the textbooks to reflect the intentions of the intended curriculum.

Additionally, as discussed earlier, to fully justify psychology in the Australian and Victorian F-10 Science curriculum, all the teachers wanted psychological sciences to be explicitly mentioned in the Science Understandings strand. Likewise, explicit inclusion of the science practices in the intended curriculum documents is needed to support the teaching of psychology.

In summary, some teachers said without explicit mention of the frameworks selected science practices in the VCE Psychology Study Design, or explicit mention of psychological science in the Victorian and Australian curriculum, it will be difficult to drive teacher change within their schools.

6.8.3 Sub-theme: Resources to support the framework.

Given the teachers desire to collaborate and share ideas regarding ways to use the framework and support their teaching, and the need for the intended curriculum to change first, it is not surprising that teachers also saw a condition on teacher change to:

- depend on ‘frame-friendly’ resources for teachers.

These views were discussed in the workshops and individual interviews and no noticeable patterns of difference were seen across teachers and the other science or non-science subjects they teach.

Teachers’ views in the workshops.

‘Frame-friendly’ resources. Teachers wished for resources specifically targeting possible ways to use the psychological science framework. Lucy planned to *“look for resources that would be ‘framework friendly’” (*Lucy, RW). In both workshops, as mentioned in the previous theme, teachers abbreviated the framework to OPEMS and felt that a suite of resources that use “OPEMS” would support their teaching and student learning. Teachers also suggested converting the framework into a visual diagram or simpler layout that they could display on the walls of the classroom. “*Is it possible to create a visual diagram of this framework for simplicity?”* (Nina, RW), others could visualise “*a bit of a flowchart where they actually see the words models and systems and how they integrate. I think I need that myself. A bit of a visual.*” (Anne, UW) and Olivia decided that she needed to mind map the framework first, and then get her students to do the same.

Shifts in teachers’ views between the workshops and individual interviews.

The teachers had similar views in the individual interviews, many stronger views as they realised they needed more support to integrate the framework into their teaching. As discussed earlier in this theme, some teachers wanted to know and share their ideas with other teachers. Nina would like to see these ‘frame-friendly’ resources developed:

> Yes, I think it is the resources for teachers. We have our resources, we have our PowerPoints. I think it is almost, if I was going to adopt this framework, I would like to adopt it in a very consistent kind of approach. And that would mean kind of redoing my PowerPoints so that they would do it too. So this is our model. This is our observation. This is our past research, let's look at our patterns and explanations. Yes, those resources are probably key to help me. (Nina, II)

Olivia found creating a mind map worked for her:

> The table for me didn't work, um but as soon as I started to put it down into my mind maps form, for me that was where I was really able to see themes and how everything linked together. (Olivia, II)

In summary, the teachers felt the psychological science framework required further clarification, especially a visual diagram. Teachers needed help understanding the framework, what it could look like in different areas of the curriculum and different systems. They desired a bank of resources to show them how to use the framework, specifically looking at different psychological systems, to drive teacher change.

6.8.4 Summary of 'conditions for teacher change' theme.

Overall, the teachers have had very little, if any, psychology education-specific professional development or professional learning, including learning about research into ways to teach psychology and contemporary science practices. They all desired more opportunities to engage in professional learning related to teaching and learning psychology, including learning about ways to understand and integrate the psychological science framework to support their teaching. They identified a number of conditions for teacher change in terms of using the framework as a support for their teaching of psychology.

Teachers in this study viewed the psychological science framework as a support for their teaching, but could also identify limitations and constraints that prevent its use. These views were not limited to those who were or were not teaching other science KLA subjects. Without changes to the intended curriculum and sustained support for teachers, including ongoing professional learning opportunities, collaboration with other teachers and teaching resources, it is unlikely the teachers will change the way they teach. For the framework to be used as a support beyond the surface use of terminology, more support is needed for understanding and planning for its use. Teachers want to engage with other teachers within their schools and the secondary school psychology teachers' community. Moving towards teaching with this psychological science framework will only occur if the teachers feel it is relevant and important and that they are capable and given appropriate time and support to plan and share ideas for teaching.

6.9 Chapter Summary

The psychological science framework presented new ideas and ways of thinking about psychology and teaching of psychology that were well received by the teachers. In the workshops, they worked well to consider how they could use the framework to support their teaching. While encouraged but not instructed to use the framework in their psychology classes, four out of the eight teachers teaching psychology explicitly used the framework and another two teachers commented on how they reconsidered the ways they embed research and research methods into their teaching without explicitly using the science practices. No noticeable trends were seen between teachers who teach other science KLAs and those who do not. NO differences suggests that teachers did not come into the study with different perspectives of psychology depending on the ways they learnt psychology at university or the other subjects they currently teach, and prior opportunities to learn about teaching psychology and contemporary science practices were limited, if any.

Discussions in both the workshops and individual interviews were built and then analysed around four themes: ‘representing the discipline of psychology’, ‘connecting with intended curriculum (documents), ‘supporting implemented curriculum (teaching)’ and ‘conditions for teacher change’. Teachers saw value in using the framework to support their teaching, but teachers’ various understandings of the framework, including the selected science practices and connections to the VCE Psychology Study Design, limited the way they discussed the potential use of the framework to support their teaching. A couple thought they were already using the approach within the framework (although not the explicit terms) although they had adapted it into their own traditional way of teaching. Some teachers wanted to start using the terms explicitly but recognised that there is more depth of understanding required in terms of using the science practices terminology, others did not recognise this link. All the teachers desired more psychology-specific professional development and professional learning opportunities and support for teachers, for teaching of psychology in general and specifically in terms of using the framework to support their teaching. However, there were interesting views on professional learning that may hint viewing being away from class as not actually helpful for the long term teaching and professional growth for the teacher. If curriculum authorities wish to use contemporary science ideas in psychology, these ideas need to be embedded into the intended curriculum and associated resources. Professional development and learning opportunities with time to collaborate, plan, share and reflect on teaching, between teachers of psychology and science teachers is necessary and desired.

Chapter 7: Discussion (Research Question 1) Teachers' Views of Psychology and Teaching of Psychology as a Science

7.1 Introduction

This chapter represents the first of the two discussion chapters. This chapter revisits the purpose of this thesis and considers the findings in light of the first research question, drawing on the ideas discussed in the first four chapters (introduction, literature and methodology) and linking with data analysis in Chapters 5 (Phase One: online survey - teachers' views of psychology as a science and ways of teaching psychology as a science) and 6 (Phase Two: workshops and Phase Three: individual interviews – teachers' views on the psychological science framework as a support for their teaching of psychology). Chapter 8 discusses the final two research questions.

7.2 Revisiting the Purpose of This Thesis

A psychological science framework (Marangio, 2013) was adapted to support the teaching of psychology concepts with the science practices that inform these concepts. As outlined in Chapter 1, the purpose of this study was to consider how this psychological science framework is perceived within the profession of secondary school teachers of psychology.

With this purpose in mind, this study aimed to get a snapshot of psychology teachers' current views and teaching of psychology as a science, introduce the framework to teachers and explore how they understand and view this framework as a support their teaching of psychology.

In doing so, it asked the following three research questions:

RQ 1 What are psychology teachers' views of psychology as a science and the ways they are teaching psychology as a science?

RQ 2 What are teachers' views on using the psychological science framework as a support for their teaching of psychology?

RQ 3 In what ways does this psychological science framework shift teachers' views for teaching psychology?

Central to answering these questions are the views of VCE Psychology teachers who are teaching with a curriculum that deems psychology as a science. Research question 1 was primarily addressed in Phase One of this study: the online survey. Research questions 2 and 3 were addressed in Phase Two and Three: the workshop and follow up individual interviews. This chapter addresses research question 1, and has further implications for research questions 2 and 3, with many of the points raised in this chapter discussed further in the next.

7.3 RQ 1: What are Psychology Teachers' Views of Psychology as a Science and the Ways they are Teaching Psychology as a Science?

Overwhelmingly, VCE Psychology teachers view psychology as a science (98%) and report that they teach psychology as a science. This is not surprising since VCE Psychology has been firmly embedded in the science curriculum for over 25 years, and also in keeping with Rowley and Dalgarno's (2010) study in which they found 87% A-Level Psychology teachers viewed psychology as a science, up from 67% (Maras & Bradshaw, 2007), after A-Level Psychology was classified as a science study. Psychological associations, including the

Australian Psychological Society (APS), are advocating psychology as a science and encouraging secondary and tertiary educators to teach how psychology uses methods of science to create its knowledge (Cranney et al., 2008). Additionally, VCE Psychology teachers were found to have a solid psychology disciplinary education (most are teaching 'in-field'), something that has been previously questioned and the lack of psychology disciplinary education has been seen as impeding the teaching of the science base of psychology (Hakala, 1999; Provost et al., 2012; Weaver, 2014). VCE Psychology teachers' views appear to be in line with the psychology profession in terms of viewing psychology as a science.

Similarly, Victorian schools perceive psychology as a science. Victorian schools tend to recognise psychology as a science, with a large majority of the teachers (89%) in schools that place psychology within the science key learning area (KLA). This is different to previous studies which has seen psychology not placed, or sitting uncomfortably, in the school's science KLA (BPS, 2013; Hakala, 1999; Rees, 2013). Teachers in this study have a widespread range of other teaching areas, from English, Humanities and Science, and likely to have studied tertiary psychology within different Faculties (Arts, Health, Science and Social Science), this range does not appear to influence their recognition of psychology as a science. On the surface, psychology does not seem to have an 'identity crisis' in terms of being a science and where it sits in Victorian KLA schools. They are able to teach within a range of learning areas, not exclusively science, rather than limited to teaching subjects within only one learning area, as for example humanities within some US jurisdictions (Weaver, 2014). That said, it would be interesting to find out why a small number of teachers (11%) in this research study did not include psychology as part of science learning area in their school. In these schools, psychology was not placed in a KLA (8 teachers) or placed in humanities (1 teacher) while the teachers were teaching a range of subjects either within science KLA or other KLAs. Therefore psychology's omission from Science KLA is not linked to these teachers other KLA and remains unexplained as to why not, open for future research. This may be due to a small number of schools not accepting psychology as a science as in the early 1990s (before psychology was a VCE study) psychology was not placed in the science KLA and consequently these may never have changed or perhaps experienced logistical issues with placing psychology in science KLA.

In terms of why psychology is a science, the views of Victorian psychology teachers may not always be aligned with both the profession of psychology and science F-12 education research literature. Furthermore, teachers' views of psychology may not always translate or be reflected in their reported ways of teaching psychology. The teachers in this research study are likely to hold a variety of views as to why they understand psychology as a science and what it means to teach psychology as a science. Some of the teachers' views and ways of teaching psychology seem to be similar across all the teachers, at least at this broad level. Other views differ among teachers, with some holding multiple and even contradictory views, or views that shift depending on the psychology context. Perhaps the variety of views are starting to reflect the contested nature of psychology (Ardila, 2007; Trapp, et al., 2011) and science (Lederman, 2007; McComas, 1998). This baseline of psychology teachers' views and reported ways of teaching psychology as a science are cautionary starting points since making such assumptions could be over simplifying the teachers' views of psychology. Importantly, the ways teachers understood each survey item and how they relate to specific contexts (such as micro (biochemical) level of analysis through to the macro (socio-cultural) level within different psychology content areas cannot be assumed and may differ between different contexts. The survey findings raise interesting questions about the extent and ways teachers view and teach psychology as a science.

7.3.1. Psychology teachers' views on what makes a discipline a science.

The way teachers view science offers an important insight into understanding how teachers view psychology as a science. Psychology teachers overwhelmingly viewed 'the research process' as what makes a discipline scientific, with only a very small number stating it was due to the 'type of content' of the discipline studies. Almost two-thirds stated 'the research process' as following *the* scientific method and/or using experiments, suggesting that a general and universal scientific method exists, a common myth of science (McComas, 1998). Some psychology teachers discussed 'the research outcome' (proving facts and seeking the truth or informing theories) as well as 'the research process'. Previous surveys with A-level psychology teachers (Rowley & Dalgarno, 2010) and first year psychology students (Rowley et al., 2008) found teachers and students discussed science as either the research outcome or the research process, not both.

While not many teachers elaborated on their answers, those who did expand on the use of scientific (experimental) method tended to write about this method being objective, valid, reliable, rigorous and/or must be replicated. Their responses could represent an understanding that science is strongly guided by certain 'epistemic' values such as objectivity (reduction of bias), accuracy, precision, consistency, and testability (Allchin, 1999) but responses were not extended to 'non-epistemic' values that play an important multi-faceted role on internal and external aspects of science (Allchin, 1999). A range of other aspects not mentioned included scientific reasoning and argumentation, theory and data interpretation, ethical guidelines, range of research methods and science practices, and other science-related dispositions, skills and personal, social and cultural aspects. Teachers may not understand the role of these aspects in science or may not consider many other aspects of science as unique to or defining of science and therefore not necessary in making a discipline a science or simply did not come to mind when filling in the survey. Alternately, as discussed next, some teachers may have a narrow view of science, limited to use of scientific (experimental) method.

7.3.2 Psychology teachers' views and teaching range of scientific methods in psychology.

A range of empirical research methods, qualitative and quantitative, each with its own value and limitations, are utilised to inform psychology knowledge (Breen & Darlaston-Jones, 2010; Bronfenbrenner, 2001; Glassman & Hadad, 2009). In line with teachers viewing psychology as a science and a discipline a science because of 'the research process', psychology knowledge was overwhelmingly reported to be empirically-based. The responses to other items, however, suggest that many teachers equate 'empirical' to using 'experiments', with experiments being instrumental to creating new psychology knowledge. Furthermore, for some teachers, an experimental method could be seen as equivalent to following *the* scientific method, as if there is only one way of performing research in psychology (and science). The use, value and limitations of a diverse range of research methods may be overlooked when teaching psychology, and unfortunately this is not surprising.

The VCE Psychology 2012-2016 (VCAA, 2012) prioritises experiments without highlighting the value and limitations with selecting research methods for particular purposes (Marangio, 2013), and it is up to the teacher to recognise these gaps and decide if or how to teach these aspects. For many teachers, this recognition seems unlikely and, although further investigation into the teachers' reasoning are required, concerns about viewing the use of experimental methods over others as the only way to obtain unambiguous, objective and reliable truth (Hodson & Wong, 2017; Lederman, 2007; Wivagg & Allchin, 2002) could be at play here. Some teachers could hold a number of McComas' (1998) myths of science, including 'a general and universal scientific method exists', 'experiments are the principal route to scientific knowledge' and 'science is more procedural than creative'. Narrow views of science puts psychology in danger of being fixed on 'the science method' rather the range of interactive and contextual factors involved in psychological processes (Pérez-Álvarez, 2018) and in danger of not thinking more deeply as to what it could mean to teach contemporary psychology to their students. For teachers to focus almost exclusively on experimental method, other research processes and values in science (Allchin, 1999) may not be emphasised, downplaying the bigger picture regarding psychology ways of knowing: ways psychology knowledge is created and why this knowledge is valued.

7.3.4 Psychology teachers' views and teaching psychology's use of science practices.

Contemporary science education reform promotes integrating the content of science with science practices (NRC, 2007), and are included within the new Australian F-10 science curriculum (ACARA, 2015). The teachers tended to report that they build on prior learning experiences within and across the semester and integrate teaching of concepts with teaching science inquiry, which could be seen as favouring a spiral curriculum (Bruner, 1960) that revisits and connects psychology concepts with science practices.

Teachers are familiar with the names of the selected science practices ('systems', 'models', 'explanations', 'patterns' and 'observations') but are likely to hold a range of views related to each practice, especially around teaching the complexities of each practice and the relationships between them. Furthermore, their views on each practice may not necessarily influence the ways they teach. For instance, teachers' view psychological systems as dynamic, multileveled and interconnected to each other and other systems of our world, in line with Bronfenbrenner's (2001) systems approach, but mixed responses were given in terms of teaching systems, from never to always. Similarly, a range of responses were given in terms of distinguishing between observation and inference, data and evidence, evidence and explanations, and the use of models in their psychology classes. Some teachers may hold more traditional (logical positivism) views of science rather than more contemporary views of science that centre on epistemic and social practices of science (Duschl, 2008) such as building theories and models, constructing arguments using specialized ways of talking, writing and representing phenomena within the science community (NRC, 2007), or multiple views, possibly conflicting at times, as discussed earlier. Alternatively, the issue may not be so much about teaching the complexities that go with each science practice, but rather providing learning experiences for their students to develop an understanding of the science practices. There was no sense, especially in the focus groups and workshops, that teachers who taught other science KLA subjects (likely to have a science degree) were more or less likely to grapple with these issues than those who also taught in non-science KLAs. In other words, they did not seem to address the science practices differently. This is another area of research worth exploring further.

The VCE Psychology Study Design 2013-2016 (VCAA, 2012) includes starting points for interweaving psychology concepts *with* science practices but these are not clearly stated and the complexities of the science practices are not explicitly addressed (Marangio, 2013). Again, it is up to the teachers to recognise and understand these implicit links to science practices and could explain the different responses from teachers. More information is needed to understand how teachers build on prior learning experience and the extent to which psychology is being taught as a contemporary science.

7.3.5 Psychology teachers' views on psychology as more or less scientific.

While psychology is accepted as a science, some teachers commented on psychology being more or less scientific at times, raising the idea that there are different degrees of being scientific. They did so in three ways: psychology was less scientific in the past but is becoming more scientific today; psychology is less scientific in comparison to other sciences; and some areas of psychology are more scientific than others. Such comments offer further insights into teachers' views on the relationship between psychology and science.

Some views could represent an understanding that psychology is emerging as a more influential and integrated science than ever before (Cacioppo, 2013) and they are distinguishing modern psychology from the less scientific areas, such as Freudian theories of the past viewed as not empirically testable nor falsifiable (Collisson & Rusbasan, 2018). Comments comparing psychology to other sciences could be similar to teachers in Rowley and Dalgarno's (2010) study who thought psychology was not as scientific as chemistry, physics, biology and geology and Rowley et al.'s (2008) findings that psychology students with biology backgrounds viewed biology as more certain, authoritative and less open to interpretation than psychology. There are many challenges with researching psychology due to the complex nature of individuals (Dyer, 2006). For instance, issues with subjectivity can arise from both the participants and the researchers in psychology, especially when our thoughts, feelings and behaviour can be influenced by others. Perhaps teachers are considering some of these challenges as insurmountable, as they view science as objective (must not be subjective), overlooking science as a value-laden endeavour including reduction of bias in research (Allchin, 1999). Additionally, this could explain why a couple of comments stated the biological basis of psychology as being “more scientific” and “scientifically proven” as opposed to other areas such as socio-cultural psychology. Others could be recognising the ongoing contentious nature of psychology (Ardila, 2007; Trapp, et al., 2011) or view some areas of psychology, such as the mind, as impossible to study scientifically.

The additional comments by the teachers related to the more or less scientific aspects of psychology highlight the importance of contextualising the propositional statements in different psychology knowledge areas and probing deeper into their arguments. Teachers’ views of psychology as more or less scientific highlight psychology’s ‘identity crisis’ within the curriculum (Rees, 2013), still searching for a place in school science traditional science disciplines (science understandings), such as in Victorian AusVELS (VCAA, 2015a) and Australian F-10 (ACARA, 2015) rather than linking with other science curriculum strands such as SHE and SIS.

7.3.6 Psychology teachers’ views and teaching psychology as a human construct and human endeavour.

The differing responses to psychology as a human construct (from strongly disagree to strongly agree) and teaching psychology as a human endeavour (from never to always) raises a number of questions, especially in terms of opportunities to understand and emphasise these elements in their teaching. Teachers may not necessarily understand ‘science as a human endeavour’ (SHE) since it is not a phrase in the VCE Psychology Study 2013-2016 Design (VCAA, 2012). Furthermore, science as a human endeavour (SHE) is new to Victorian

AusVELS (VCAA, 2015a) and Australian F-10 (ACARA, 2015) science curricula, with science teachers unlikely to have experienced it as a student themselves (Aubusson, 2011; Fensham, 2016) and neither curricula explicitly include links to psychology. Equally, this could also be related to teacher views that psychological science is factual, objective and unchanging, as already discussed, with psychology concerned with observing the truth, having to see something to be believed rather than making inferences about (abstract) concepts that are not directly observable. Further research is required here, as responses may differ in light of a specific psychological concept or depending on the psychological concept they are teaching at the time. For example, when they teach specific models, such as the Atkinson-Shiffrin model of memory and Baddeley's working memory model, it is unclear if they discussing why models are created, the abstract construct they represent and the tentative but durable aspects that may cause a model to change over time. Furthermore, to what extent are they comparing these two models and discussing why they may differ to highlight ways psychology works? Some psychology teachers could have sophisticated reasons as to why they gave these responses and this may even change depending on the concepts they are teaching.

Interestingly, psychology teachers express a desire to teach psychology in useful, beneficial and relevant ways for both the individual and society. Their aim is for students to apply their knowledge and develop skills and capabilities to psychology-related situations in their daily lives, now and into the future. The reasons why psychology is important to teach is in line with how students feel about learning A-level Psychology (Banyard and Duffy, 2014). In this way, they have captured aspects of SHE, and included a goal to for psychologically literacy (Cranney & Dunn, 2011) and scientific literate citizenry (Goodrum & Rennie, 2007). Almost half of teachers who responded said they were able to teach the ways they felt important while the other half had various levels of discontent, mainly due to the VCE Psychology Study 2013-2016 Design (VCAA, 2012) limitations, including heavy content load and the high stakes assessment. VCE Psychology has received similar criticism in the past from teachers (Skouteris et al., 2008). It makes it unlikely that teachers have had opportunities to understand how 'science as a human endeavour' connects with their current ways (or desires) of teaching psychology, or if they do understand this connection, teachers could see limitations in the curriculum that prevent them from teaching this way.

7.4 Further considerations: What could this mean for psychology teachers and the systems in which they teach?

The teachers in this study were teaching with a curriculum that viewed psychology as a science. It is not surprising that they identify with psychology as a science, at least on a surface level. Given that most of the teachers were teaching 'in-field' and the other subjects they teach spread across the range of KLAs, they most likely studied tertiary psychology via different faculties (such as Faculty of Arts, Health, Science and Social Sciences). Psychology began from different roots (for example, philosophy, medicine, anthropology, sociology, biology) and tensions around psychology as a science still exist (Ardila, 2007; Trapp, et al., 2011) and can manifest as an 'identity crisis' within curriculum (Rees,2013). Perhaps some of these tensions played out in the survey, given the variety of views, not necessarily linked to their tertiary backgrounds or other subjects they teach but across the board.

Since learning psychology content for most of these teachers included tertiary study, it would be interesting to explore the ways faculties or departments of psychology identify psychology with science and if different faculties convey different messages (explicit or implicit) regarding nature and values of science? Similarly, for a number of teachers learning to teach, psychology would have started in ITE psychology method units. In what ways are different ITE psychology method units facilitating the teaching of contemporary views of both psychology and the nature and values of science appropriate for a school audience? In what ways are psychology pre-service teachers enabled to consider the commonalities across science disciplines and psychology's possible place in STEM education, interdisciplinary and multidisciplinary programs?

The majority of the teachers in this study may be 'in-field' teachers but psychology and education are ever changing. The teachers' self-reports on the ways they teach psychology as a science, with many possibly teaching from more traditional sciecne viewpoints, raises questions regarding the opportunities for teachers to deeply reflect on what it means to teach psychology as a science. In what ways are they given opportunities to critically reflect on their own teaching and relate these to contemporary views of psychology and science? Such opportunities place teachers in the expert position to make decisions about how these views could look like in their teaching practice and student, class and school contexts, and move beyond teaching in ways they were taught at school or continue to use favourite activities without focussing on how this enhances individual student learning (Loughran, 2012).

There was a sense of dissatifaction for some teachers in terms of aligning the ways they want to teach psychology with the ways they are currently teaching. This dissatifaction, cognitive dissonance, could act like a form of motivation to actively pursue and / or take up professional learning opportunities that allow them to deeply reflect on what it means to teach contemporary science (Loughran, 2012). To what extent do such professional growth opportunities exist in terms of teaching and learning psychology?

While the teachers identify with psychology as a science, and psychology is placed in the Science KLA in the overwhelming majority of the teachers schools, the systems in which they teach may not identify with psychology as a science. Each key learning area is unique, espcially due to the individual teachers and the school context, and the culture within a key learning area plays a significant role in the way teachers plan their work and interact with their students (Donnelly, 2000; Simon, et al., 2011; Siskin, 1994). Ongoing and intense collaborative work in teacher teams facilitates conditions where teachers can share expertise and leadership and learn together (Darling-Hammond, 2005). A small number of schools do not place psychology in their Science KLA and reasons for this isolation are unexplained. Do the other science teachers hold contemporary views of science within their schools? How do their views align with the psychology teachers within the school? If they do align, are they more likely to be accepted into the science KLA ? To what extent are psychology teachers actively seeking and/or given opportunities for professional growth and leadership including working with other teachers in their Science KLA?

The teachers may be missing out on opportunities to explore what it means to teach the science as a human endeavour (SHE) strand and consider what SHE may look like in their teaching of psychology. Alternatively, given that views seemed to be across all psychology teachers, has Victorian AusVELS (VCAA, 2015a) downplayed the SHE strand in the curriculum? Teachers have the biggest influence on whether a curriculum emphasis is implemented into their teaching practice, not the intended curriculum (policy documents) (van Driel, Bulte & Verloop, 2008). Teachers are unlikely to want to change their teaching practice unless they know about the new reforms, understand the intentions behind them and want to shift their teaching practice (Loughran, 2012). Changing curriculum emphasis is not easy for teachers

(Roberts, 1988), and other science teachers have struggled to make these changes (Lowe & Appleton, 2015) and such shifts to transform practice will take time and is influenced by their ability to critically reflect on their own teaching and to relate this to the intentions behind the curriculum reform (Korthagen, Loughran & Russell, 2006).

In terms of the Victorian psychology curriculum, the VCE Psychology Study Design 2013-2016 (VCAA, 2012), this thesis raises further questions about the messages it communicates in terms of teaching psychology as a contemporary science. While starting points exist in this intended curriculum (Marangio, 2013), it is up to the teachers to recognise, understand and value teaching psychology as a contemporary science. How do curriculum policy holders view psychology as a science? According to Roberts (2007), a Vision I scientific literacy curriculum concerns the products and processes of science itself while Vision II is more outward looking at situations in life where science plays a role. The SHE strand is designed for a Vision II curriculum as it aims for scientific literate citizenry (Goodrum & Rennie, 2007). However, curriculum policy holders can downplay Vision II curriculum (Fensham, 1998), especially regarding the way the curriculum is assessed (Aikenhead, Orpwood & Fensham, 2011). Furthermore, VCE Psychology is a high stakes curriculum, and high-stakes curricula are at risk of being taught as isolated bits of content knowledge via teacher-centred pedagogies to meet the demands of the assessment (Au, 2009). Are curriculum policy holders sending messges that priortise Vision I curriculum, especially via the assessment? More concerning, is the curriculum sending traditional messages (implicit or explicit) regarding views of science as a way to ‘fit’ psychology in with the science KLA, rather than embracing the identity of psychology and its relationship with contemporary science?

Given that psychology teachers collectively teach a range of other subjects across the curriculum, they are in an excellent position to get involved in STEM education and other interdisciplinary and multidisciplinary programs, a current focus in schools (Schleicher, 2018). If psychology teachers are not engaging with other teachers, including science teachers, this isolation could prevent inclusion into such programs. Curriculum is a contested space (Pinar, 2004) and negotiating what goes into a curriculum and what is left out demands advocacy for inclusion at the onset of discussions for new programs. To miss out on being part of these new programs is likely to make it harder later on to get involved. Obviously, there is a question regarding whether or not psychology teachers want to be involved, and whether or not they have had opportunities to learn and appreciate how psychology could be part of these new programs.

7.5 Chapter Summary

In summary, the online survey offered a snapshot of teachers' views of psychology as a science and ways of teaching psychology as a science, views that were also seen in the workshops and individual interviews. While at times their views seemed to be in line with the profession of psychology and school science education, this does not appear to be always the case. Teachers may hold multiple views of psychological science, sometimes contradictory and sometimes not transferred into the ways they teach psychology. Many teachers are likely to view science as limited to following the scientific (experimental) method, without expanding to a range of science processes, practices and values that lead to contemporary psychology knowledge. Teachers have a desire to teach psychology as a human endeavour but do not necessarily understand what the phrase 'psychology as a human endeavour' means. The possible misalignment between teacher views and science education is not surprising given that some of these aspects are only implicit or not mentioned in the VCE Psychology Study Design 2013-2016 (VCAA, 2012), which has a heavy emphasis on experimental methods (Marangio, 2013). More investigation is needed, particularly in relation to teaching different psychology content areas. The multiple and diverse views, however, suggest that within the profession of psychology teachers there is a broad range of starting points for teaching contemporary psychological science. They also raise questions in terms of opportunities for teachers to learn pedagogies for teaching psychology as a science, starting in ITE psychology method units and continuing with professional development and professional learning opportunities within their schools. These different starting points need to be considered for teachers' professional learning, and are likely to influence the ways teachers view and use the psychological science framework at the centre of this thesis.

Chapter 8: Discussion (Research Questions 2 & 3) Teachers' Views of the Psychological Science Framework

8.1 Introduction

This chapter is the second of the two discussion chapters. Chapter 7 discussed research question 1: What are teachers' views of psychology as a science and the ways they are teaching psychology as a science? Teachers may hold multiple views of psychology as a science, sometimes contradictory and sometimes not transferred into the ways they teach psychology nor in line with the profession of psychology and school science education. Chapter 8 extends this discussion to the final two research questions that focus on how the psychological science framework is perceived by secondary school teachers of psychology:

RQ 2 What are teachers' views on using the psychological science framework as a support for their teaching of psychology?

RQ 3 In what ways does this psychological science framework shift teachers' views for teaching psychology?

Both questions are now addressed, then the key insights into how and why the psychological science framework is perceived as a support for their teaching by secondary school psychology teachers are discussed.

8.2 RQ 2: What are Teachers' Views on Using the Psychological Science Framework as a Support for Their Teaching of Psychology?

The teachers in this thesis are implementing a curriculum that deems psychology as a science and this research question considers their views on using the psychological science framework as a support for their teaching of contemporary psychological science. The teachers were very enthusiastic about teaching psychology in secondary schools. Upon data analyses, four themes emerged regarding their views of the psychological science framework as a support for their teaching: 'promoting the discipline of psychology', 'connecting with the intended curriculum (documents)', 'supporting implemented curriculum (teaching)' and 'conditions for teacher change'. The teachers discussed using the framework to support their teaching in a number of ways, with some of these views varying between teachers and shifting slightly between the workshops and individual interviews.

The teachers were positive about the potential use of the framework to support their teaching in terms of the framework emphasising psychology as a science, creating opportunities to connect to the curriculum in various ways, teaching psychology in richer ways, and offering scope to reflect on their teaching of psychology. While many similarities, they also expressed different views from each other about ways to use the framework as a support for their teaching. The differences in teachers' views highlighted a number of limitations and constraints on enabling the use of the framework to support their teaching. Limitations were due to the teachers' different understandings and different preferences for selected science practices and difficulties understanding the framework in its entirety. Constraints were associated with teaching a high stakes VCE curriculum and the narrow focus on experimental methods within the VCE Psychology Study Design, as well as uncertainty about ways to integrate the framework into their teaching and desire for further resources, time and opportunities to learn. Interestingly, the teachers' views of the framework did not always match the ways they teach or intended to use the framework, and they all wanted more opportunities to learn about the framework and ways to use it to support for their teaching. Such responses are not surprising given the range of views of psychology as a science and teaching psychology as a science identified in the online survey, as discussed in Chapter 5 (data analysis) and Chapter 7 (RQ 1 discussion).

8.3 RQ 3: In What Ways does this Psychological Science Framework Shift Teachers' Views for Teaching Psychology?

This thesis focuses on teachers of psychology and their teaching of psychology as a science. This research question considers the use of the framework to support them to teach psychology concepts with the science practices that inform these concepts, and therefore likely to demand a shift in emphasis from teaching psychology as 'facts and skills' to teaching 'how we know what we know' and 'why we believe'. The teachers involved in this research study were enthusiastic about the framework as a support for their teaching despite differences, limitations and constraints highlighted in the previous section. These differences were more noticeable in the follow up individual interviews. Most teachers reported explicit or implicit use of the framework to support their teaching, and all wanted to learn more about its potential use, as well as professional teacher learning specifically related to psychology education and not limited to the framework. Consequently, some slight shifts in teachers' views for teaching of psychology were found, and these shifts were to different extents, if any, for different teachers.

The teachers felt the psychological science framework got them thinking about psychology and teaching of psychology in new and exciting ways. In terms of views of psychology, learning about the framework got teachers thinking about their understanding of contemporary psychology and how these fit with the framework and the intended curriculum. It reinforced their desire to teach psychology and helped reflect on their views of the bigger picture of teaching psychology. This bigger picture was extended to the purposes for teaching psychology, beyond teaching for the examination, and what deeper thinking may look like in their classes. It also got them thinking about the ways they interact with other teachers, including science teachers within their schools and psychology teachers in other schools.

In terms of their teaching, some teachers reported changes to the ways they teach as a result of learning about the framework. These changes tended to differ between teachers. The ones that changed the ways they teach the most spent time purposefully planning to use the framework prior to their classes. The teachers who used the framework explicitly, did so in a variety of ways from planning units of work to integrating research with content knowledge. These teachers tended to shift their focus from teaching theory first (learning the content) to teaching the concepts together *with* science practices, often beginning with observations and facilitating class discussions with a number of associated questions. Interestingly, they all taught with other psychology teachers within the school and two of them were in one of the workshops. Most teachers who reported using the framework, either explicitly or implicitly, tended to pick and choose the science practices that resonated with them and tended to use them in a way that fitted with their previous views of teaching psychology. In other words, they assimilated the framework to fit with their current teaching with minimal change to their teaching. Often the teachers did not view the framework in its entirety, although they recognised further shifts in their teaching are required to use the framework to its potential. Two teachers used the framework for their teaching by reframing and incorporating it into what they already do, and therefore not shifting their practice or perceiving any need to use the framework. One of these teachers was the only psychology teacher in the school. Furthermore, for most teachers the use of the framework during their teaching was usually not planned but occurred spontaneously as science practices (or at least the terms) surfaced in class. Additionally, some teachers were reluctant to change the ways they teach unless this change was driven by the intended curriculum, and another two teachers remained positive about the framework but were reluctant to use it as they acknowledged the need to learn more about the framework and ways to integrate it as a support for their teaching. Both of these teachers were the only teacher of psychology in their school.

The teachers articulated a diverse range of views and needs to support the ways they view and teach psychology, and raised a number of 'conditions for teacher change'. These conditions included engaging in professional learning and development specifically related to the teaching and learning of psychology, including (but not limited to) learning more about the framework, as well as rethinking science and how psychology relates to science and intended curriculum change. They wanted more opportunities to collaborate with teachers (including psychology and science teachers within and outside their schools), psychology teacher educators and psychologists to enhance their teaching of psychology.

8.4 Discussion: Teachers Views on Using the Framework to Support their Teaching of Psychology

A number of key insights into the teachers' views of the framework and ways it can be used to support teaching of psychology, including shifts in their thinking about teaching of psychology were found. The framework was viewed as a potential support for teaching psychology but its use was limited because teachers experienced difficulty integrating it into their teaching and felt constrained by the intended curriculum. All the teachers wanted to learn more about the framework and most recognised a desire to change their teaching although felt the shifts in emphases required for teacher change were too big without further support. Without further support, the use of the framework to support their teaching is limited.

The teachers' views and experiences raise interesting questions about the potential use of the framework to support their teaching of psychology in the future, especially the following key points related to each theme:

- promoting the discipline of psychology: emphasising psychological science, therefore legitimising psychology as a science,
- connecting with the intended curriculum: creating an overarching theme to connect the curriculum in multiple ways, including psychology and science teachers,
- supporting the implemented curriculum: teaching psychology in richer ways, and
- conditions for teacher change: desiring opportunities to learn more about ways to potentially use the framework for teaching psychology and psychology education.

These key points are now discussed in light of views of the profession of psychology, school science education and the intended curriculum.

8.4.1 Promoting the discipline of psychology: emphasising psychological science, therefore legitimising psychology as a science.

The psychology teachers were very positive and open to a framework that emphasised psychology's relationship with science, and therefore potentially being used to support their teaching of psychology as a science. Emphasising psychological science was seen as a way to understand and legitimatise psychology as a science in a number of ways.

Promoting contemporary science.

While the teachers already viewed psychology as a science, the use of the science practices helped teachers think more deeply about ways psychology connects with science, in many ways legitimising psychology as a science beyond the use of experiments or biological basis of psychology. The teachers were interested in how the framework related to roles of observation and inference, data and evidence, evidence and explanations, models and systems in psychology, as part of contemporary science (Duschl, 2008). They welcomed the bigger emphasis on the social processes of psychological scientists work and the way the framework offered a common base for teaching about scientists work on local and global issues in large interdisciplinary and multidisciplinary teams (MacLeod, 2018; National Academy of Sciences, 2009). Such discussions highlight how science has moved beyond traditional logical positivism to embrace conceptual, epistemic and social roles in contemporary science (Duschl, 2008) and contemporary psychology as an emerging integrated, interdisciplinary and collaborative science (Cacioppo, 2013), rather than discrete and isolated areas of psychology. The framework could play a role in supporting teachers to identify psychology with science, offer compelling arguments around the nature of science that relate to different subfields of psychology, and open up opportunities to connect psychology with other studies, including other science disciplines.

Legitimising psychology as a science in the intended curriculum.

While the teachers saw opportunities to use the framework to promote the discipline of psychology, they recognised gaps in their teaching and the curriculum in terms of emphasising the teaching of contemporary psychology. It is more important than ever to portray psychology as a science within psychology curriculum (Cranney et al., 2008; Hakala, 1999) and a curriculum, such as the VCE Psychology Study Design, may place psychology in the science learning area, but more needs to be done to show both teachers and students how psychology draws on science to inform its knowledge. Teachers felt the framework helped them explore how psychology knowledge is created and why this knowledge is valued, offering more than just 'lip service' in understanding and teaching psychological science, and beyond inclusion of a research methodologies section.

The teachers felt limited by the curriculum, in line with earlier analysis of the VCE Psychology Study Design 2013-2016 (VCAA, 2012) which found starting points for teaching science practices but only in implicit ways (Marangio, 2013). They felt they needed further support to shift their teaching to focus on developing understandings of science practices while teaching psychology concepts. Some felt that unless there is explicit inclusion of science practices in the VCE Psychology Study Design (especially the external examination), they are unlikely to use the framework. For these teachers reluctant to shift, endorsement needs to come from the intended curriculum and associated documents first.

Understanding and teaching concepts together with science practices.

The teachers were in favour of the emphasis on science practices within the framework despite experiencing difficulty integrating the framework as a support for their teaching. They liked a systems approach (Bronfenbrenner & Morris, 2006), highlighting the interrelated, multivariable and dynamic nature of psychology. At the same time, they had different and multiple views and ways of teaching systems, and many found systems beyond labelling a content area (for example, memory systems) very difficult to integrate into their teaching. Similar experiences occurred with understanding and teaching the other selected science practices, supporting similar studies that found teachers struggle with using science practices in their classroom and how these practices are tied with content (Pruitt, 2014) as they require knowledge, abilities, beliefs and ways of teaching that teachers are unlikely to possess (Biggers et al., 2013). While the teachers recognised that the selected science practices are intricately linked to each other (do not work in isolation) to develop content knowledge, the ideas within the framework were new and they wanted more time and support to understand what this may look like in their classes within and over the year levels.

Equally the teachers discussed the newness of teaching the science practices and difficulties knowing how to put the framework into practice, and some felt the terminology could confuse students. Importantly, while teachers teaching psychology as a way of knowing and doing cannot be expected to be history, sociology and philosophy experts (Matthews, 2012), they need to know enough to make sense of these aspects for their teaching. Teaching for understanding and experiencing science practices can support appreciation for the nature of science knowledge (Erduran et al., 2018). Using the framework could offer prompts to elaborate, inquire and reflect on the ways science is communicated in the classroom, paying attention to the nature and ways psychological science works: features of science (Matthews, 2012) and values of science (Allchin, 1998) in context of the psychology content area, and the associated challenges of studying this specific area of psychology (Dyer, 2006). The framework could support the portrayal of science in a way that captures the complexities and diverse ways science practices are employed to generate knowledge within and across science disciplines, far more than a generic list of nature of science characteristics for students to memorise (Hodson & Wong, 2017; Matthews, 2012). The teachers wished for more support to implement the framework in meaningful ways to promote the discipline of psychology and therefore emphasise psychology as science.

8.4.2 Connecting with the intended curriculum: creating an overarching theme to connect the curriculum in multiple ways, including psychology and other science teachers

The teachers viewed the psychological science framework as providing an overarching theme, something they thought was currently missing and in line with previous criticisms of VCE Psychology (Marangio, 2013; Skouteris et al., 2008). By creating an overall theme, they viewed the framework as potentially offering a number of ways to support their teaching by connecting curriculum. In particular, as discussed earlier, they liked the idea of a systems approach (Bronfenbrenner & Morris, 2006), emphasizing ways content areas of psychology can relate to each other, although had difficultly integrating these ideas for their teaching. Interestingly, the teachers created the 'OPEMS' acronym to represent the science practices: Observation, Patterns, Explanations, Models and Systems. This acronym provided a starting point to help them use the framework when teaching although many had difficulty going beyond the terminology and recognising the complexity of each science practice, as although discussed. That said, they saw the framework as potentially enabling them to connect their curriculum in multiple ways, including the following three ways.

Connecting curriculum experiences.

First, the framework opened up possibilities in terms of connecting curriculum experiences within and across units and year levels. Some of the teachers viewed the standard use of terminology of the science practices to build on ideas and scientific reasoning, and others began to map units of work and consider scope and sequence charts. Building on curriculum experiences supports Bruner's (1960) idea of a spiral curriculum to introduce underlying concepts which are then revisited in more and more complex forms over years rather than just mastering the factual information taught as discrete topics in a single and isolated unit of work. They praised the approach of teaching concepts with science practices, acknowledging that understanding of science practices go hand-in-hand with the understanding of the psychology content knowledge, in line with Duschl et al. (2011) ideas for learning progressions. Teachers recognised that each science practice demands knowledge and competency that take time to learn and develop capacity to apply knowledge to new and unique situations (NRC, 2011), such as different psychological concepts.

Connecting with science curriculum and teachers.

Second, the framework provides connections with F-10 science units and science teachers. They liked the idea of the framework as providing a common base to communicate and work collaboratively with other science teachers. As discussed already, the teachers felt more genuine in understanding why psychology is a science, with the use of science practices opening up important conversations between psychology and F-10 science teachers, as well as justifying teaching of psychology in the younger years. Like many science teachers (Atweh

& Singh, 2011), most of the psychology teachers had not considered the new Science as a Human Endeavour (SHE) and Science Inquiry Skills (SIS) strands within the Victorian AusVELS (VCAA, 2015a) and Australian (ACARA, 2015) curricula. The teachers felt they needed further support to learn more about these strands, ongoing support that most teachers of science are likely to need (Fensham, 2016), and being involved in science professional learning. Furthermore, they wanted to understand how using the framework may provide a bridge between the strands and their psychological science understandings within their school's Psychology units. A common contemporary science framework opens up opportunities for psychology to find a place in the curriculum, beyond senior psychology.

A single discipline cannot solve real world problems (Proctor & Vu, 2019), with different disciplines working together to develop a bigger picture of personal, social and global issues (Krohn, 2017). The common science base within this framework potentially offers a broad and flexible support for teachers, students and curriculum with other science disciplines to collaborate and communicate expertise, build knowledge and competencies that are specific to each practice and the ways they interact with each other to develop science knowledge, and appreciate ways science practices alter depending on the relevant science discipline content area and context. Learning in multiple ways across disciplines is an essential element of education for the future.

Connecting sections of the intended curriculum.

Thirdly, the teachers discussed the value of the framework in terms of connecting the separate sections (Key knowledge, Key skills and Research methodologies and ethical considerations) of the VCE Psychology Study Design 2012-2016 (VCAA, 2012). While many of the teachers thought they had connected them together in the past, the framework got them thinking about this connection in new ways, viewing this as a richer way of teaching, rather than teaching research methods, for example, on its own. Connecting concepts with science practices was seen as a more genuine and interesting way of teaching psychology, rather than teaching content, skills and research methods out of context. Many teachers began to recognise this connection in their teaching, although they struggled with understanding complexities of the science practices, and some (not all) appreciated this struggle. Connections to the VCE Psychology Study Design 2012-2016 (VCAA, 2012) were not obvious, as seen in previous work using the framework to map the curriculum (Marangio, 2013) and this places the sections (Key knowledge, Key skills and Research methodologies) in danger of being taught as isolated and unrelated topics. Tertiary psychology curriculum has also been criticized for separating content from methodology (Costa & Shimp, 2011) and is not in line with contemporary science which centres on important conceptual, epistemic and social practices of science (Duschl, 2008). Science teachers have been criticised for teaching content and skill separately (Pruitt, 2014), leading to a facts-driven and low level thinking curriculum (PCAST, 2010). The teachers viewed the framework as opening up possibilities to create connections between the separate sections within the intended curriculum (documents) and implemented curriculum experiences.

8.4.3 Supporting implemented curriculum: teaching psychology in richer ways.

The framework was seen to support teaching of psychology in richer ways, agreeing with Lehrer and Schauble (2010) that rich learning opportunities occur in classrooms in which teachers connect science practices and science content. Interweaving concepts with the science practices offers a more authentic way of teaching emphasising how psychology knowledge is formed as opposed to ignoring these aspects and teaching in decontextualized ways. Learning about the framework prompted the teachers to consider what deeper thinking and learning of psychology may look like in their classrooms and they desired further opportunities to learn to use the framework in this manner.

Teaching psychology in ways teachers think are important.

Importantly, the teachers viewed the framework as fitting with their ideas of why it is important to teach psychology in schools, views in line with the ideas expressed in the online survey. They viewed the framework as supporting a desire to teach psychology in useful, beneficial and relevant ways for their students and society, promoting a bigger purpose of psychology curriculum. These views are similar to views of A-level Psychology students (Banyard & Duffy, 2014). Such a curriculum seems to be aiming for psychology literacy (Cranney & Dunn, 2011) and scientific literate citizens (Goodrum & Rennie, 2007) with students able to apply their knowledge and develop skills and capabilities for psychology-related situations in their daily lives and benefit the community, now and into the future. This purpose fits with how the framework can help to understand and promote psychological science as a human endeavour, as the SHE strand focuses on the nature and values of science, ethical and social implications, the contributions of people over time, and how science can be used to inform decisions and actions (ACARA, 2015). Teaching concepts with science practices aims for students development as scientific literacy and scientific literate citizens (Duschl & Grandy, 2013; NRC, 2011). Their views represent a shift towards the often coined '21 century skills' that encourage students to apply knowledge creatively and ethically and work collaboratively to their own solutions, with thinking and reasoning skills more important than heavy memorising of content (OECD, 2014).

Promoting deeper thinking.

Some teachers reported a shift towards more satisfying ways of teaching psychology, as discussed earlier. The teachers who explicitly used the framework saw it as support to go beyond 'black and white' thinking and simple 'correct' answers to asking more questions in relation to each science practice and encouraging scientific reasoning and decision making. They felt they could learn to use the framework to support the teaching of psychology at a deeper level, especially in terms of emphasising strategic thinking processes, including creativity, critical thinking, curiosity, scientific reasoning, argumentation, decision making and applying psychological understandings to everyday life. In these ways, the framework could be used to facilitate opportunities to teach contemporary science, embracing the features (Matthews, 2012) and values of science (Allchin, 1999) and viewing science as a coherent whole to help enable students to see the relevance of science for their everyday lives, rather than science as a list of unfragmented and irrelevant ideas (Erduran et al., 2018). Teaching that prioritises science practices supports students to develop and apply knowledge in new and unique situations (Krajcik et al., 2014), promoting the deeper thinking and learning of psychology within our society. Aiming to teach at this deeper level aligns with the teachers' bigger purpose for teaching psychology in ways they think are important, including building competencies useful for students personal lives and society now and into the future.

Shifting focus beyond learning facts and skills for the examination.

Teaching contemporary science requires a shift from teaching 'facts and skills' towards focusing on 'how we came to know and develop this knowledge' and 'why we believe we know it' (NRC, 2011) and teachers saw interweaving the teaching of concepts with science practices as supporting this shift. They showed some dissatisfaction with the restrictions they felt the current curriculum had on the way they teach and could use the framework, not surprising given that teacher-centred approaches are often dominant when teaching a high stakes curriculum (Au, 2009). They felt this VCE curriculum placed too much emphasis on learning content for the external examinations over deeper learning, similar to criticisms of other secondary psychology curricula, such as A-level Psychology which has been judged for too much emphasis on rote learning over skill development (Kitching & Hulme, 2013; Rowley & Dalgarno, 2010; Smith, 2010).

Teaching range of content areas and methodologies.

Some teachers desired a better balance between qualitative and quantitative research in their teaching to promote the ways psychology employs a range of methods to investigate the many diverse research questions within a range of contexts (Bronfenbrenner & Morris, 2006), especially in terms of highlighting the unique and important contribution of qualitative work, as argued by psychology researchers (Breen & Darlaston-Jones, 2010; Bronfenbrenner & Morris, 2006). Similarly, some teachers wanted to incorporate more socio-cultural aspects as they felt these were missing, and viewed the framework as broad and flexible enough to support this inclusion. While they viewed the framework mostly in positive terms, however, they felt constrained with the curriculum's narrow focus on experimental methods. Overlooked were discussions around the complexities and ways of studying wilful, intelligent, subjective, emotional and social individuals, important considerations in psychology research (Dyer, 2006).

Moving away from teaching 'the' scientific method.

Rather than getting students to merely follow procedural steps of a research investigation given to them to, many teachers started to open up conversations to learn about the concept in context of the science practices, in line with Matthews (2012) notion of deeper engagement beyond 'doing an activity' to learning about the concept in context of features of science. Creating opportunities for students to experience and understand that there are major differences relating to the kind of research questions asked and the methods employed to investigate these questions (Hodson & Wong, 2017), highlighting creative and imaginative thinking, careful decision making and arguments to support these decisions involved in science. However, they experienced difficulties with understanding some practices and found that interweaving concepts with science practices as more complex than it initially seemed, something that takes careful planning (Allchin et al., 2014).

Other factors were identified as limiting the teaching of psychology at a richer level. The curriculum's narrow focus on experimental methods is more in line with the philosophy of logical positivism, prioritising methodology as experiments and investigations and often separate from theory and its specific assumptions (Duschl, 2008). Such omissions are likely to be reinforcing the myth of a general and universal scientific method that guarantees discovery and unambiguous and reliable conclusions (McComas, 2011), rather than contemporary science education that values the epistemic, social and conceptual aspects of the science discipline (Duschl, 2008). Such omissions could explain why there were teachers who viewed using the framework as following a lock-step process, mimicking the writing up of an experimental research investigation report although using different terms from data (observation) to results (patterns) to discussion (explanation) and failing to understand the values underpinning science (Allchin, 1999). Therefore, as seen in the online survey, teachers could be holding the notion that a general and universal science method exists to reach unambiguous, objective and reliable conclusions (McComas, 1998).

8.4.4 Conditions for teacher change: opportunities to learn more about ways to potentially use the framework to support their teaching of psychology.

The psychological science framework represented new ways of thinking about psychology and teaching psychology, and the teachers were open to exploring the value of the psychological science framework to support their teaching. The teachers initially felt familiar with the science practices but not necessarily understanding the complexities of each or the ways they work together to develop knowledge, and consequently different views and ways of teaching the science practices were seen. While they were positive about the framework, the teachers desired more time and opportunities to learn more about ways to potentially use the framework to support their classroom teaching. These views support previous research findings focussing on teaching that integrates content with science practices represents substantial challenges for teachers (Bybee, 2011). This uncertainty about how to use the framework fits with research that one shot workshops seldom support teachers integration of ideas into their teaching practice (Loucks-Horsley et al., 2009) as they fail to work with teachers existing attitudes, beliefs, knowledge and ways of teaching (van Driel et al., 2001). With so many different views of psychology and teaching psychology as a science, further learning about the potential use of the framework for their teaching will require an understanding of each teacher's starting points.

The teachers wanted to be involved in professional learning, generally seeing themselves as active agents for teacher change (Hoban, 2002). They desired more opportunities related to their professional development and professional learning including working collaboratively with teachers, teacher educators and psychologists. This desire to work with other teachers opens up the possibility of professional learning communities (PLCs) with teachers, to share expertise and critically reflect about their teaching practice as they learn from and with each other about and for their teaching practice (Darling-Hammond, 2005). They felt their work is usually not organised to provide much time for ongoing professional learning opportunities, with one teacher giving mixed views about value of removing teachers from class for such opportunities. Such opportunities are more likely to be powerful and cater to their different individual needs and classroom contexts in order to instigate transformative teacher change (Loughran, 2012). The teachers wanted learning opportunities specific to the teaching of psychology, feeling as if they were missing out on learning about latest research and curriculum initiatives in psychology. Furthermore, the teachers in this study could see more connections with science education, and therefore participating in science education professional learning opportunities is equally important. If psychology is firmly embedded in the science key learning area, then understanding the similarities with other science studies should be a central step to support teachers to identify with science. The teachers felt there was a disconnect from psychology academics, as previously identified with Tasmanian Psychology teachers (Provost et al., 2012) but were willing to associate with professional organisations, such as Australian Psychological Society (APS) and Science Teachers Association of Victoria (STAV), should they increase their advocacy and support for teaching of psychology in schools.

Interestingly, the teachers' desire for ongoing learning did not stop at the framework but extended to a desire for learning about current research into teaching and learning psychology in secondary schools, recognising the valuable contributions ongoing learning could make to support their career as a professional teacher (Schleicher, 2018) and meet the expectations and diverse needs of learners today (Guerriero & Révai, 2017). They wanted to know more about contemporary psychology and psychology pedagogy, recognising that quality teaching practice demands both psychology knowledge and pedagogy, not just one or the other. It must be noted that since the teachers volunteered to take time out of their busy schedule to participate in this study, they are more likely to be open to new ideas for teaching psychology. Therefore, it is not surprising that the teachers wanted to learn more about research and reflect on their teaching.

8.5 Further considerations: What could this mean for potential use of the psychological science framework and supporting teacher change?

The teachers in this study are teaching psychology with a curriculum that deems psychology as a science. When considering the framework for potential support for their teaching, they raised very interesting points as have been discussed. As discussed, the teachers recognised value in the framework, especially around promoting the discipline of psychology, connecting with the intended curriculum, supporting the implemented curriculum and conditions for teacher change. This study was an opportunity to work with other teachers and allowed them to critique their current teaching. In this way, the values they saw in the framework was a reflection on the current ways they teach. Their insights also add light to the ways they currently view the ways they teach psychology, the messages (implicit or explicit) they receive from the curriculum authority and the systems in which they teach. This study is important because teachers are the ones who shape and define the curriculum and what they do in the classroom strongly influences shapes the kinds of learning their students experience (Hargreaves, 1994). These teachers are tied to their teaching context that comprises a mix of their professional knowledge, values, beliefs and experience which are intricately combined with the systems in which they teach (including the curriculum they use). Therefore, considering the ways the teachers in this study viewed the framework and the extent, if any, they used the framework in their teaching practice can inform future professional learning opportunities.

Contemporary science education shifts the emphasis *from* more traditional teaching of facts and skills *towards* interweaving concepts with science practices (how we came to know and develop this knowledge and why we believe we know it) (Duschl, 2008; NRC, 2011). This shift also represents more student-centred than teacher-centred pedagogical approaches. The psychological science framework, with its contemporary science base, was designed around this shift in emphasis. Roberts' (1982) seminal paper identified a number of curriculum emphases in science, and many more have been identified since (Fensham, 2011) as education changes. Curriculum emphases reflect the reasons for learning science content rather than the content itself because the teaching of content is always connected with a particular intent of purpose (Roberts, 1982). Different views of science and its purpose for education by teachers can explain why the same intended curriculum can be implemented in different ways by different teachers (Roberts, 1988; van Driel, Bulte & Verloop, 2008). The framework represented new ideas for the teachers and while they were very positive, the shift in emphasis in their teaching was too big for teachers to fully accommodate the framework into their teaching. Interestingly, some teachers shifted their teaching more than others, and a couple did not shift at all. There could be a number of reasons for these differences.

The psychological science framework, with its contemporary science base, requires broad understandings of the following: 1. psychology as a contemporary science, 2. the five core science practices within the framework that are used to construct psychological knowledge, and 3. the ways these core science practices work together to construct psychological knowledge. Teachers are unlikely to change their practice if it requires significant change from their current knowledge, beliefs and experiences (van Driel, Beijaard, & Verloop, 2001). Therefore, teaching with the framework requires pedagogy around each of these broad understandings and, at the same time, likely to require a shift in emphasis for teaching. Teachers with these broad understandings who understand the intent of purpose behind these understandings, are more likely to start using the framework.

VCE Psychology, with its external examination, is part of a high stakes curriculum. In high stakes environments, curriculum often moves to the 'default' (traditional) position of teaching for a solid foundation and correct explanations (Fensham, 1988, Aikenhead, Orpwood & Fensham, 2011) and often increases teacher-centred pedagogies (Au, 2009). These 'default' positions are more aligned with Vision I scientific literacy, an inward looking curriculum focussing on learning the facts, theories and skills within science. Since there are only starting points for teaching the science practices with concepts within the VCE Psychology Study Design 2013-2016 (VCAA, 2012) (Marangio, 2013), teachers who understand how the framework connects with the assessment and/or feel comfortable changing their teaching practice in this high stakes environment and/or feel they have permission to experiment with their teaching practice by their students and systems in which they work and/or feel the need to shift their practice are more likely to use the framework as a support for their teaching.

Teachers in this study were time poor. However, collaboration and informal discussions with other psychology teachers may make a difference. All those who changed their practice and explicitly used the framework to support their teaching, had another psychology teacher at their school. Those that did not, either did not change their practice, or made implicit links to the framework, and may have felt it too risky to do so. Teachers may view these new ways of teaching as risky and therefore are more likely to stick with safe teaching practices (risk aversion) than innovate in their teaching practices, reflecting a risk management approach rather than pedagogical frailty (Hulme & Winstone, 2017). Collaboration with other psychology teachers may make teachers feel more comfortable using the framework to support their teaching of psychology.

To support teachers professional learning, Crawford, et al. (2014) argue that multiple strategies are required including recognising teachers' initial knowledge, beliefs and concerns, sufficient time to plan, opportunities to experiment in their own practice and collegial exchange among teachers. The diverse views of psychology as a science and teaching psychology as a science amongst teachers regarding their views and teaching of psychology as a science, including the traditional views of science, and the extent and ways they shifted, or did not shift, their teaching practice in response to learning about the framework. These views and the ways they used (or did not use) the framework offer excellent starting points for planning meaningful professional development and professional learning opportunities for psychology teachers, and support from all the systems in which they teach.

8.6 Chapter Summary

This chapter addressed two research questions of this study in light of the findings in Chapter 6 (Phase Two and Three). The teachers' views of the potential use of the psychological science framework as a support for their teaching and shifts in their views for teaching of psychology were explored. Their views on the limitations of the framework varied, highlighting different understandings of the framework, perceived constraints with the current curriculum and desire for further learning of contemporary psychology and psychology pedagogy. Their views represented a disconnect between teachers and the profession of psychology and school science education. Key points of the discussion centred on potentially using the framework to support their teaching in terms of legitimising 'psychology as a science' and 'its place in the curriculum', creating overarching themes to connect the curriculum in different ways and supporting the teaching of psychology in richer and more important ways. The diverse starting points among these teachers, however, highlight challenges for teacher change, and more directed personalised support is likely to be required to use the framework as a support for their teaching of psychology, and learn about contemporary psychology and psychology pedagogy.

The teachers recognised a gap between the ways they currently teach and use the psychological science framework to support their teaching. But the shift to using the psychological science framework as a support for their teaching was too big with a limited one-shot workshop. In order to change, teachers desire curriculum change and the related professional development and teacher resources. They want more opportunities for teacher learning, collaboration and planning, and given the range of views of psychology as a science, this needs to be individually targeted to suit their needs. The teachers were passionate about teaching of psychology and viewed their involvement in this study as an opportunity to consider new possibilities for teaching and reflect on their own teaching. Implications and recommendations of this research are discussed in the next chapter.

Chapter 9: Conclusions, Implications and Recommendations

9.1 Introduction

In this final chapter, Chapter 9, this thesis is reviewed. A summary of the major findings is presented and the limitations of this research are discussed. Implications of the findings and future recommendations for teaching psychology are given, with the chapter ending with concluding remarks.

9.2 Reviewing This Thesis

This thesis considered what is meant by contemporary psychology, how to teach it with a curriculum that deems psychology as a science, and teachers' views on the potential use of a psychological science framework as a support for their teaching. This framework can promote the teaching of psychology concepts together with science practices that inform these concepts. Secondary psychology teachers' views were central to answering the three research questions:

RQ 1 What are psychology teachers' views of psychology as a science and the ways they are teaching psychology as a science?

RQ 2 What are teachers' views on using the psychological science framework as a support for their teaching of psychology?

RQ 3 In what ways does this psychological science framework shift teachers' views for teaching psychology?

Chapter 1 set the scene for this research, including discussing the initial development of the psychological science framework to map progression of learning in the VCE Psychology Study Design 2012-2016 (VCAA, 2012), the same intended curriculum that the psychology teachers in this study were currently implementing in their classrooms. It introduced the research questions and the reasons why this study is important to me and contributes to our understanding of teaching of psychology in schools.

Chapter 2, Views of psychology, is the first of two literature review chapters. This chapter considered the nature of contemporary psychology and ways science has been understood in the past and understood today. It explored different views of science as relevant for school science education teachers' and students' views of psychology as a science and ended with outlining some possible teachers' views on the selected science practices within the psychological science framework.

Chapter 3, Psychology curriculum and psychology teachers, is the second literature review chapter. This chapter explored the status of psychology in the curriculum around the world and implications for the implemented curriculum as a result, with a closer look at the Victorian curriculum within Australia. It then considered the teachers who teach psychology, focussing on their opportunities for professional growth throughout their career. Their opportunities for career development, including those specifically targeted to teaching and learning psychology, are likely to influence their views on using a psychological science framework to support their teaching.

Chapter 4 discussed the underpinning methodological aspects and the methods used in this research. Guided by a constructivist (interpretivist) research paradigm, it explained and justified its approach and the three phases of this research selected to explore psychology teachers' views and experiences teaching psychology as a science and using the framework to support their teaching of psychology.

Chapters 5, the first data analysis chapter, presented the Phase One (online survey) data analysis. This chapter provided a snapshot of Victorian psychology teachers' demographics and current views and ways of teaching psychology as a science, addressing the first research question. This analysis gave a starting point for introducing the framework. Chapter 6, the second data analysis chapter, presented Phases Two (workshops) and Three (individual interviews) data analyses and addressed the final two research questions.

Chapter 7, the first discussion chapter, revisited the aims of the study and addressed the first research question, tying the Phase One (online survey) data analysis, research literature and curriculum together in relation to Victorian teachers of psychology demographics, views and ways of teaching psychology as a science. Chapter 8, the second discussion chapter, addressed the second and third research questions in Phase Two (workshops) and Phase Three (individual interviews). It considered these research questions in light of the data analyses, research literature and curriculum to focus on teachers' views on (potentially) using the psychological science framework as a support for their teaching.

This concluding chapter, Chapter 9, ties this thesis together, presenting the major findings, limitations of the research, implications and recommendations for the teaching of psychology in the future.

9.3 Summary of Major Findings

Teachers are passionate about the teaching of psychology in secondary schools and view psychology as a relevant, enjoyable and beneficial subject for their student's personal, social and vocational lives and society. They hold mixed views, however, on whether or not they are able to teach in the ways they think are important, with many perceiving the high stakes psychology curriculum as constraining their desired ways of teaching.

The majority of teachers have a psychology tertiary background (in-field teachers), and psychology is placed within the science key learning area within their schools. The other subjects they teach are spread across all key learning areas (KLAS), including an even spread between English, Humanities and Science. They report that they view and teach psychology as a science, although they seem to have diverse, multiple and perhaps contradictory views on what this means. It is possible but unclear if these views change depending on the psychology content area they are teaching. Their views are not always in line with the profession of psychology or school science education, including the view that the processes of science are limited to following one ('the') scientific (experimental) method.

The psychological science framework immediately resonated with psychology teachers in new and interesting ways. They discussed the framework in multiple ways around the following four themes: promoting the discipline of psychology, connecting with intended curriculum (documents), supporting implemented curriculum (teaching) and conditions for teacher change. They viewed the framework as offering a broad contextualised approach to teaching psychology, rather than being restrictive and limited, especially in terms of emphasising psychology as a science, offering an overarching theme to connect curriculum experiences in multiple ways and teaching in richer and more satisfying ways.

Teachers' views of the uses and limitations of the framework varied, however, with different understandings of the framework. This was especially in regards with using the framework to support their teaching as the science practices were viewed differently between teachers. There was support for using the framework to teach psychology, with some teachers starting to use the framework to integrate concepts with contemporary and classic psychological studies and student- led research investigations, support assessment tasks, employ a range of learning activities and pedagogical approaches and plan units. Some appeared to change their understandings of the framework after the workshop and viewed the framework as matching what they were already doing. Others reported that they would like to use the framework but needed to learn more about it first. Using the framework for teaching in its entirety was problematic for teachers, with most taking a pick and choose approach that fitted with the ways they are already teaching. While the framework was seen as broad and flexible, the teachers experienced difficulties, to different extents, with integrating it into their teaching of psychology.

The various ways they used, or did not use, the framework suggests that teaching psychology concepts together with science practices requires large shifts in the ways they view and teach psychology. Many teachers recognised that a large shift was required and desired more opportunities to learn about ways to use the framework for their teaching. They offered suggestions for teacher change, such as more explicit reference to science practices in the curriculum policy documents, a simplified visual representation of the framework, opportunities for collaboratively creating and sharing ideas with psychology and other science teachers. Given the differences in teachers' views and ways of teaching, new learning is needed if they are to use the framework, albeit in varied ways for each individual teacher, within their school and classroom context. Teachers are in the best situation to contextualise this psychological science framework for their specific classes, although require opportunities to work out the best ways to support their own learning and their student's learning.

9.4 Limitations of This Research

The implications and transferability of the findings must be considered in light of the research goals and limitations of this research. This study was guided by a constructivist (interpretivist) research paradigm (Denzin & Lincoln, 2008), with the views of the teachers central to this study and acknowledging the subjective nature of their perceptions within their school context. The online survey, drawing on both quantitative and qualitative data, was to provide a snapshot of the current situation within the community of Victorian psychology teachers, with the workshops and individual interviews with a small number of teachers providing a richer, more contextualised understanding of the teachers' views and experiences with (potentially) using the framework as a support for their teaching.

Online survey.

It is estimated that between 10 to 15 percent of the population of Victorian psychology teachers completed the online survey, and increasing the size of this sample may have provided a different set of data (Cohen et al., 2011). It is important to remember that the participants are a sample of convenience and while the findings throw some light into Victorian Psychology teachers' demographics, views and current ways of teaching psychology as a science, they may not be representative of the entire Victorian psychology teacher population. That said, the teacher participants were mostly female (as expected), and represented a range of teaching experience, range of schools (government, catholic and independent) and locations (urban and rural).

The online survey took a simple descriptive approach (Mertens, 2015). The survey was designed to be quick and relatively simple to complete, although this avenue to get a snapshot has its drawbacks. While teachers' views are central to this study, the survey relies on their honesty, awareness and understanding of the items (Mertens, 2015). A number of factors may have skewed the responses to the online survey items. The teacher participants may have been more inclined to participate in the survey because they view psychology as a science. The survey items were not contextualised for specific content areas of psychology and therefore drilling more deeply into different psychology content areas may have generated different results. While participants were given opportunities to write additional comments, and those that did provided valuable information, it is still uncertain how each teacher interpreted each item. In future, it would be ideal to contextualise the items and then ask for responses to be exemplified by illustrations in follow up interviews. Despite expert checking and a pilot study, the items may have been expressed in a manner not in line with the language the teachers currently use. Some items were ambiguous (double barrelled) in terms of not knowing what aspects of the item the teachers agreed or disagreed, making the responses difficult to interpret, and therefore these items were omitted in the analysis. The open-ended questions provided some detailed responses, but again some responses were generic and some responses were unclear at times. Analysis can only go on what was written in the survey, and so it is quite possible that some have more to say but this is unclear without extra probing. Similarly, those who did not respond to these questions may not have explicitly outlined their views before and are likely to add further valuable input if interviewed. Despite these limitations, the online survey did provide valuable information in line with the research intentions. A follow-up survey would be useful to further explore the outcomes of this thesis, especially as teachers' views on the nature of science may change depending on the context (Matthews, 2012) such as the research question and level of analysis (macro to micro). In particular, a shorter survey that focusses on one or two areas of psychology content and included a small number of open-ended questions to explore teachers' views in terms of the nature of the science practices within a given context. A survey in the future could aim for a bigger cohort size and monitor teacher change, including any change in views with new curriculum. In summary, the analysis offers starting points for understanding the current status and views of psychology teachers and ideas for further research.

Workshops and individual interviews.

The workshop offered a one-shot introduction to learning about the psychological science framework and was performed with two groups of teachers. Such short professional development opportunities are unlikely to be transformative experiences, especially when the learning required is not in line with current knowledge and ways of teaching (Loughran, 2012). Sustainability of teachers' views and potential ways of using the framework was considered in terms of whether the initial enthusiasm for the framework was short-lived or continued. The individual interviews occurred 2 to 3 months following the workshops to check whether the initial views potential ways of using the framework remained the same or had shifted over time.

There were five participants in the workshops and four in the individual interviews that I knew personally due to prior teaching relationships and others who may have known me. I was upfront with the teachers from the onset of the workshops, and made it clear that I needed their critical feedback. It is possible that the teachers wished not to offend me, however, the prior relationships may have influenced their views, and must be considered as a limitation to transferability of these results.

A small sample size was used to explore teachers' views of the psychological science framework as a support for teaching psychology. The sample was detailed and defined and while these teachers appeared to represent the online survey population, the study was not designed to be generalised to the entire teachers of psychology community. That said, the trends within the findings offer insights for Victorian teachers. Transferability of these findings is possible, as this research invites readers to make connections with the different teachers and their starting points, views and experiences and apply to similar groups of teachers. Teachers know their context and need to know where they stand and can start to consider how the findings apply to their own classrooms. The various views and experiences of teachers can also help schools and curriculum writers consider difficulties in conceptualising such new ideas for their teaching so they can more confidently plan for curriculum reform and professional learning of their teachers in the future.

9.5 Implications and Recommendations

This thesis makes a unique contribution to the education research literature regarding teachers and their views teaching with a curriculum that deems psychology a science. It explores teaching of psychology with a contempory science framework, including the teaching of psychological concepts with core science practices. It contributes to the science education research literature regarding teaching science practices and teaching of concepts with science practices, within the context of teaching psychology concepts. Importantly, this thesis provides research that extends from focussing on teaching one science practice to focusing on teaching the interrelationships between science practices to construct knowledge. It adds to the body of works regarding teachers as professionals and teacher change, and potentially could open up conversations around psychology's place in the curriculum and supporting psychology teachers' professional growth throughout their career. Therefore, it sends important messages to psychology teachers and the multiple systems in which they work and with the ultimate view of supporting teachers in their teaching of psychology. For teachers of psychology it is important to consider the views of contemporary science and what this may mean for teaching psychology. Therefore, this study has potential to open discussions regarding how psychological sciences are portrayed in curriculum policy documents, school systems, ITE, opportunities for teacher professional growth and student learning to reinforce the nature and values of psychological sciences. In summary, this thesis makes a number of unique contributions to and extends on the body of works within education research literature, particularly psychology school education, science school education and teacher change.

This research study highlighted teachers' diverse views and ways of teaching psychology as a science. The construction of the psychological science framework was inspired by the work by Duschl (2008) that advocates the teaching of 'what we know' to 'how we know' and 'why we believe', drawing on a number of core science practices (NRC, 2011) which are intricately tied to conceptual understanding (Duschl et al., 2011). Therefore, using the framework as a support for teaching requires shifting the focus from learning content and skills (including research methods) in isolation to teaching science practices with concepts (Duschl & Grady, 2013). The teaching of content is always connected with a particular intent of purpose, known as curriculum emphasis (Roberts, 1972) and teachers' views influence the extent different curriculum emphases are taught (Roberts, 1978; van Driel et al., 2008), highlighting why the same intended curriculum can be taught in different ways by different teachers. Teachers' personal views on what constitutes quality education is important since they shape the implementation of intended curriculum but shifting teachers' practice is difficult (van Driel et al., 2001). The use of the psychological science framework for a support for teachers requires new ways of thinking and teaching psychology. While teachers are open to learning about teaching psychology as a contemporary science, the shift in emphasis is likely to be too big for teachers without ongoing support.

Consequently, there are a number of implications for the future use of the framework and wider implications for teaching and teachers of psychology. These implications may ultimately impact on teachers' career pathways, their students' learning and the ways psychology is perceived in the wider community. Recommendations from this research study to support teachers and teaching of psychology include:

1. *The potential of the psychological science framework*. The psychological science framework can provide a mechanism for building a shared meaning between teachers of many discipline types in highlighting what is common (particularly within science) and what are important differences (particularly outside of science). Additionally, the framework has the potential to allow teachers to build an integrated approach to teaching both concepts and practices and embed these approaches in more contemporary and authentic contexts.
2. *Curriculum reform*. Curriculum reform presents opportunities for established thinking and ways of teaching psychology as a contemporary science to be challenged, not only by the teachers, schools and curriculum authorities, but extended to the ways teacher educators, education researchers, psychology academics, psychologists and professional teacher associations embed psychology as a contemporary science in their work with teachers. Challenges would need to be inclusive of what are the unique and diverse contributions of psychology to a contemporary science, the nature

of psychology and the values and practices that underpin psychology in relation to science.

3. *Psychology teachers as professionals*. To develop as specialists, teachers require conditions to grow and develop as professional learners and leaders throughout their career (Schleicher, 2018). Teachers' development as specialists require multiple strategies, especially strategies that consider the teacher's contexts, to support their professional growth (Crawford et al., 2014). To facilitate psychology teachers as specialists, as a professional community, psychology teachers will need to take a central and active role in their on-going professional growth utilising resources from allied professionals such as science teachers, school communities, curriculum authorities, professional teacher associations, psychology academics and psychologists, teacher educators and researchers. Learning opportunities will need to acknowledge teachers' current knowledge, attitudes, beliefs and ways of teaching (van Driel et al., 2001), something that this research study found differs between teachers.

This section elaborated on these recommendations and implications to support teachers and teaching of psychology.

9.5.1 The potential of the psychological science framework – building a shared meaning.

As seen from this research psychology teachers found the framework as a mechanism to develop their shared understanding of science practices as an integral part of understanding psychology concepts. In this limited sample, the framework has begun to realise its potential, largely in part to number of core science practices that are intricately tied together to construct science knowledge (Duschl, Maeng & Sezen, 2011; NRC, 2011) or in this case psychology knowledge. With further application of the framework across wider samples of psychology teachers, the indication for modification may become more apparent than presently indicated.

It is important to recognise that these core practices are clearly articulated while being intricately tied together and thereby avoiding potentially oversimplifying or overcomplicating the science practices within the framework. Oversimplification could reduce these practices to a checklist which could downplay the challenges, knowledge and capabilities that go with the science practices to build knowledge within the specific psychological context (Duschl & Bybee, 2014). On the other hand, it could be too complicated for teachers without the prior experience of working with the framework (as in the case of the workshops) or thinking in terms of teaching science practices with psychological concepts. Teachers are likely to feel familiar with the science practices but this may be misleading. Some teachers may have had more traditional views of science such as holding the common myth about the scientific (experimental) method as the sure and the only way to produce knowledge (McComas, 1998). Such views will limit the ways they understand the framework with its contemporary science base, and puts it at risk of becoming a checklist. Without understanding the science practices, teachers could 'pick and choose' which science practice to use.

Undertaking science practices highlights the ways constructing new science knowledge is challenging and difficult, and discussing these struggles with students could facilitate a deeper appreciation for the wonders, challenges and value of knowledge construction in science (Duschl & Bybee, 2011). The same could be said for teachers and involving them in critical discussions about psychology's relationship with contemporary science. In line with Matthews (2012), the science practices could provoke a deeper interest in science by exploring appropriate questions to empower them to think more crucially about the features of science and consequently psychology in many contexts (as psychology in school education is embedded in the Science KLA). The framework, it is hoped, could encourage teachers to go further in elaborating, refining, discussing how science works within the psychological concepts studying at that particular point of time.

A key recommendation is for stakeholders to work together to build a shared meaning of psychological science and the psychological science framework, as follows:

- Stakeholders to reflect a shared meaning of *psychology as a contemporary science* and consider the extent the framework reflects a more contemporary view of psychological science.
- Build a shared meaning of the framework's potential *use as a support for teaching psychology*, including ways to integrate it into teaching (what it looks like in practice).

Working together to develop shared meanings in a way that *makes better sense* for teachers to integrate the framework into their teaching should support understanding psychology as a contemporary science, and will be an integral component of psychology teachers as professional, which is detailed later in this chapter. Such a shared meaning should support teachers in the following ways:

- Support for the teaching of psychological science in more *contemporary and authentic ways.* Teaching for conceptual understanding within epistemic and social contexts, and highlighting psychology's potential benefits for individuals and society.

- Represent the complexity of the framework, enabling teachers to *use the entire framework* rather than the fragmented 'pick and choose' and assimilation approaches seen within this research study.
- *Support student learning* of psychological science in ways that are contemporary, authentic and relevant, building capacity for students to use their psychology knowledge in beneficial ways now and in the future, whether they continue studying psychology or not.

9.5.2 Curriculum reform – finding psychology's position within the system(s).

Curriculum is a contested space (Pinar, 2004) and psychology's inclusion will take a sustained effort and negotiation. A variety of views of both psychology and science exist, as seen in terms of teachers' views in this thesis, and these different views can lead to 'identity confusion' (Rees, 2013), a likely factor that limits psychology's place in the curriculum. Furthermore, there are wider implications for psychology in secondary schools, in the ways psychology is embraced as a science and the messages this sends to the systems in which teachers work, and the public. Building on shared meaning, as previously indicated, should lead to a consensus amongst stakeholders in the further development of curriculum. In addition to discipline knowledge, there is a future need for students to think across boundaries of subject disciplines (Schleicher, 2018) and the identity of psychology and commonalities with science could support psychology's place in these new curriculum directions.

Curriculum reform presents opportunities for established thinking and ways of teaching psychology as a contemporary science to be challenged, not only by the teachers, schools and curriculum authorities, but extended to the ways teacher educators, education researchers, psychology academics, psychologists and professional teacher associations embed psychology as a contemporary science in their work with teachers and pre-service teachers. Challenges have been experienced before (e.g. in A-level by psychology and other sciences and curriculum authorities (BPS, 2013)), and likely to be experienced again. The contested nature of curriculum demands communication between all stakeholders to develop a shared meaning, which may be facilitated by the psychological sciences framework. It is these efforts of shared meaning that will enable psychology will be able to establish its place in all the systems teachers work. Such curriculum reform should aim to:

- *Enable psychology to establish a place* as a science in all the systems teachers work.
- Ensure that the high stakes environment reflects the *embedded essence of the psychological science framework*.

Teachers wanted to see explicit reference to science practices in the curriculum, which in essence gives them permission to use science practices (and possibly the framework) in their classrooms. Explicitly referencing of science practices, in both curriculum and its assessment, is an important step given the high stakes environment of many senior secondary curricula with their tendency to present narrow and fragmented curricula and take a more teacher- centred approach to meet the perceived demands of assessment (Au, 2009). Success in the senior secondary space could pave the way for opening up discussions to include psychology as a sub-strand of science in F-10 science curricula, and beyond to STEM and other interdisciplinary and/or multidisciplinary studies. Curriculum reform should include important messages about this shared meaning and reflects the embedded essence of the psychological science framework, including:

- Communicate psychology as a contemporary science, *emphasising the discipline's unique contributions* to understanding and supporting personal, social and global issues.
- Communicate the *science base of psychology*, paying attention to the nature, values and practices of science within the context of psychology. These commonalities offer a way of promoting contemporary science and providing a way for interrelating knowledge from various areas of science.
- Communicate *the commonalities between science* disciplines and *psychology's unique contributions* it makes as a discipline to individuals and society. The two work together to establish knowledge; to focus on one does not forgo the other.
- Communicate *psychology's diversity* in terms of range of content areas, levels of analyses and research methods used create its knowledge; each with their own inherent complexities for studying psychology, including ethical and moral considerations.
- Emphasise *the ways psychology works with a range of other science and non-science disciplines* to develop a bigger picture of personal, social and global issues.

The culture within their key learning area plays a significant role in the way teachers plan their work and interact with students (Donnelly, 2000; Simon et al., 2011; Siskin, 1994), and this is very much the case for teachers working in a curriculum that deems psychology a science. In many ways, establishing a place for psychology in science depends on psychology teachers and their willingness to be part of science beyond senior psychology. Likewise, other science teachers and their schools must embrace psychology teachers and value their expertise, and appreciate psychology's science base. Some teachers are already teaching psychology within their Years 7 (or younger) to 10 curricula, and inclusion is likely to increase the sustainability and visibility of their programs. For others to find a place for psychology in their school's curriculum, they are most likely going to have to negotiate a space with science teachers. The following conditions should be considered to enable curriculum reform and connections with all stakeholders:

- Establishing a place for psychology in science *depends on psychology teachers* and their willingness to be part of science beyond senior psychology.
- Establishing a place for psychology in science *depends on other science teachers* and *their school's* willingness to be part of science beyond senior psychology.
- Establishing a place for psychology in science requires *all systems*, including the science professional teacher associations, psychology academics and psychologists, science education researchers, and initial teacher education programs, to embrace psychology's place in science and raise psychology's profile.
- Psychology will need to *negotiate a place within the F-10 science curriculum*, accepting that compromise may be necessary, as addition of new content will likely need to replace other content.

Curriculum reform, especially if curriculum, assessment and desired pedagogies align (Fensham, 2009) is an important step, although teachers are likely to read such reform through the lens of their current curriculum emphasis (Roberts, 2007) without extra support. It may lead to innovative teaching practices, as the reform could be viewed by teachers as offers permission for them to experiment with their teaching practice and learn about intentions behind the curriculum emphasis which could support them to shift their teaching practice (Roberts, 1988). In this way, curriculum reform lowers the perceived risk to implement innovative practices making it more likely that they trial new approaches rather than sticking with being risk averse, a concept of pedagogical frailty as seen in tertiary psychology (Hulme & Winstone, 2017). Curriculum reform is likely to lead to ongoing creation of 'framework friendly' resources, as the teachers in this research study requested. Creating resources for teachers and students should specific examples regarding how teachers could potential use or have used the framework with the rationale behind these suggested ways of use. It is important that such resources represent the complexity of the framework, rather than oversimplify the messages. They could offer teachers insights into possible problematic areas for teaching and learning psychological science and potential ways to navigate these challenges. In this way, curriculum resources may offer starting points for teachers to make considered decisions for their teaching context, and potentially enabling them to teach in ways that promote the discipline of psychology, connect the intended curriculum in multiple ways and support teaching psychology in richer and more meaningful ways, as they discussed in this research study.

Curriculum reform will drive implementation workshops, textbooks and resources although in most cases of curriculum reform, teachers require ongoing support (Fensham, 2016). The success of the use of the psychological science framework as a support for their teaching is likely to depend on the extent psychology teachers identify themselves as science teachers and the extent psychology teachers feel connected to science within the systems they work. This will require other science teachers, indeed all stakeholders, to identify psychology teachers as science teachers.

9.5.3 Psychology teachers as professionals.

To build a shared meaning of psychology as a contemporary science and what this can look like when teaching psychology, and implement this shared meaning as intended within the curriculum, relies on valuing psychology teachers as professionals. To develop as specialists, teachers require conditions to grow and develop as professional learners and leaders throughout their career (Schleicher, 2018). The findings of this thesis put a spotlight on professional learning opportunities for psychology teachers, which teachers in this study regarded as limited, and implications for their professional careers and their teaching of psychology. Teachers' development as specialists require multiple strategies, especially strategies that consider the teacher's contexts, to support their professional growth (Crawford et al., 2014). To communicate a shared meaning of psychology as a contemporary science, establish a place within the systems and undergo curriculum reform, teachers need to be valued and value themselves as professionals. To facilitate psychology teachers as specialists:

- *Build on the expectation* on what it means for psychology teachers to be professional and take a central role in their ongoing professional growth.
- *Support and advocacy* for psychology teachers as specialists from psychology teachers, science teachers, school communities, curriculum authorities, professional teacher associations, psychology academics and psychologists, teacher educators and researchers.

Teachers working together to make sense of the framework is more powerful learning than a professional development one-short workshop (Loughran, 2012). This work could begin in teacher professional learning communities (PLCs), with teachers working collaborative over a sustained period of time to share expertise, build shared understandings and learn from and with each other about and for their teaching practice (Darling-Hammond, 2005). Outside sources may be invited to stimulate ideas, knowledge and different perspectives, such as teachers who use the psychological science framework and others who work within the multiple systems that teachers work. This learning is likely to be deep and powerful and transformational to allow the shift in emphasis required to teach contemporary science (Loughran, 2012). The shared meanings are likely to be broad within different PLCs to recognise that teachers are in the best position to understand the context in which they teach.

The development of specific resources is likely to be helpful but not enough to drive teacher change since the changes required to implement curriculum reform are not their usual ways of teaching (Davis & Krajcik, 2005). Furthermore, the ways teachers understand these materials is influenced by their ability to critically reflect on their own teaching and to relate this to the intentions behind the materials (Korthagen et al., 2006). Learning opportunities will need to acknowledge teachers' current knowledge, attitudes, beliefs and ways of teaching (van Driel et al., 2001), something that this research study found differs between teachers. Sufficient time and multiple strategies according to the teachers' context are required to support teacher learning (Crawford et al., 2014) if a shared vision and sustained use of the framework as a support for teaching psychology is to be realised. Potential ways to facilitate teacher change include:

- Learning opportunities that attend to differing starting points and learning needs amongst teacher in relation to their *understanding of the framework* and *understandings of contemporary psychological science*.

- Learning opportunities that attend to differing starting points and learning needs amongst teacher in relation to their *teaching of contemporary psychological science* and *ways to integrate the framework* as a support for their teaching.
- *Time and resources* for teachers to plan and develop ideas on how to use the framework as a support for teaching, teach, evaluate and critically reflect on their own teaching.
- *Time, resources and multiple opportunities* for teachers to work in collegial and supportive networks to collaboratively discuss, share, reflect and explore issues that arise associated with the use of the framework.
- Exploring what it means to teach psychology as a contemporary science in *initial teacher education (ITE) psychology method units*. Such 'trickle up' approaches for pedagogical change are slow but likely to be deep, effective and doable.
- Learning opportunities that specifically target what teachers want to attend to, *empowering them to take ownership and direct their own learning* about ways to integrate the framework into their teaching and associated impact on their teaching and student learning.
- *Leadership* and multiple career pathways for psychology teachers to share, mentor and lead with their specialist knowledge and practice.

Teachers are in the best situation to contextualise this psychological science framework for their specific classes and as professionals, need to actively seek and be given ongoing opportunities for professional growth. Loughran (2012) discusses teacher professional learning as powerful and enduring learning. Findings from this thesis indicate that teachers will appreciate learning "up-to-date" education research, and teachers are likely to see potential benefits for teaching with the framework to support their students and themselves as teachers. Conditions for teacher change are more likely when a teacher becomes dissatisfied with current teaching practice and recognises the need for change. As a result of this cognitive dissonance they are likely to be open to change, and given the opportunities enables professional growth (Loughran, 2012). Recognising potential benefits of the framework may elicit an interest to step back and reflect on their current teaching practice. Critical reflection on teaching practice may lead to more creative and innovative teaching (Loughran, 2012), enhanced through the collective power of working in professional teaching teams. While slow, this grass roots approach to professional learning is likely to lead to deeper and more transformative change.

For teachers of psychology and the multiple systems in which they work, including when they are working in a system that deems psychology a science, it is important to consider the views of contemporary science and curriculum policy documents to reinforce nature and values of psychological sciences. Support and advocacy for psychology teachers as specialists will facilitate their ongoing learning and their career pathways, and drive future research into teaching and learning psychology in schools and curriculum policy. Importantly, teachers are in the best position to impact student learning, with the flow on effects likely to increase psychological literate citizenry and therefore have ongoing benefits for the general population.

9.6 Concluding Remarks

This study contributes to our understanding of psychology teachers' views and what it may mean to teach psychology as a science in secondary schools. This thesis has implications and recommendations for (1) the potential of a psychological science framework to build shared understanding; (2) the ways curriculum reform communicates messages about psychology, and teaching of psychology as an accepted part of the science key learning area; and (3) the professional learning of psychology teachers through collaboration with others (especially psychology and other science teachers) within and between schools, supported by schools to create and give time to facilitate such professional learning networks, and ongoing learning and career pathways. Navigating these recommendations will take time, support, advocacy and negotiation within the multiple systems of which teachers of psychology work. Psychology is a popular senior study for both students and teachers, and to have so many switched on to science, these challenges are well worth pursuing!

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Appendix A

Psychology Teachers Online Survey Invitation

You are invited to take part in a research project to support teaching of psychology. The online survey takes 10 to 20 minutes to complete and can be completed anonymously. It consists of Likert Scale questions and open-ended questions.

If you would like to assist or find out more, please clink HERE LINK

Appendix B

Sample of Source, Development and Justification of Online Survey Items

Item	*Key aspect*	Adapted from	Reasons for changes
B Item 1 'The study of psychology is a science.'	Psychology is a science	'The study of psychology should be seen primarily as a science.' (Friedrich, 1996; Provost et al, 2011)	Replaced SHOULD BE SEEN with IS to make this a stronger statement.
B Item 2 'Psychology consists of a diverse range of unrelated areas.'	Systems	'The different areas within psychology seem very unrelated to each other.' (Friedrich, 1996; Provost et al, 2011) Reverse item	Deleted VERY. Vetter later suggested rewording to simplify the item (see Appendix D).
B Item 3 'Psychology is empirically-based.'	Empirical	'Scientific knowledge is empirically-based.' (Consensus list of NOS, see Table 2.3)	Interesting to see if the term is familiar to teachers.
B Item 4 'Psychologists seek to find patterns of influence within and between psychological systems.'	Systems Patterns		Created this statement as needed one that explicitly mentioned patterns and systems.
B Item 5 'Models are invented in psychology to represent psychological explanations.'	Models		Created this statement as needed one that explicitly mentioned models.
B Item 6 'In psychology, an objective and standardised set of procedures and rules are followed to discover facts.'	Subjective Tentative	'Scientists are very objective because they have a set of procedures they use to solve their problems.' (Provost et al, 2011) Reverse item	Deleted the word VERY Put this in terms of psychology
B Item 7 'For new knowledge in psychology to be trusted, it must be supported by experimental research.'	Multiple research methods of science	'The only way to produce scientific data is to conduct an experiment.' (Rowley & Dalgarno, 2010); 'Reverse item 'Psychological theories presented in the media should not be trusted unless they are supported by experiments.' (Friedrich, 1996; Provost et al, 2011)	Original statements helped frame this statement, tapping into ideas about new knowledge, trust and experimental research.
B Item 8 In psychology, all of the data collected must be treated and analysed equally.	Patterns, Subjective	In psychology, it is critical to analyse all of the data collected. Reverse item	Created this statement to represent patterns and recognising anomalous data.
B Item 9 'If you get the same result over and over and over again, then you become sure that your theory is a proven law.'	Theories and laws	'Laws started as theories and eventually became laws after repeated and proven demonstration.' 'If you get the same result over and over and over, then you become sure that your theory is a proven law, a fact.' (Provost et al, 2011) Reverse item	Shortened, took out the term 'a fact'.
B Item 10 'In every stage of their research work, psychologists have to use their imagination and be creative.'	Subjective, Creativity	'In their work, scientists often have to use their imagination and be creative.' (Provost et al, 2011; Rowley & Dalgarno, 2010)	Changed SCIENTISTS to PSYCHOLOGISTS, added research to avoid confusion with type of psychologist. Got rid of OFTEN to make this a stronger statement. Add every stage to highlight that not just beginning but throughout.
B Open-ended question 'What makes a discipline a 'science'?'	View of science	'If you were asked to explain what makes something 'scientific', what would you say?' (Rowley et al, 2008)	Simplified the question.

Appendix C

Psychology Teachers Online Survey

EXPLANATORY STATEMENT
(Teachers of Psychology – Online Survey)

Project: Validating a frame to support the teaching of psychology concepts with science practices in secondary schools.
Project Number: CF14/3927 - 2014002041

Associate Professor Debra Panizzon Faculty of Education Phone: 03 9905 0175 Email: debra.panizzon@monash.edu	**Karen Marangio** Phone: 03 9905 2788 Email: krphi2@student.monash.edu

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?
You are invited to take part in an online survey as part of a larger research project to support teaching of psychology. This study aims to validate a frame within the profession of secondary school psychology teachers to support the teaching of psychology concepts with the science practices that build these concepts. The frame is designed to support teachers to connect curriculum and build on psychology learning experiences within and over the years. The online survey will help establish a baseline for views of psychology and current ways of teaching of psychology.

The online survey takes 10 to 20 minutes to complete and can be completed anonymously. It consists of Likert Scale questions and three open-ended questions.

Why were you chosen for this research?
As a teacher of psychology, your views are central to this research. This online survey aims to capture secondary school psychology teachers' views of psychology and current ways of teaching of psychology that relate to the frame and provide a baseline for this research.

Recruitment is via an invitation to this survey on the Carter Down Educational Services (CDES) website, the leading conference provider for teachers of psychology in Victoria, and not affiliated with the researchers. Your contact details are not required by us.

Consenting to participate in the project and withdrawing from the research
Being a part of this study is voluntary and you are under no obligation to participate. This survey can be completed anonymously. At the end of the survey, you will be asked if you consent to the researchers contacting you about further participation in this research project. This may involve participation in a focus group and interview. If you are interested and consent to the researchers contacting you with more details, you are invited to leave your name and email address. If you do, this survey will not be completed anonymously.

If you are willing and consent to participate in this research, simply click on the Accept button and the survey will open. If you are not interesting in participating, please close this page. If at any stage during the survey you wish to withdraw, simply click out of the survey.

Your responses will be anonymous and/ or de-identified and aggregated with others responses. If you complete this survey anonymously, once you have completed the survey, we are not able to withdraw your responses because they will be pooled into a spreadsheet for analysis. If you leave your contact details, you can withdraw your data up to the time when results start to be analysed, by informing the Chief Investigator, Debra Panizzon, using the contact details listed above.

It is not likely that any of these questions will cause you any discomfort but if they do, simply click out of the survey.

Confidentiality
Your data and the results will be treated with sensitivity and data will be securely stored by the student researcher to ensure privacy and confidentiality. Only members of this research team will have access to the data. Privacy and confidentiality will be upheld with any dissemination of results.

A report of the findings of this study will be submitted for publication, but individual participants will not be identifiable in any report.

Storage of data
The data will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years after publication of the findings. Data will be destroyed after this time.

Results
This online survey is part of a larger research project. Results of this online survey are likely to be disseminated from 2016 onwards via thesis, publications and conferences.
If you would like to be informed about the research findings, please contact Karen Marangio on (03) 9905 2788 or krphi2@student.monash.edu.

Complaints
Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Executive Officer, Monash University Human Research Ethics (MUHREC):

Executive Officer
Monash University Human Research Ethics Committee (MUHREC)
Room 111, Building 3e
Research Office
Monash University VIC 3800
Tel: +61 3 9905 2052 Email: muhrec@monash.edu Fax: +61 3 9905 3831

Thank you,

Associate Professor Debra Panizzon

Instructions

This survey should take 10 to 20 minutes to complete.

This survey is divided into *three* sections:
A: Demographics; B: View of Psychology; C: Teaching of Psychology.

Please complete each section.

In most cases you only need to select your response to a question from given options.
You are welcome to provide additional comments.

We thank you in advance for answering as honestly and completely as possible.

Section A: Demographics

1. What is your gender?

- Male
- Female

2. What is the highest level of study of **psychology** you have completed?

- no formal secondary or tertiary psychology education
- senior secondary school psychology
- Undergraduate psychology (Please select: 1st year, minor or major sequence)
- Honours/ forth year psychology
- Masters in psychology or masters in educational psychology or masters in education with focus on teaching & learning of psychology
- PhD (focus on psychology or teaching and learning of psychology)
- Other

3. How many years of experience have you had teaching psychology in secondary schools?

4a. Where do you currently teach?

- Secondary school
- Tertiary pre-service teacher education (psychology method)
- Tertiary psychology
- Currently studying as a pre-service teacher
- Not currently teaching
- Other

4b. Type of secondary school:

- government
- independent
- catholic
- other

4c. Where is your secondary school located?

- Melbourne
- Victorian country
- Outside Victoria

4d. Psychology belongs to which key learning area (department) in your current school?

- Health and Physical Education
- Humanities
- Psychology (a stand-alone subject/ department by itself)
- Science
- Other

5. Not including psychology, your other teaching methods belong to which key learning areas (departments)?

- The Arts
- English
- Health and Physical Education
- Humanities
- Languages
- Mathematics
- Science
- Technologies
- Other
- Do not have another teaching method

6a. Which of the following psychology curricula do you currently teach?

- Victorian Certificate of Education
- International Baccalaureate
- Years 7 to 10 (Please list year levels)
- Other (eg SACE, WACE, ACT, Tas, AP, A level ...)

6b. Which of the following psychology curricula have you taught in the past?

- Victorian Certificate of Education
- International Baccalaureate
- Years 7 to 10 (Please list year levels)
- Other (eg SACE, WACE, ACT, Tas, AP, A level ...)

Section B: Your View of Psychology

To what extent do you agree that:

	Strongly Disagree	Disagree	Agree	Strongly Agree	*Unsure*
1. The study of psychology is a science.	○	○	○	○	○
2. Psychology consists of a diverse range of unrelated areas.	○	○	○	○	○
3. Psychology is empirically-based.	○	○	○	○	○
4. Psychologists seek to find patterns of influence between and within psychological systems.	○	○	○	○	○
5. Models are invented in psychology to represent psychological explanations.	○	○	○	○	○
6. In psychology, an objective and standardised set of procedures and rules are followed to discover facts.	○	○	○	○	○
7. For new knowledge in psychology to be trusted, it must be supported by experimental research.	○	○	○	○	○
8. In psychology, all data collected in a study must be treated and analysed equally.	○	○	○	○	○
9. If you get the same result over and over and over again, then you become sure that your theory is a proven law.	○	○	○	○	○
10. In every stage of their research investigations, psychologists have to use their imagination and be creative.	○	○	○	○	○

To what extent do you agree that:

	Strongly disagree	Disagree	Agree	Strongly Agree	*Unsure*
11. In the field of psychology, knowledge is tentative and subject to change.	○	○	○	○	○
12. Psychology will never be a true science because its predictions of individual behaviour are seldom exact or certain.	○	○	○	○	○
13. To be certain that psychology knowledge is correct, the psychological phenomenon must be directly observable.	○	○	○	○	○
14. In psychology, data must be interpreted without subjective influence of the researcher.	○	○	○	○	○
15. In psychology, it is possible for researchers to come to different interpretations of the same data and therefore disagree.	○	○	○	○	○
16. Psychology consists of a complex set of interrelated concepts.	○	○	○	○	○
17. Psychology involves theory construction and revision.	○	○	○	○	○
18. Psychology involves peer review and evaluation.	○	○	○	○	○
19. Psychology knowledge is socially and culturally embedded.	○	○	○	○	○
20. Psychology is a human construct.	○	○	○	○	○

Please provide additional comments if you selected 'Unsure' or wish to comment further on any of these statements.

What makes a discipline a 'science'?

Section C: Your Teaching of Psychology

The following statements relate to the way you currently teach psychology (or, if not currently teaching, most recently taught psychology in secondary school).

	Never	Rarely	Sometimes	Often	Always	*Unsure*
1. I teach research methods *within* a stand-alone unit.	○	○	○	○	○	○
2. I explicitly discuss the importance of following the scientific method.	○	○	○	○	○	○
3. I explicitly discuss the vital role of experiments in creating psychology knowledge.	○	○	○	○	○	○
4. I frame my topics in terms of psychological systems.	○	○	○	○	○	○
5. Within each topic of psychology I teach, I include different levels of analysis, from micro (biological) to macro (socio-cultural) levels.	○	○	○	○	○	○
6. I teach about the development of psychological models.	○	○	○	○	○	○
7. I teach the importance of using models as exact replicas of reality.	○	○	○	○	○	○
8. I teach the distinction between evidence and explanations.	○	○	○	○	○	○
9. I teach psychology as a science.	○	○	○	○	○	○
10. I teach psychology as a human endeavour.	○	○	○	○	○	○

The following statements relate to the way you currently teach psychology (or, if not currently teaching, most recently taught psychology in secondary school).

	Never	Rarely	Sometimes	Often	Always	*Unsure*
11. I teach students how to plan and undertake observations to generate data that is in line with the purpose of their research.	○	○	○	○	○	○
12. I teach students how to analyse patterns in observational data.	○	○	○	○	○	○
13. I teach the distinction between data and evidence.	○	○	○	○	○	○
14. I teach students how to construct arguments to justify their psychological explanations.	○	○	○	○	○	○
15. I explicitly teach why different levels of analysis ask different research questions and employ different methods of inquiry.	○	○	○	○	○	○
16. I teach the central role of imagination and creativity in every stage of psychology research.	○	○	○	○	○	○
17. I integrate the teaching of psychological concepts *with* the teaching of science inquiry.	○	○	○	○	○	○
18. I explicitly build on student's prior learning of psychology across semesters and year levels.	○	○	○	○	○	○
19. I explicitly discuss the way psychology compares to everyday discussions about thoughts, feelings and behaviours.	○	○	○	○	○	○
20. I teach how the values and expectations of the psychology community influence what and how psychology is conducted, interpreted and accepted.	○	○	○	○	○	○

Please provide additional comments if you selected 'Unsure' or wish to comment further on any of these statements.

Consider why you think psychology should be taught in secondary schools and the related aspects you feel are important to teach.

Why do you think psychology is important to teach?

Are you able to teach psychology in the ways you think are important? Please explain.

Thank you for participating in this survey.

Thank you for participating in this survey.

Please add any additional comments you have about the survey.

If you are interested in further participation in this research project, then please leave your details here.

Name

Email Address

Appendix D

Feedback and Changes to Online Survey Following Expert Checks and Pilot Test

Original item	Feedback	Considerations	Modified item
C Item 20 'I teach how the values and expectations of the psychology community influence what and how psychology is conducted, interpreted and accepted.'	Expert A – worried that this item suggests bias in psychology. Expert B – favourite item in the survey. Expert C – no feedback.	Interesting feedback. No change – keep, could generate rich comments.	-
C Item 6 'I teach about the development of psychological models.'	Expert A – teachers may not know what is meant by 'models'.	No change – familiarity with the science practices is part of the intention of the survey.	
C Item 5 'I frame my topics in terms of psychological systems.'	Expert A - teachers may not know what is meant by 'systems'.	No change – familiarity with the science practices is part of the intention of the survey.	
Open-ended question 'what makes a discipline a 'science'?'	Expert B: Fits better at end of section B.	Move from end of section C to end of section B.	
B Item 2 'Psychology consists of a diverse range of *discrete* areas'	Expert B: 'discrete' may confuse teachers.	Change discrete to unrelated.	'Psychology consists of a diverse range of *discrete* areas'
B Item 3 'Psychology knowledge is empirically-based.'	Expert C: 'knowledge' is not needed, may be confusing.	Deleted knowledge	Psychology is empirically-based.'
C Item 11 'I teach students how to plan and undertake observations to generate data that suits the purpose of their research.'	Expert C - the use of 'suits' makes item unclear if the item collected data to 'complement the purpose' or the data was 'adjusted to fit the purpose'.	the word 'suits' replaced with 'in line with' as the	'I teach students how to plan and undertake observations to generate data that is *in line with* the purpose of their research'
Open-ended question 'Are you able to teach psychology in the ways you think are important? Please explain.'	Expert C - The second open-ended question was seen as ambiguous and unclear if 'ways' refers to activities, strategies, topics, purpose or increasing engagement and learning.	A stem sentence and an extra question added to clarify the second open-ended question.	'Consider why you think psychology should be taught in secondary schools.' 'Why do you think psychology is important to teach?' 'Are you able to teach psychology in the ways you think are important? Please explain.
B Item 14 'In psychology, data must be collected and interpreted without subjective influence of the researcher.'	Pilot test: Ambiguity between researcher bias/ researcher when collecting and interpreting data and experimenter effects/ demand characteristics when collecting data and subjective interpretation.	The item was meant to tap into the role of the researcher in deciding what to observe and how to observe and which data to keep, rather than the effect the researcher can have on the participant's thoughts, feelings and behaviours. Delete 'collected'.	'In psychology, data must be interpreted without subjective influence of the researcher.'
C Item 2 'I teach research methods within a stand-alone unit.'	Pilot test – may read as I teach research methods, whether or not in a stand-alone unit.	The word 'within' was put in italics to make this stand out.	'I teach research methods *within* a stand-alone unit.'

Appendix E

Phase Two (Workshop) Explanatory Statement and Consent Forms

MONASH University

EXPLANATORY STATEMENT

(Teachers of Psychology – Focus Group)

Project: Validating a frame to support the teaching of psychology concepts with science practices in secondary schools.

Project Number: CF14/3927 - 2014002041

Associate Professor Debra Panizzon Faculty of Education Phone: 03 9905 0175 Email: debra.panizzon@monash.edu	**Karen Marangio** Phone: 03 9905 2788 Email: krphi2@student.monash.edu

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?
You are invited to take part in our next stage of a research project to support teaching of psychology. This study aims to validate a frame within the profession of secondary school psychology teachers to support the teaching of psychology concepts with the science practices that build these concepts. The frame is designed to support teachers to connect curriculum and build on psychology learning experiences within and over the years. As a teacher of psychology, your views are central to this research.

We will be conducting a focus group meeting, where the frame will be introduced and its potential use as a support for the teaching of psychology will be explored.

The focus group will comprise of 4 to 8 psychology teachers, take approximately 2 hours (plus breaks for food and refreshments) and facilitated by Karen Marangio. The frame will be introduced, mapped with current curriculum and its potential use as a support for teaching of psychology explored. Participants will be asked to bring in a copy of their current curriculum. The meeting will be audio-taped with a digital recorder and occur at the following location and time:

Focus Group Meeting
Date:
Time: (up to 2.5 Hours)
Place:

Psychology teachers are not required to change their intended (current) curriculum or the way they teach as a consequence of participating in the focus group. After the focus group meeting, however, some change may occur. For instance, teachers may alter the way they enact the curriculum and/or think about their curriculum and views of psychology and/or connect the learning of psychology concepts with the science practices that build these concepts. Participants will be invited to a follow up individual interview designed to capture the impact of being involved in this focus group. Participants in the focus group are not obliged to take part in individual interview.

Why were you chosen for this research?
We greatly appreciated your assistance in participating in our initial stage of the project, an online survey for psychology teachers. At the end of this online survey you registered interest in further participating in this research project. It is important to note that while you provided your contact details in this survey, you are not obliged to take part in the focus group meeting.

Secondary school psychology teachers' views and experiences are central to this research project. Your participation will help capture teacher's views and experiences with use and potential use of this frame to support their teaching of psychology.

Consenting to participate in the project and withdrawing from the research
Being a part of this study is voluntary and you are under no obligation to participate. Your decision not to participate will not impact you in any way. If you do consent, you may withdraw from the project at any time, even during the focus group meeting. If you withdraw during or after the focus group meeting, however, your data will not be able to be withdrawn because it is not isolated data but part of the group's aggregate data. Your identity will be known to the research team and other focus group participants. The researchers will keep this confidential and we ask participants to do the same. If you are willing to participate in this part of the research, simply sign and return the attached consent form.

We are planning for the focus group meeting to be carried out in respectful and collaborative manner, open to a range of perspectives. It is not likely that participation in the focus group will cause you any discomfort but if you do, you can withdraw from the study.

Confidentiality
Focus group participants will know your identity and what occurred during the meeting and, while we cannot make assurances on their behalf, we will ask for verbal agreement between all participants to maintain the anonymity of other participants and the confidentiality of the meeting. Your transcripts will be de-identified with a pseudonym to help retain confidentiality. Your data and the results will be treated with sensitivity and data will be securely stored by the student researcher to ensure confidentiality. Only members of this research team will have access to this data. Confidentiality will be upheld with any dissemination of results.

A report of the findings of this study will be submitted for publication. Pseudonyms will be used so that individual participants will not be identifiable in any report.

Storage of data
The data will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years after publication of the findings. Data will be destroyed after this time, unless you consent to it being used in future research.

Results
The interviews are part of a research project. Results of this research are likely to be disseminated from 2016 onwards via PhD thesis, publications and conferences.

If you would like to be informed about the research findings, please contact Karen Marangio krphi2@student.monash.edu.

Complaints
Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Executive Officer, Monash University Human Research Ethics (MUHREC):

Executive Officer
Monash University Human Research Ethics Committee (MUHREC)
Room 111, Building 3e
Research Office
Monash University VIC 3800
Tel: +61 3 9905 2052 Email: muhrec@monash.edu Fax: +61 3 9905 3831

Thank you,

MONASH University

CONSENT FORM

(Focus Group)

Project: 'Validating a frame to support the teaching of psychology concepts with science practices in secondary schools'

Project Number: CF14/3927 - 2014002041

Chief Investigator: Associate Professor Debra Panizzon

I have been asked to take part in the Monash University research project specified above. I have read and understood the Explanatory Statement and I hereby consent to participate in this project.

I consent to the following:	Yes	No
Taking part in a workshop focus group of up to 8 teachers of psychology	☐	☐
Audio-taping the workshop focus group meeting with a digital recorder	☐	☐
Researcher recording notes during the workshop focus group meeting	☐	☐
Curriculum document statement(s)	☐	☐
Use of a pseudonym to protect my identity in any reports or publications on the project	☐	☐

I understand that my participation in voluntary, that I can choose not to participate in part or all of this focus group meeting, and that I can withdraw at any stage without being penalised or disadvantaged in any way. If I do withdraw during or after the meeting, the researchers will do their best to withdraw my data. Due to the nature of focus groups, however, my individual data in relation to the group work may be difficult to separate and therefore withdraw.

I understand the researchers will respect confidentiality and anonymity, and while they cannot provide assurances that all participants do the same, will ask for verbal agreement between all participants that they maintain the anonymity of other members and the confidentiality of the meeting.

I understand that any data that the researcher extracts from the focus group meeting for use in reports or published findings will not, under any circumstances, contain names or other identifying information.

I understand that data from the focus group meeting will be kept in secure storage and accessible to the research team. I also understand that the data will be destroyed after 5 years after publication unless I consent to it being used in future research.

Name of Participant ______________________________

Participant Signature ______________________________ Date ____________

Appendix F

Individual Written Reflective Tasks

P-M-I CHART

PLUS	Minus	Interesting

Heart, Head, Bin, Bag

1.
2.
3.

1.
2.
3.

Using this 'psychological science' framework as a support for teaching of psychology

1.
2.
3.

1.
2.
3.

Appendix G

Focus Group (Semi-Structured) Questions

1. What was your initial reaction to the frame? To what extent has this changed throughout this focus group workshop?
2. What was it like to undertake the activity? Were there straight forward parts to the activity? Were there major challenges?
3. What were the highlights with being involved in today's focus group? Any lowlights or aspects that you were hoping for that did not eventuate?
4. In what ways, if any, do you think participating in this focus group will impact you and your teaching of psychology? Has it got you thinking?
5. Do you think you will use or refer to the framework to support your teaching of psychology in the future? Explain.

Appendix H

Curriculum Mapping Exercise

Connecting psychology concepts with the science practices that inform these concepts

1. Select Psychology curriculum:
2. Select a topic within this curriculum:
3. Identify a psychology concept/ construct/ system within this topic: ____________

Working in groups (2 to 4 people), attempt to fill out the following table.

- *The science practices are iterative and do not operate in isolation*
- *There are many more science practices – this is a limited selection for secondary school psychology*
- *This frame is designed to highlight themes (overarching ideas) to connect understanding psychology concepts with how they are developed & why they are valued (ways of knowing & doing psychology)*
- *This frame is designed to support the teaching of psychology but not designed to be a checklist or an exclusive list – not all areas need to be addressed all the time & teaching of psychology should not be exclusive to only using this.*

PSYCHOLOGY CONCEPT & SCIENCE PRACTICE	Linking psychology concept with science practice	Examples: *What do you want to teach students (in terms of the psych concept(s) & the science practice(s) that inform these concepts)?* *Where may this fit in your current curriculum?*	Possible teaching procedures *What are possible teaching ideas & activities to promote learning and linking psychology concept with the science practice?*	Possible challenges for teaching and student learning *What could be challenging or difficult to teach for student learning of psychology?*	Connecting and building on psychology learning experiences *What are the links to previous & future curriculum experience?*
______ SYSTEMS	_______ as a dynamic system. _______ systems interaction with other systems.				
______ MODELS	_________ models to represent understandings or explanations. _______ models of different levels of analysis.				

________ EXPLANATIONS	Explanations of _________ using empirical evidence in light of the model. Arguments to justify explanations of __________ and communicate to a range of audiences. Applying explanations of _________ to different contexts and individuals, own lives and society.				
PATTERNS IN ________ DATA	Recognising patterns in ___________ data.				
________ OBSERVATIONS	Intentional observations of ___________.				

Appendix I

In-Situ Chart

IN SITU CHART – *To what degree has the frame been used as a support for teaching psychology concepts with the science practices that inform these concepts?*
Rate the times you used, mentioned or thought of aspects of the frame (overarching ideas) in your psychology class following the focus group.
Add a quick note to capture the context. (Note: Please adapt this chart in a way that suits you).

Appendix J

Individual Interviews (Semi-structured) Questions

1. In what ways have you considered this framework (or aspects of this framework) since our focus group meeting?
2. In these circumstances, to what extent did you consider or refer to this frame (or aspects of the frame) during the planning for teaching *and/or* your teaching?
3. a. To what extent did you find this framework helpful? Why/ why not?

   b. What were the challenges with using this framework?

   c. Do you have any suggestions, modifications and limitations with using this framework?
4. What have been the highlights with participating in this study? What has had the most impact on you? How?
5. In what ways, if any, has participating in this study changed, shifted or shaped your ideas about the nature of psychology and teaching of psychology in the future?
6. Is there anything else you wish to say in relation to this study?

Appendix K

Individual Interview Explanatory Statement and Informed Consent Forms

MONASH University

EXPLANATORY STATEMENT

(Teachers of Psychology – Follow up 1:1 Interviews & online post-survey)

Project: Validating a frame to support the teaching of psychology concepts with science practices in secondary schools.

Project Number: CF14/3927 - 2014002041

Associate Professor Debra Panizzon Faculty of Education Phone: 03 9905 0175 Email: debra.panizzon@monash.edu	**Karen Marangio** Phone: 03 9905 2788 Email: krphi2@student.monash.edu

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?

You are invited to take part in our final stage of this research project to support teaching of psychology. This study aims to validate a frame within the profession of secondary school psychology teachers to support the teaching of psychology concepts with the science practices that build these concepts. The frame is designed to support teachers to connect curriculum and build on psychology learning experiences within and over the years. As a teacher of psychology, your views are central to this research.

We will be conducting individual interviews and online post-survey, to follow up the focus group meeting. Follow up individual interviews are designed to capture the impact of being involved in this study.

Participants in the focus group are invited to a follow up individual interview designed to explore capture participant's views and perceptions of the frame's potential use as a support for their teaching of psychology. Participants in the focus group are not obliged to take part in the individual interviews. Karen Marangio will conduct the interview on a 1:1 basis at a time (eg after school) and place (eg at your school) that suits the participant. It will take approximately 45 minutes and be audio-taped with a digital recorder. Participants will be provided with the list of interview questions beforehand.

Why were you chosen for this research?

We greatly appreciated your assistance in participating in our focus group meeting. You have been invited for follow up interviews because we would like to explore the impact of being involved in this study.

Secondary school psychology teachers' views and experiences are central to this research project. Your participation will help capture teacher's views and experiences with use and potential use of this frame to support their teaching of psychology.

Consenting to participate in the project and withdrawing from the research

Being a part of this study is voluntary and you are under no obligation to participate. Your decision not to participate will not impact you in any way. If you do consent, you may withdraw from the individual interviews at any time, even during the interviews and simply click out of the online post-survey. You can withdraw your individual interview data up to the time when results start to be analysed, by informing the Chief Investigator, Debra Panizzon using the

CONSENT FORM

(Individual Interview)

Project: 'Validating a frame to support the teaching of psychology concepts with science practices in secondary schools'

Chief Investigator: Associate Professor Debra Panizzon

I have been asked to take part in the Monash University research project specified above. I have read and understood the Explanatory Statement and I hereby consent to participate in this project.

I consent to the following:	Yes	No
Being interviewed by the researcher	☐	☐
Audio-taping the interview with a digital recorder	☐	☐
Researcher recording notes during the interview	☐	☐
Using my curriculum documents	☐	☐
Use of a pseudonym to protect my identity in any reports or publications on the project	☐	☐
	☐	☐

I understand that my participation in voluntary, that I can choose not to participate in part or all of this interview, and that I can withdraw at any stage without being penalised or disadvantaged in any way.

I understand that any data that the researcher extracts from the interview for use in reports or published findings will not, under any circumstances, contain names or other identifying information.

I understand that data from the interviews will be kept in secure storage and accessible to the research team. I also understand that the data will be destroyed after 5 years after publication unless I consent to it being used in future research.

Name of Participant ______________________________

Participant Signature ______________________________ Date __________