Edith Cowan University

Research Online

2021

Mindsets matter: Early childhood teacher perceptions of mindset

Fiona Boylan
Edith Cowan University

Recommended Citation

Edith Cowan University

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study.

The University does not authorize you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following:

- Copyright owners are entitled to take legal action against persons who infringe their copyright.

- A reproduction of material that is protected by copyright may be a copyright infringement. Where the reproduction of such material is done without attribution of authorship, with false attribution of authorship or the authorship is treated in a derogatory manner, this may be a breach of the author's moral rights contained in Part IX of the Copyright Act 1968 (Cth).

- Courts have the power to impose a wide range of civil and criminal sanctions for infringement of copyright, infringement of moral rights and other offences under the Copyright Act 1968 (Cth). Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Mindsets matter: Early childhood teacher perceptions of mindset

This thesis is presented for the degree of

Doctor of Philosophy

Fiona Boylan

Edith Cowan University

School of Education

2021

Abstract

The research study investigated early childhood teacher perceptions of mindset theory and how teachers can be supported to incorporate the teaching of mindset theory in early childhood contexts. Teachers are pivotal in extending children's passion for learning to help them aim high and pursue their goals. Substantial research has shown that students with a growth mindset are better positioned for success in learning and in life. The development of a growth mindset to support student learning is recommended as it leads to greater motivation, self-regulation and academic achievement to develop agile and confident 21st century learners. While the literature identifies the impact a growth mindset can have on learning in the upper primary and adolescent years, little is known about supporting early childhood teachers to develop a growth mindset in students in early childhood contexts.

This study addresses the need to support early childhood teachers to implement mindset theory to lay solid foundations for learning early in life. A sample of early childhood teachers' perceptions of mindset was initially examined. Following this, a smaller group of teachers collaboratively developed a set of design principles to support teachers to foster a growth mindset in students in early childhood contexts. Drawing on a pragmatist theoretical framework, four phases of design-based research (Reeves, 2006) were conducted with early childhood teachers in one school in Western Australia. An online survey in Phase One initially gathered 95 early childhood teachers' (K–2) perceptions of mindset theory through four closed early childhood teacher Facebook groups. The survey data informed the remaining phases of the research. One school in Western Australia was chosen for the remaining phases. Over two five-week iterations, six teachers of children aged 3.5 years to 6.5 years in early childhood classrooms designed, implemented, trialled, refined and evaluated a set of design principles. During

the iterations, video reflection diaries, jottings, focus group discussions and a final evaluative survey were used to inform the development and refinement of the principles.

Results from Phase One of the study revealed that while early childhood teachers had some understanding of mindset theory and believed that it is an important factor for successful learning, most did not know how to include it in practice. Phases Two, Three and Four aimed to address the identified problem and findings indicated that early childhood teachers found the design principles highly effective and practical in implementing mindset theory in early childhood classrooms.

This study offers theoretical and practical contributions to improve early childhood teacher knowledge and practice to assist young learners to develop a growth mindset. All six early childhood teachers indicated that their knowledge of mindset theory improved after developing and implementing the design principles. Additionally, teachers found that the principles were highly effective in providing crucial guidance on the teaching of mindset theory. This novel study was conducted from an educator's perspective rather than through a psychological lens. It provides findings to develop early childhood teachers' knowledge and practice of mindset theory in early childhood contexts and highlights the importance of mindset theory to inform strategic direction and policy development.

Declaration

I certify that this thesis does not, to the best of my knowledge and belief:

    i.   incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education,

    ii.   contain any material previously published or written by another person except where due reference is made in the text of this thesis, or

    iii.   contain any defamatory material.

Candidate signature: ▮▮▮▮▮

Date: 13/09/2021

Acknowledgements

"There's only one thing more precious than our time and that's

who we spend it on"

(Leo Christopher)

I would like to thank those who have given their precious time to support me throughout this journey. To my supervisors, Associate Professor Lennie Barblett and Associate Professor Marianne Knaus, my deepest thanks for giving so generously of your time to mentor, teach and guide me to completion of this thesis. Your deep knowledge, critical feedback, friendship and support was always appreciated.

To the teachers who participated, thank you for your time and for welcoming me into your school to improve student mindsets for learning.

Thanks to Elite Editing who provided editing services. Editorial intervention was restricted to Standards D and E of the Australian Standards for Editing Practice.

To my friends and family, thank you for all of your support. In particular, to the 'Geek Girls', I couldn't have done this without you. Our social catch-ups always reinvigorated my drive to continue. You understood my frustrations and celebrated my achievements as good friends do.

To my parents, Bill and Kerryn, you have given so much of your time to love and support me. Thank you for teaching me the value of hard work and persistence to achieve anything I wanted. I will always be grateful for the wonderful role models you have provided.

To my husband, Gary, from the beginning you showed unwavering support of my goal to achieve a PhD knowing you would sacrifice your time for me. Your love, humour and encouragement made it possible and I am so grateful to you for taking on my share and believing in me.

To my children, Cayley and Conor, thank you for your support and understanding when I was not always focused and available for you. To Cayley, thank you for letting me run my ideas past you as a fellow early childhood educator. To Conor, thank you for proudly sharing my work with your friends.

I hope I have taught you both that being challenged in life is inevitable but being defeated is optional. Great things are possible if you have the mindset, will, desire and put the time in.

Publications Arising From This Thesis

At the time of submission one paper was published as a result of this thesis. I am the lead author. I have presented results arising from this thesis as detailed below.

Manuscripts published in peer-reviewed journals

Boylan, F., Barblett, L., & Knaus, M. (2018). Early childhood teachers' perspectives of growth mindset: Developing agency in children. *Australasian Journal of Early Childhood*, *43*(3), 16–24. doi:10.23965/AJEC.43.3.02

Peer-reviewed conference presentations

Boylan, F. (2021, July). Nurturing a growth mindset in the early years [Symposium presentation]. *European Early Childhood Education Research Association (EECERA) Conference*, Online event, Zagreb, Croatia.

Boylan, F. (2021, February). Fostering a growth mindset in the early years [Round table presentation]. *Australasian Journal of Early Childhood Research Symposium*, Online event, Australia.

Boylan, F. (2019, February). Delving into design based research [Flash presentation]. *Australasian Journal of Early Childhood Research Symposium*, Queensland University of Technology, Brisbane, Australia.

Boylan, F. (2018, January). Agency in learning: Early childhood educator perceptions of growth mindset [Round table presentation]. *Australasian Journal of Early Childhood Research Symposium*, Queensland University of Technology, Australia.

Boylan, F. (2018, November). Mindset matters: Early childhood educator perceptions of mindset [Individual presentation]. *Fogarty Foundation Post-Graduate Research Forum*, University of Western Australia, Perth, Australia.

Other publications

Boylan, F. (2020). Mindset matters: A research in practice series title. *Early Childhood*

　　Australia, *27*(2).

Table of Contents

List of Tables

List of Figures

Glossary

ACECQA: Australian Children's Education and Care Quality Authority

AITSL: Australian Institute for Teaching and School Leadership

DBR: Design-based research blends scientific investigation with systematic development and implementation of solutions to challenges (McKenney & Reeves, 2019)

DEEWR: Department of Education, Employment and Workplace Relations

Early childhood: Refers to the period from birth to 8 years of age

Early childhood teacher: A person working with young children, aged birth to 8 years, in an educational setting who has an initial teacher education tertiary degree and is registered with the Teacher Registration Board of Western Australia

Early years setting: Refers to kindergarten to Year 1 in the Western Australian schooling system with children between the ages of 3.5 and 6.5 years

EYLF: Early Years Learning Framework (DEEWR, 2009)

Fixed mindset: Those with a fixed mindset believe their basic abilities such as intelligence, abilities and talents are fixed traits and no amount of effort or persistence will improve them

Growth mindset: Those with a growth mindset believe their talents, abilities and intelligence can be developed through effort and persistence

K–1: Refers to kindergarten, pre-primary and Year 1 classes

K–12: Refers to kindergarten to Year 12 classes

KCG: Kindergarten Curriculum Guidelines (School Curriculum & Standards Authority [SCSA], 2016)

Kindergarten: The non-compulsory year of schooling in Western Australia for children aged 3.5–4.5 years

Mindset: Mindsets are the beliefs you have about your most basic qualities such as your

intelligence, talents and personality (Dweck, 2016a)

OECD: Organisation for Economic Co-operation and Development

PISA: Programme for International Student Assessment

PMI: Plus, minus, interesting

Pre-primary: The first formal year of schooling in Western Australia for children aged

4.5–5.5 years of age

SCSA: School Curriculum and Standards Authority

Students: Refers to children enrolled at school

Chapter 1: Introduction

1.1 Introduction

The ability to use metacognitive strategies to assess and regulate ones learning assist students to be active learners. Mindset theory is one such strategy that supports the development of metacognitive skills. Limited understanding of the teaching of mindset theory as a metacognitive strategy in early childhood classrooms warrants further exploration. This study investigated the current perceptions that early childhood teachers have of mindset theory and devised principles to support early childhood teachers to incorporate the teaching of mindset theory and foster a growth mindset in students. This chapter comprises the background and rationale for the study, the significance of the study, research aim and questions, and an overview of the organisation of the thesis.

1.2 Context

A search for the word 'perceptions' presents different definitions according to the field of research. Walker and Avant (2005) use defining attributes to describe the concept of perception. For perception to occur, there must be "sensory awareness or cognition of the experience, personal experience, and comprehension that can lead to a response" (McDonald, 2012, p. 4). Armstrong (1961) claims that, "perception is nothing but the acquiring of knowledge of, or, on occasions, the acquiring of an inclination to believe in, particular facts about the physical world, utilizing our senses" (p. 105). In this study the word perception has been used to describe a belief or opinion about the way you "think about or understand someone or something" and therefore encompasses the attitudes and knowledge one has about something (Merriam-Webster, n.d.).

Perceptions are a driving force for action (McDonald, 2012). In the present study, gathering teachers' perceptions aimed to provide an understanding of teacher knowledge and attitudes of mindset theory that influence practice. In addition, a set of design

principles was developed to assist teachers in including the teaching of mindset in early years context. An early years context in this thesis describes kindergarten to Year 1 classrooms in the Western Australian schooling system with children between the ages of 3.5 and 6.5 years attending. Throughout this study, the terms *children*, *students* and *learners* are used interchangeably as is found in the literature regarding this age group. In Western Australia the majority of children attend Kindergarten on school sites at the age of three and a half. This tends to lead to the referral of young learners as students, the same term used for older learners. Such a trend has seen the 'schoolification' of young learners and primary school policies intended for older students imposed on all students even if they are young leaners (Bellen, 2016). The literature referred to in this study for this age group refers to children, students and learners.

1.3 Rationale for the Study

This investigation is a result of the researcher spending many years teaching in early years school settings. Observations highlighted changes to student's motivation, engagement and achievement in learning as a result of more complex curriculum demands. Inquiry by the researcher of metacognitive strategies to support learning led to Carol Dweck's mindset theory. Whilst much research has been carried out with adolescents and upper primary students the customisation of the teaching of mindset theory in the early years was not evident. Thus, this study aims to research early childhood teacher perceptions of mindset theory and to develop principles to assist teachers to incorporate the teaching of mindset theory to foster a growth mindset in students.

The challenges of the 21st century require students to make a deliberate effort to cultivate their personal growth so they may fulfil social and community responsibilities as global citizens (Department of Education and Training [DET], 2018; Masters, 2014). For

this to occur, students require knowledge and social and emotional skills, including communication, collaboration, creativity and critical thinking, along with character traits such as resilience, mindfulness, courage and leadership (DET, 2018). The Organisation for Economic Co-operation and Development (OECD, 2015) argues that "children need a balanced set of cognitive, social and emotional skills to adapt to today's demanding, changing and unpredictable world" (p. 1). Recently, the strong relationship between social and emotional skills and life outcomes has been recognised by policymakers. The importance of the early years for children in reaching critical developmental markers in all developmental domains, including social-emotional skills, continues to be of concern in many localities, as shown in the Australian Early Developmental Census (AEDC; Commonwealth of Australia, 2018). Social-emotional skills such as metacognition, goals and mindset can predict success later in life (Claro et al., 2016). Early years settings are where the foundations of learning are formed in combination with the home environment; however, despite this, the teaching of mindset has not been researched in Australia.

Mindsets are your beliefs about basic qualities such as your intelligence, talents and personality (Dweck, 2017). From her extensive research in this area, psychologist Carol Dweck identified two types of mindset, fixed and growth, which sit at either end of a continuum. Mindset plays a significant role in motivation, self-regulation, achievement and interpersonal processes (Dweck, 2017). Research indicates that many children seem to lose their intrinsic motivation as infants and toddlers when reaching school age (Carlton & Winsler, 1998). Intrinsic motivation drives an innate need to interact with the environment and leads to learning and acquiring knowledge (Carlton & Winsler, 1998). A student's mindset can powerfully affect motivation and agency for learning during their formative years and beyond.

Mindset is a valuable tool in promoting agency for young learners as it empowers children to take responsibility for their own learning. Agency is the ability to "make choices and decisions, to influence events and to impact one's world" (Department of Education, Employment and Workplace Relations [DEEWR], 2009, p. 45). In Australia, policy prioritises the development of children's sense of agency. For example, the Alice Springs (Mparntwe) Education Declaration (Education Council, 2019) endorsed by all Australian education ministers, requires schools and teachers to assist students in developing the skills and dispositions required to become lifelong learners. In particular, goal two describes students "developing their capacity to learn and play an active role in their learning in becoming successful lifelong learners" (Education Council, 2019, p. 6). Additionally, the Early Years Learning Framework [EYLF] (DEEWR, 2009), the nationally mandated framework for children from birth to 5 years old, supports the development of agency. The EYLF requires teachers to assist children in knowing themselves and their ability to meet challenges in everyday life (DEEWR, 2009). Boylan et al. (2018) highlight that early childhood teachers have a responsibility to help young learners develop a mindset whereby they thrive on challenges, work towards goals and begin to recognise the power of effort and resilience in readiness for the 21st century, in which they will live and work.

Early childhood teachers play an important role in developing children's agency for learning by creating conditions for positive growth. Teachers have reported noticeable differences in children's motivation for learning as a result of the demands placed on them in the early years of school (Barblett et al., 2016). These include factors reported by teachers such as the 'pushdown' of curriculum requirements into the younger years, an earlier emphasis on the National Assessment Program for Literacy and Numeracy (NAPLAN) testing, and the expectation that children will complete more complicated

tasks at an earlier age in a more formal learning environment (Barblett et al., 2016). By applying mindset theory, early childhood teachers can enhance students' intrinsic motivation for learning to develop a greater sense of motivation and agency.

Establishing robust intrinsic motivation for learning in the early years helps students develop positive beliefs about themselves as learners. Challenges in life and learning require students who are intrinsically motivated to work towards the achievement of their goals. Carlton and Winsler (1998) found that intrinsically motivated students gain greater knowledge, experience more enjoyment from their learning and consequently feel better about themselves as a learner. Intrinsically motivated students are also more likely to persist in their goal-directed activities (Barrett & Morgan, 1995; Deci et al., 1991; Ford & Thompson, 1985; Pintrich & Schunk, 2002). In decades of research on achievement and success, Dweck (1999) has shown that there is more to student success than cognitive ability, curriculum and instruction. The integration of mindset theory in classrooms may help students increase their agency in learning and optimise academic achievement as they develop metacognitive skills.

Knowing your own mindset requires significant metacognition about your own thinking and attitudes to learning. Historically, metacognitive skills have been underestimated in young children (Marulis et al., 2016). *Metacognitive skills* can be referred to as "knowledge about personal, task and strategy variables affecting one's cognitive performance" (Whitebread et al., 2009, p. 72). Lyons and Ghetti (2010) state, "young children may be much more adept at monitoring their mental activity than is often assumed" (p. 256). Brinck and Liljenfors (2013) speculate that the origins of metacognition may be present in infants as young as 2–4 months of age. Further, Marulis et al. (2016) found 3–5-year-olds are capable of contextualised metacognition. The development of a growth mindset further develops students' metacognitive skills as they

monitor the effectiveness of learning strategies and self-regulate to redirect their

strategies as needed (Darling-Hammond et al., 2020). Students in the early years face

increasingly complex tasks that require the use of metacognitive skills to monitor learning

and achievement of goals. A growth mindset can help young students develop

metacognition and autonomy in learning. Developing students' mindsets in the early

years is partly reliant on early childhood educator knowledge of mindset theory and

practices utilised to develop a growth mindset in students.

The present study addresses the pertinent need for research to raise early

childhood teachers' awareness of mindset theory, its importance for learning and how it

can be applied in early childhood settings to foster a growth mindset in students. Firstly,

early childhood teachers' perceptions of mindset were gathered. Secondly, principles

were developed to help early childhood teachers foster a growth mindset in students.

1.4 Significance

A recent review of Australia's education system has acknowledged declining

academic performance and calls for reform to ensure Australian schools prepare children

for the 21st century (Department of Education and Training Australia [DET], 2018). The

education ministers in Australia believe that "education plays a vital role in promoting the

intellectual, physical, social, emotional, moral, spiritual and aesthetic development and

wellbeing of young Australians, and to ensure the nation's ongoing economic prosperity

and social cohesion" (Education Council, 2019, p. 2). The decline in Australian student

results over the past decade is also evident in recent OECD Programme for International

Student Assessment (PISA) 2018 results (Thomson et al., 2019). A key recommendation

in the PISA report is to "equip every child to be a creative, connected and engaged learner

in a rapidly changing world" (OECD, 2019, p. x). An Australian report that outlines a

review of Australian schools to achieve excellence recommends that developing a growth

mindset is a natural complement to personalised learning and helps children achieve greater agency of their own learning (DET, 2018). Further, this report found that "ongoing reforms that lay the foundations in the early years for future learning, and close the learning differential between advantaged and disadvantaged students, are essential to ensure all children have the best start in life" (DET, 2018, p. xvi). Laying strong foundations for learning requires schools and teachers to establish high-quality learning environments during the early years. High-quality learning environments include developing students' growth mindset to exercise autonomy and ownership of learning.

The proposed research will make significant contributions to early education in Australia as it is one of few studies that focus on the teaching of a growth mindset in the early years of school. Firstly, the study will improve early childhood teachers' knowledge of mindset theory and the impact a growth mindset has on children's learning and achievement. The findings will help teachers place a greater emphasis on learning processes to achieve a growth mindset for learning in the early years. Secondly, the development of the design principles to assist early childhood teachers to implement growth mindset in their teaching will address a scarcity of research and support for teachers. Dweck (2015) acknowledges teachers require support to customise the teaching of growth mindset for the early education context.

Thirdly, the findings may also address the increase in the number of children who are developmentally vulnerable in the social competence domain, as is evidenced in the Australian Early Developmental Census (Commonwealth of Australia, 2018). A recent analysis of PISA data indicated that "a growth mindset was positively associated with students motivation to master tasks, general self-efficacy, learning goals and perceiving the value of schooling; it was negatively associated with their fear of failure" (OECD, 2019, p. 200). The OECD report found that students with a growth mindset are most

likely to be high performers stating, "in about half of education systems, students who exhibited a growth mindset were more likely than students who held a fixed mindset to expect to complete a university degree" (OECD, 2019, p. 200).

Finally, the findings of the present study will provide information for policymakers in Australia to enable key reforms to incorporate mindset teaching in early years educational settings. Policymakers have been challenged to place learning growth at the forefront of the education model to enrich every element of a student's life and future career (DET, 2018; Education Council, 2019; OECD, 2019). Indeed, the teaching of a growth mindset has been recommended to achieve learning growth (DET, 2018; OECD, 2019). The results of the present study will add valuable knowledge to inform policy and practice to tackle these challenges.

1.5 Research Aim

The aim of this study was twofold. The first aim was to investigate the perceptions (i.e. knowledge and attitudes) that early childhood teachers have of mindset. The second aim was to develop a set of design principles for early childhood teachers to include the teaching of mindset theory to foster a growth mindset in kindergarten, pre-primary and Year 1 students.

1.6 Research Questions

The research questions for this study were:

1. What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?

2. What attributes do early childhood teachers believe students require to be effective learners?

3. How do early childhood teachers support the development of a growth mindset in students?

4.   How effective are the design principles for guiding practice in the teaching of

mindset theory?

1.7 Organisation of the Thesis

A review of the literature follows in the next chapter, Chapter 2, and discusses the characteristics required of 21st century learners, the development of social-emotional skills in the early years, metacognitive skills, motivational theories for learning, mindset theory and the importance of mindset theory in an early years context. In Chapter 3, the conceptual framework that informs the study is discussed. Chapter 4 outlines the methodology including details of the research site, participants, data collection methods and instruments, and data analysis for each phase. Issues of trustworthiness are discussed along with limitations of the study and researcher bias. Chapters 5, 6, 7 and 8 report the findings for each of the four phases. Chapter 9 presents the discussion and outlines how the findings contribute to the field of early childhood education. Lastly, Chapter 10 concludes with key findings, recommendations and implications for future research.

1.8 Summary

Chapter 1 has provided a background and rationale for the study presented in this thesis. It highlights a prominent need validated by Australian educational policy documents for research to establish how early childhood teachers can incorporate mindset theory in early education. Specifically, teacher practice in the early years can help children alter their beliefs about themselves as a learner and thus enable them to gain higher levels of motivation, agency, academic achievement and self-belief in their abilities. By reinforcing the power of effort and resilience, students may be prepared for the challenges of living and working in the 21st century. Finally, the organisation of the thesis was explained in this chapter. A review of the literature is presented in the following chapter, Chapter 2: Review of the Literature.

Chapter 2: Review of the Literature

2.1 Introduction

A review of the literature presented in this chapter summarises and synthesises mindset theory to justify its inclusion in an early years context. The review is organised in a funnel approach (see Figure 2.1) with the broadest theme of the development of 21st century learners addressed first. Subsequent themes follow, as the review builds a conduit to the research questions. The following sections provide an overview of 21st century learners in relation to mindset and the integration between mindset theory and social-emotional development including metacognitive skills. A summary of motivation theory precedes a review and critique of mindset theory. Finally, the implications of developing a growth mindset in early childhood education are discussed.
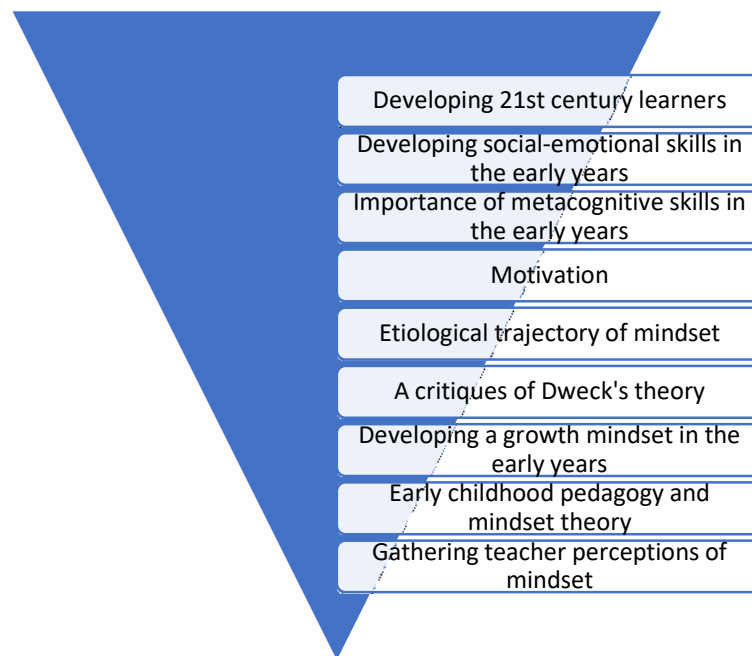
Figure 2.1

Themes in the Literature Review

2.2 Developing Effective 21st Century Learners

Efforts to reconceptualise kindergarten to Year 12 (K–12) education to prepare students for the realities of the 21st century are underway (Fadel, 2015; Gardner, 2008; Lamb et al., 2017; Partnership for 21st Century Skills, 2007). The technological modernisation and globalisation of society provides an impetus behind the preparation of students for living and working in the 21st century. The initial focus of 21st century education in the 1980s was to develop skills as a focus for educational reform (Howard, 2018). Competencies such as critical thinking, creativity, metacognition, problem solving, collaboration, motivation, self-efficacy, consciousness and perseverance are viewed as 21st century learning skills to meet the needs of a globalised economy (Fadel, 2015; Gardner, 2008; Lamb et al., 2017; Partnership for 21st Century Skills, 2007; Pink, 2005). Standards, curriculum and policy documents are changing worldwide to reflect the inclusion of these competencies across countries such as the United States (US), Canada, Europe, Australia and New Zealand (Bolstad et al., 2012; Caena & Redecker, 2019). These documents aim to disrupt deeply embedded education practices and priorities to form new educational goals to better prepare students for a changing global society.

Teachers and schools are urged to incorporate the teaching of 21st century learning skills and competencies. The proponents of 21st century education assert that schools have a responsibility to prepare students to ensure that they develop into contributing citizens who can compete in the global economy (Conley, 2014). Conversely, Howard (2018) disagrees, arguing that 21st century education is "an education of preparation" (p. 141), which is future oriented and does not address the fundamental question of the purpose of education? Other critics advocate for a broadening of the terminology of 21st century skills.

Critics of 21st century education argue for a more expansive view of learning with a focus on learning dispositions. Lucas (2019) challenges that the term *skills* does not "distinguish between skills that are eternally useful, as opposed to those which are legitimate responses to the world we live in now" (p. 3). Additionally, Lucas (2019) argues that the use of the term skills has been interchanged with alternate terms such as *knowledge* and *learning* to create further confusion. Lucas et al. (2013) suggest a newer concept of 'expansive education', which widens the notion of what school is about. They propose a focus on developing learning dispositions, knowledge and encouraging mindsets so learners can better deal with complex problems. Lucas et al. (2013) support the development of a student's growth mindset during schooling for the present and the future. Further, they describe promoting engagement between schools and communities to widen the horizons of students and rethink the role of teachers to include the modelling of learning dispositions such as mindsets. Many frameworks have been developed to transform education and advocate for 21st century learning.

A meta-analysis of 15 of the most significant 21st century frameworks by Kereluik et al. (2013) found three common types of learning they claimed to be integral to the 21st century approach, that is, foundational, meta and humanistic knowledge. The review suggests that not all the knowledge evident in the frameworks is new to the 21st century; however, there is a need to substantiate knowledge in new ways.

Foundational knowledge includes core content knowledge such as numeracy and literacy, digital literacy and cross-disciplinary knowledge, whereby knowledge is integrated (Kereluik et al., 2013). Excellence in traditional domains of English and mathematics is frequently cited as the foundation on which other 21st century skills are developed. Meta knowledge refers to problem solving and critical thinking, communication and collaboration, creativity and innovation. In many of the frameworks

analysed by Kereluik et al. (2013), these skills were considered necessary to face and create innovative solutions for the complex problems of 21st century society. Humanistic knowledge refers to a learner's understanding of self in the broader social and global context. Humanistic knowledge pertains to life and job skills, leadership, cultural competence and ethical and emotional awareness (Kereluik et al., 2013). Self-regulation is identified as an important skill for students to learn to manage the multi-dimensions of their lives (Kereluik et al., 2013). Self-regulation refers to the ability to "generally control one's emotions, behaviour and attention in accordance with a given situation" (Rademacher & Koglin, 2019, p. 229). The development of social-emotional skills such as self-regulation is an integral part of the development of a growth mindset.

Teachers who foster metacognitive skills such as a growth mindset are paving the way for the development of 21st century learning skills. Dweck (2009) contends that students with a growth mindset who believe their intelligence can be developed are self-regulated, independent and eager learners. Masters (2014) supports Dweck's view, agreeing that students who have flexibility, openness to change and a willingness to continually learn will be passionate and resilient learners ready for the 21st century. Conley (2014) challenges that schools are less focused on the learning processes required to master content due to the influence of educational policy focused on core content knowledge. Schools that incorporate metacognitive learning skills, strategies and techniques in a formal, explicit and purposive fashion assist students to set goals, monitor progress and persist when they encounter tasks that are more demanding. Australian education policy documents include a focus on metacognitive skills to direct teachers to develop 21st century learners to leverage school and future success.

The Alice Springs (Mparntwe) Education Declaration (Education Council, 2019) endorsed by all Australian education ministers contains an important goal to improve

educational outcomes for all Australian students for the 21st century. The goal describes students "developing their ability and motivation to learn and play an active role in their own learnings" (Education Council, 2019, p. 7). It further describes students being resilient and developing the skills and dispositions to tackle current and future challenges in the 21st century. To address this goal, schools and teachers in Australia are required to focus on content knowledge and the development of skills and dispositions to foster lifelong learners. Developing students' social-emotional skills and dispositions for effective 21st century learning in the early years is important as children form self-beliefs of themselves as learners.

2.3 Development of Social-Emotional Skills in the Early Years

Nurturing social-emotional skills and the development of self is important for positive developmental outcomes for students. Social-emotional competence includes the development of self-awareness, self-regulation and social awareness (Cornell et al., 2017). According to Allport (1961), one of the early researchers on social-emotional skills, self is the "central, private region of our life and is what makes us unique and who we believe ourselves to be" (p. 110). A common view is that self is not a single entity, rather we are made up of several *selves* or dimensions such as self-concept, self-esteem, self-control and self-help (Barrett, 2000; Fogel, 1995). These dimensions of self make up some of the social and emotional skills that are malleable and can be taught to positively affect learning and development.

The literature on social and emotional learning reports that social contexts and emotions are contributing factors that shape children's brain development and learning motivation. The way a child responds to difficult situations shapes pathways in the brain to create a blueprint for future emotional responses (National Scientific Council on the Developing Child, 2004). The brain and capacities grow throughout a child's

14

development and what happens in one developmental domain may affect others (Osher et al., 2016). Magelinskaitė et al. (2014) found a positive correlation between social competence and learning motivation in first and second grade students. Further, emotions were found to enhance or block learning as "social competence may act to reduce anxiety and lowered anxiety may enhance learning motivation" (Magelinskaitė et al., 2014, p. 2939). A central implication for educators is that the education environment nurtures not only a child's cognitive development but also social-emotional development to ensure that both developmental systems and learning are optimally supported.

A compelling body of research suggests that students participating in well-designed and well-taught social-emotional programs have improved social and academic outcomes. Two meta-analytic reviews found that students who participate in social and emotional learning programs and practices have improved attitudes about themselves, others and school with evidence of pro-social behaviour. The first meta-analysis (Durlak et al., 2011) reviewed 213 studies on school-based, whole-school social and emotional learning programs involving in total 270,034 kindergarten to high school students. The findings indicated that students involved in a school-wide program demonstrated significantly improved social and emotional skills, attitudes, behaviour and academic performance. The second meta-analysis reviewed 75 studies that reported the effects of universal, school-based social-emotional programs and found that students also demonstrated greater psychological wellbeing and academic performance (Sklad et al., 2012). Australian program Kids Matter, now known as BeYou, was initiated to address declining social-emotional skills in students in Australia. Dix et al. (2012) examined the impact of the Kids Matter program on 96 Australian primary schools across a two-year implementation period. Teachers using Kids Matter taught students

how to cope with their emotions, bounce back from problems and develop positive relationships. After controlling for factors such as socioeconomic background, a significant positive correlation was found between the quality of implementation and academic performance. Schools that implemented a school-wide program showed up to six months of academic improvement compared with schools where not all teachers implemented the program. These studies provide valuable insight that schools may benefit from intentionally developing students' social-emotional skills. Combined with a growth mindset, social-emotional skills can help students manage their emotions, work well with others, persevere in the face of setbacks and make productive decisions at all developmental stages including the early years.

High-quality early childhood programs include the development of children's social-emotional skills recognising them as an essential element in the development of the whole child. Social-emotional development occurs in cohesion with all other areas of development including cognitive, language and physical skills (Darling-Hammond et al., 2020; Waters & Sroufe, 1983). Theorists including Bandura (1999), Bowlby (1978), Erikson (1998) and Vygotsky (1978) all developed theories about children's social-emotional development and agree that social-emotional skills have a fundamental influence on a child's learning and development. The EYLF (DEEWR, 2009) for Australia aims to extend and enrich children's learning and also recognises the importance of the development of children's social and emotional skills, resilience and self-regulation to positively affect children's learning.

Australian early childhood policy and curriculum documents direct teachers to develop childrens social and emotional skills. The EYLF (DEEWR, 2009) was developed for teachers of children from birth to 5 years in Australia and includes the development of children's social-emotional skills for learning. The framework posits

that to be an effective learner and citizen children have positive feelings about themselves, know how to express their emotions and be able to relate to others (DEEWR, 2009). Outcome Four of the EYLF particularly focuses on learning dispositions such as curiosity, learning processes, the transfer of knowledge from one context to another and children resourcing their own learning (DEEWR, 2009). A focus on developing these dispositions in the early years may enable children to become lifelong learners. Crick et al. (2004), in a cohort of 180 students aged 6 to 18 years, identified that the elements necessary for lifelong learning include curiosity, meaning-making, creativity, metacognitive awareness, learning relationships, resilience and growth orientation (Crick et al., 2004). A focus on the development of social-emotional skills in the early years also supports the development of self-regulation.

The more developed children's social-emotional skills, the better they are able to regulate their behaviour to learn (Rademacher & Koglin, 2019). Children who feel content and secure are more able to concentrate and explore their environment. Morton et al. (2020) used data from the contemporary longitudinal Growing Up in New Zealand study to understand the development of self-control in the first five years of life. The study followed the development of 6,800 children at 9 months of age, 2 years and 4.5 years using self-control directed measures (Morton et al., 2020). One aim of the study was to describe the stability of pre-schoolers' self-control and explore whether there is an age at which children at greater risk or poor self-control can be identified. The study found that children with higher levels of self-control exhibited pro-social behaviour at each age (Morton et al., 2020). Conversely, lower self-control at all three ages was associated with hyperactive behaviour. The findings suggest that young children may benefit from strategies that help them develop self-regulation skills in the early years.

Positive links have also been found between students who have a growth mindset and self-regulated learning processes.

Mindset affects self-regulation skills, which are an important indicator of future school success (Yan et al., 2014). The literature on the link between self-regulation skills and growth mindset reports the implicit beliefs students have about whether their intelligence is malleable or fixed has been shown to predict the use of self-regulation strategies for learning (Aronson et al., 2002; Burnette et al., 2013; Dupeyrat & Mariné, 2005; Romero et al., 2014). These studies report that students with a growth mindset who believe their intelligence is malleable are more likely to use self-regulation strategies such as goal setting, goal operating and goal monitoring when they learn. A recent study by Compagnoni et al. (2019) examined the relationship between 147 kindergarten children's (aged 5–7 years) mindsets and their behavioural self-regulation, in particular, executive function and classroom behavioural self-regulation. A multi-method approach, including a self-report and direct measures of behavioural self-regulation, achievement and a mindset scale, was used. The findings indicated that children with a mastery goal orientation (i.e. growth mindset) showed better executive function such as inhibition, cognitive shifting, attention and working memory. Children who believed that traits are malleable (i.e. growth mindset) showed better classroom behavioural self-regulation such as actively remembering instructions from the teacher (i.e. working memory), focusing on the task at hand (i.e. attention) and ignoring distractions (i.e. inhibition) in class. The findings suggest that children's motivational beliefs (i.e. mindset) are important in fostering self-regulation as children adjust to the demands of kindergarten.

The evidence reviewed suggests that an intentional focus on teaching social and emotional skills along with a growth mindset may positively affect student learning and

enhance social skills. Thus, focusing on the development of a growth mindset in students in the early years is one way that teachers can support students to develop metacognitive skills to be flexible and goal-oriented learners.

2.4 Importance of Metacognitive Skills in the Early Years

Metacognition helps students explicitly think about their own learning (Ohtani & Hisasaka, 2018). In recent years, policymakers have paid increasing attention to the development of metacognitive skills to enhance learning and wellbeing. A report by García (2014) asserts that the definition of an educated person includes not only a command of the curriculum but also metacognitive skills such as critical thinking, problem solving, social skills, persistence, creativity and self-control. Metacognitive strategies offer the ability to engage students and energise teaching consistent with evidence from brain and cognitive research (Dweck & Reppucci, 1973; Grant & Dweck, 2003; Greene & Miller, 1996). Farrington et al. (2012) agree and maintain that metacognitive skills and self-regulating behaviours are critical components to help learners analyse new situations, and identify and apply strategies in new contexts. Teaching metacognitive strategies empowers students to think about their own thinking and consequently raise awareness of the learning process.

Failing to focus on the development of metacognitive skills may in turn negatively affect the development of cognitive skills. Success at school is affected by cognitive skills and social learning, attention and self-control (Conti & Heckman, 2013; Duncan & Magnuson, 2011). According to Almlund et al. (2011), metacognitive skills represent an appropriate target for interventions as they may be more malleable than cognitive skills. Payler et al. (2017) argue that growing evidence from neuroscience regarding early brain development and its effect on metacognition be considered. Interventions that improve students metacognitive strategies may improve learning.

Metacognitive interventions may ensure a greater number of students achieve academic success by creating a positive environment for learning. This view is supported by Gutman and Schoon's (2013) meta-analysis on the impact of metacognitive skills on outcomes for young children. A key finding identified perception of ability, expectations of future success and the value placed on an activity influence motivation and persistence. Importantly, positive influences in these areas can lead to improved academic outcomes, especially for low-achieving pupils. Claxton and Carr (2004) agree and argue that "education for the 21st century must aim at developing young people's ability to be skilful and competent when facing complex predicaments of all kinds" (p. 87). The teaching of content, accompanied by attention to students' metacognitive strategies (i.e. attitudes, values and habits towards learning) can positively affect motivation for learning and life outcomes.

Enhancing metacognitive skills can also have a positive impact on life outcomes for individuals. A study by Jones et al. (2015) in the US examined whether kindergarten teachers' ratings of children's pro-social skills, an indicator of metacognitive ability at school entry, predict key adolescent and adult outcomes. The goal was to determine associations over and above other important child, family and contextual characteristics. Data were collected from a 'fast track' study of low-socioeconomic-status neighbourhoods in three cities and one rural setting. The results found statistically significant associations between social-emotional skills in kindergarten and key adult outcomes in education, employment, criminal activity, substance abuse and mental health. Thus, early social competence appears to serve as a marker for important long-term outcomes (Jones et al., 2015). Similarly, Moffitt et al. (2011) found the metacognitive skill of self-control in early childhood was a significant predictor of

outcomes in multiple domains of early adult functioning. These findings provide compelling evidence for teaching metacognitive skills in early education.

Neuroscientific research indicates that emotion and cognition are interrelated (Blair, 2002). Indeed, Bell and Wolfe (2004) found that emotion and cognition jointly inform an infant's impressions of situations and influence behaviour and therefore motivation. Similarly, children as young as 4 or 5 years of age use social comparisons to assess their performance of simple tasks (Butler, 1998). Also, 2–5-year-old children seek positive reactions to success and avoid negative reactions to failure (Stipek et al., 1992). Further, 4–5-year-old children can spontaneously use evidence from social comparisons to make inferences about their abilities, which subsequently affect their persistence on a task (Magid & Schulz, 2015). Young children react differently to failure, for example, some children respond negatively with emotion, others show pessimism about future efforts, some show avoidance of challenge and others exhibit lower evaluations of their work (Heyman & Dweck, 1992; Smiley et al., 2016). Together, these studies indicate that young children do have the neural capability to engage in metacognition to form beliefs of the relationship between ability and performance.

Bandura (1977, 1991) referred to belief in ability in relation to performance as *self-efficacy*. Self-efficacy is thought to strongly influence thought, affect, motivation and action and is a key motivating factor in goal achievement. Self-efficacy theory contends that a person with low self-efficacy regarding their ability to complete a task will expend little effort or avoid the situation. An individual with high self-efficacy will feel more motivated to have a go and will use more effort to succeed (Bandura, 1991). Bandura's (1977, 1991) theory claims that a person's own and vicarious experience informs their self-efficacy, which supports Dweck's research on mindsets. Self-efficacy

theory has had a significant influence on educational research and practice (Schunk, 1989). Indeed, self-efficacy and mindsets play a central role in personal agency and support the view that a student's ability to reach their learning potential is influenced by their metacognitive skills. Additionally, understanding the relationship between metacognitive skills and learning provides further evidence to support the explicit teaching of such skills in schools beginning in the early years.

Early years settings can encourage children to form positive attitudes, habits and values towards learning. Claxton and Carr (2004) describe these learning dispositions as "the default responses in the presence of uncertain learning opportunities" (p. 1). Dweck (1999) describes these as 'learning orientations' and emphasises that early years settings do change children's learning orientations for better or for worse. Smiley and Dweck (1994) found that the implicit beliefs that 4-year-olds hold about their own ability effect their motivation for learning. Those with performance goals may succumb to a helpless response and sacrifice valuable learning opportunities when faced with a challenging task. They lack confidence, motivation and avoid new learning opportunities to avoid feeling inadequate when they are uncertain of a good outcome. Changing students' implicit beliefs from performance goals (i.e. fixed mindset) to learning goals (i.e. growth mindset) can increase motivation and achievement.

2.5 Motivational Theories for Learning

Dweck's work on mindset theory is informed by research on motivation theory. Motivational theories are concerned with the energisation and direction of an individual's behaviour. The term *motivation* is derived from the Latin verb 'movere', which means to move (Dörnyei & Ushioda, 2014). A general definition consistent with prior research is that motivation is "the process by which a goal-directed activity is instigated and sustained" (Schunk et al., 2008, p. 4). Motivation plays a large role in

learning and has been researched over many years to establish why some learners are more motivated than others, for example, to improve academic achievement. Different views on motivation have added to the research in this field over many years. Over the past four decades research has focused on attributions (Ames, 1984; Weiner & Kukla, 1970; Wilson & Linville, 1985), achievement goals (Ames & Archer, 1988; Elliott & Church, 1997; Elliott & Dweck, 1988) and their impact on academic outcomes. Dweck's research followed earlier models of motivational theory such as intrinsic and extrinsic motivation theory, which is steeped in behaviourism.

Behaviourists propose that motives are intrinsic (i.e. arising from internal factors) or extrinsic (i.e. arising from external factors) (Skinner, 1992). Extrinsically motivated behaviours are performed to receive something from others, such as incentives and rewards, which reinforce certain behaviours. Skinner's (1992) research on operant conditioning demonstrates that behaviour may be changed dependent on the type of reinforcement used. Debates over the past century have argued that the use of extrinsic rewards diminishes the intrinsic drive of learners and when the external rewards diminish the behaviour diminishes (Reeve, 2006). Behaviourism ignored cognitive processes such as the beliefs one holds, which were thought to be irrelevant to motivation. However, in the late 1960s theories of motivation considered a more cognitivist view.

Cognitive theorists accept that humans are innately active learners and hold the view that behaviour is initiated and regulated by plans, goals, schemas, expectations and attributions. McClelland (1953) used the term 'achievement motivation' to refer to this process while Weiner (1992) focused on the way people attribute their successes or failures (i.e. attribution theory). The expectancy-value theory of motivation (Hill et al., 1977) accounts for both the behaviourist and cognitivist perspectives and claims that

goal setting influences task performance. Thus, the more specific and challenging a goal is, the more motivated a person will be to achieve the task. Socio-cultural theory takes into consideration the beliefs one has about their abilities.

The social-cultural approach stems from Bandura's (1977) social learning theory and contends that people learn new things by observing others, and that a person's mental state also affects their learning. Bandura believed that motivation is a goal-directed behaviour closely linked to feelings of self-efficacy or personal effectiveness. Self-efficacy refers to an individual's ability to self-regulate, organise and direct their life towards a goal (Bandura, 1999). Previous research has shown that a student's beliefs about their academic competence affect their motivation and achievement (Deci et al., 1991; Schunk, 1989; Zimmerman, 1990). A more recent approach by Deci and Ryan (2002) based on the theory of self-determination argues that supporting a student's interest, sense of competence, creativity, conceptual learning and preference for challenge enhances their self-determination and autonomy. Other motivational factors also influence learning.

More recently, two motivational factors that influence learning (i.e. theories of intelligence and achievement goal orientations) have emerged (Ames, 1992; Dweck & Leggett, 1988). The way students attribute success and failure affect motivation and achievement. If a student attributes academic success and failure to internal and controllable factors such as effort, they are more likely to persist. However, if they believe success or failure is attributable to stable internal factors such as ability, they are more likely to become unmotivated and give up. Indeed, a student's beliefs about their intelligence affects their achievement and ability to cope with challenges (Aronson et al., 2002; Henderson & Dweck, 1990; Robins & Pals, 2010). The two theories of

intelligence and achievement goal orientations create what Dweck refers to as fixed mindset and growth mindset.

2.6 Etiological Trajectory of Mindset Theory

2.6.1 Attribution Era (1970s)

Dweck has developed mindset theory over 30 years of research on achievement and success. Dweck's model informed by Weiner's (Weiner & Kukla, 1970) research on attributional theory in the late 1960s represents a social cognitive approach to motivation that centres on goal-oriented behaviour. In addition, the model considers personality as it identifies the individual differences in beliefs and values that contribute to behaviour (Dweck & Leggett, 1988). Dweck's focus is on attributional theory or people's judgements about the cause of events and the consequences of the attributions people make in response to failure.

Dweck found that individuals display either a *helpless* or *mastery* response to failure. Diener and Dweck's (1978, 1980) study of 70 Grade 4 and Grade 5 primary school students elicited two polarised responses (i.e. the helpless response and the mastery-oriented response) when given a discrimination task involving eight success and four failure problems. The helpless respondents underestimated the number of successes they had and overestimated the number of failures. Additionally, they did not view their successes as indicative of their ability and did not expect the successes to continue. The mastery respondents were undaunted by their failure, attributing their success to effort. They revealed an optimistic stance and showed perceptions of difficult problems as challenges to be conquered. Dweck's research on helpless and mastery responses demonstrated that students who avoid challenges and struggle in the face of difficulty are initially equal in ability to students who seek challenges and persist in learning (Diener & Dweck, 1978, 1980; Dweck, 1975, 1986; Dweck & Reppucci,

1973). Dweck's findings provided initial insights into why some students are more motivated to learn than others. Further research investigated why individuals of equal ability showed a marked difference in response to challenges.

2.6.2 Goal Era (1980s Onward)

Dweck looked further at the helpless and mastery responses and their relationship to 'performance goals' and 'learning goals'. Elliott and Dweck's (1988) study of 101 Grade 5 students tested the hypothesis that different goals set up the observed helpless and mastery patterns. They predicted that students with performance goals would succumb to the helpless response as they only focus on the adequacy of their ability, which leads to impaired performance. In contrast, those with learning goals who focus on increasing their ability over time will promote a mastery response to obstacles and sustained performance. The results clearly supported the hypothesis and suggested that students' achievement goals are critical determinants of these patterns of helpless and mastery responses. The results raised the question about what predicates the formation of either a learning or performance goal and how this relates to theories of intelligence.

A model presented by Dweck and Leggett (1988) emphasised the importance of implicit theories of intelligence in terms of attributions, resilience and perseverance. The model outlines an individual's goals, which are fostered by their self-beliefs about their intelligence, and sets up a pattern for responding with either a helpless or mastery response. It was identified that some students hold an *incremental theory* of intellect. They see their ability as something that can be increased with time and effort and frame the experience of school in terms of learning goals. Other students hold an *entity theory* where they see their abilities as static and inflexible and frame schoolwork in terms of performance goals (Dweck, 1999; Dweck et al., 1995; Dweck & Leggett, 1988).

Dweck's model was tested in several studies with a focus on adolescents (Bandura & Dweck, 1985; Blackwell et al., 2007; Henderson & Dweck, 1990). A study by Blackwell et al. (2007) with Year 7 students reported that after attending a workshop on how the brain grows with learning to make you smarter, students showed an increase in effort and motivation three times greater than the control group. Importantly, these students had a good understanding of how your brain works when learning including the analogy your brain is like a muscle and grows when you learn hard or challenging things (Blackwell et al., 2007). Additionally, students with a growth mindset apply greater effort to achieving their goals, make responsible decisions and demonstrate good self-regulation when learning. These findings led to the development of what is now known as fixed and growth mindsets.

2.6.3 Mindset Era (Mid-1980s to Present)

Over time, Dweck and her colleagues conceptualised the entity view as a *fixed mindset* and the incremental view as a *growth mindset*. Those with a fixed mindset view mistakes as a poor reflection of their fixed ability and reject challenging academic opportunities for fear of failure and therefore exert less effort to succeed (see Table 2.1). Those with a growth mindset believe that their intelligence is malleable, view mistakes as fundamental to the learning process and will persevere when faced with challenges and adversity (Blackwell et al., 2007; Dweck, 1999, 2007). Further, a student's mindsets or how they perceive their abilities play a key role in their motivation and achievement. One experimental study by Blackwell et al. (2007) with 91 Grade 7 students demonstrated a halt in academic decline in mathematics when taught a growth mindset as opposed to a control group who received no instruction and continued to decline academically.

Table 2.1

Characteristics of Fixed and Growth Mindsets

Fixed mindset (performance orientation)	Growth mindset (learning orientation)
Believe intelligence is static	Believe intelligence is malleable
Gives up easily	Persists in the face of setbacks
Avoids challenges	Embraces challenges
Views effort as pointless	Believes effort can influence performance
Ignores useful criticism	Learns from criticism
More likely to plateau early and achieve less than their full potential	Reaches higher levels of achievement

It is important to acknowledge that the two mindsets are positioned at either end of a continuum. The learner can be placed along the mindset continuum for different tasks and abilities and at different times in their life (see Figure 2.2; Dweck, 2016a). Dweck (2016a) clarifies that a person is not one mindset all of the time and is a mixture of both. Other researchers influenced by Dweck's work have further developed what is known about mindset.

Figure removed due to copyright

Note. From Mindset Works (2021), https://www.mindsetworks.com Copyright 2017 by Mindset Works.

Figure 2.2

Mindset Continuum

Supporting Dweck's theory of mindset and goal-oriented motivation is the work of Duckworth et al. (2007) on *grit*, which they define as "perseverance and passion for long term goals" (p. 1087). Grit demonstrated incremental predictive validity of success measures over and beyond intelligence quotient (IQ) and conscientiousness. In the same vein, Tough (2012) agrees that crucial components of the character ethic (e.g. grit, curiosity, conscientiousness, optimism and self-control) can allow students to overcome grave environmental obstacles. Collectively, these findings suggest that the achievement of difficult goals entails not only ability but also the sustained and focused application of effort over time. Dweck's research on mindset has garnered followers and critics.

2.7 Critique of Dweck's theories

Supporters of Dweck's theory of mindset agree that the implicit beliefs one holds about their intelligence and ability affect motivation and achievement in learning. Student learning is a complex process contingent on many aspects of behavioural and classroom functioning. A meta-analysis by Lucariello et al. (2016) identified the top 20 principles from psychological science relevant to teaching and learning. In the category of motivation, they identified four principles for teachers to consider that support Dweck's theory of fixed and growth mindset where intrinsic motivation is developed and a mastery goal approach (i.e. growth mindset) is encouraged. First, if students are more intrinsically than extrinsically motivated they tend to enjoy learning and do better. Second, when they adopt mastery goals rather than performance goals they tend to persist in the face of challenging tasks and process information more deeply. Third, the expectations of teachers affects students motivation, opportunities to learn and learning outcomes. Finally, motivation can be enhanced by encouraging students to set short-term, specific and moderately challenging goals rather than goals that are long term,

general and overly challenging. Additionally, Graham and Weiner (1996) support Dweck's research stating,

> The belief that 'I can' (self-efficacy), 'I cannot' (helplessness) and preoccupation with avoiding public recognition of helplessness (self-worth) all characterise contemporary motivation research on self-perceived ability. (p. 63)

While Dweck's theory of mindset has offered new insights into student motivation and achievement, other commentators do not agree and argue that the model is simplistic and not supported by replicable findings.

The detractors of Dweck's implicit theory of intelligence argue that the model lacks complexity and is seemingly one-dimensional and dualistic, despite the success of interventions (Graham, 1995; Harackiewicz & Elliott, 1995). The implicit theory of intelligence developed by Dweck categorises individuals as either fixed or growth oriented and does not consider the malleability of intelligence. Some researchers are also uncertain about other factors that may influence an individual's beliefs in their intelligence and the flexibility of intelligence such as stability of intelligence over time, and hereditary and environmental factors (Gelman et al., 2007; Gottfried et al., 1999; Graham, 1995; Haslam et al., 2004, 2006). Despite frameworks of self-theories exhibiting important determinants of human self-behaviour in a range of fields, other studies suggest that this theoretical framework has not been used to its full potential.

Some question the two exacting assumptions that different implicit theories and different effort beliefs represent opposite poles on a single scale (Burnette et al., 2013; Tempelaar et al., 2015). Others contend that a growth mindset is not enough, claiming a third mindset of deliberate practice is needed (Ericson & Pool, 2016). The general principles of deliberate practice include, "maintaining an intense focus, staying on the edge of one's comfort zone, getting immediate feedback, identifying weak points and

developing practice techniques designed specifically to address those weaknesses"

(Ericson & Pool, 2016, p. 4). They argue that a fixed mindset that suggests that

potential talents and abilities are set at birth may lead students to decide they are no

good at mathematics or no good at art and to simply give up trying to improve in those

areas. Additionally, others have argued that the effect of growth mindset interventions is

minimal.

Critics claim that the proponents of growth mindset research have overstated

findings in papers, books and the popular press, talking of the mindset revolution (Sisk

et al., 2018). Sisk et al. (2018) undertook two meta-analyses of the literature reviewing

273 and 43 studies respectively to examine the effectiveness of mindset interventions on

academic achievement and potential moderating factors. The findings indicated a weak

correlation between a growth mindset and academic achievement. They reported that

the average effect size for educational interventions was 0.57 and found an effect size of

0.19 for growth mindset interventions for students at risk of low achievement (i.e.

students needing an academic boost). In response to this finding, Dweck (2018) argued

that an effect size of 0.20 is a large effect in a real-world setting. Additionally, costs

associated with these mindset interventions are low per student, they are practical to

implement and provide a reasonable effect on a cost basis. Dweck (2018) acknowledged

that approaches to cultivating a growth mindset are in their infancy and there is much

research to be done.

Dweck and colleagues recently undertook a nationwide study of mindset

interventions to examine which work best and how they can be improved. Dweck and

Yeager (2019) confirmed that mindset interventions can work at scale, especially for

low-achieving students, but that context is critical. The present study adds to the

research on mindset theory and provides an insight into the contextualisation of mindset theory in the early childhood years.

2.8 Developing a Growth Mindset in Early Years Contexts

Initially, researchers thought children could only have a growth mindset and not a fixed mindset. Researchers previously thought young children were protected from the negative effects of failure and that they held a growth mindset and/or incremental view (Dweck, 1991, 1999; Elliott & Dweck, 1983). Studies showed that young children did not display helpless reactions when confronted with the same failures that evoked helpless reactions in older children (Miller, 1985; Parsons & Ruble, 1977; Stipek, 1984). Rholes et al. (1980) investigated learned helplessness in children five to ten years of age by exposing the children to either repeated failure or repeated success on hidden figure problems. The results confirmed that younger children are less susceptible to helplessness than older children due to the way they attribute success or failure. The younger subjects did not fully understand the way ability and effort affect outcome. Dweck (1999) initially believed this finding to be true as young children attempting to learn to walk and talk would be protected from vulnerability. However, over time Dweck and colleagues have questioned the findings and the studies have been reviewed for flaws.

New studies have revealed that young children can demonstrate helplessness when facing a difficult task or confronted with failure and attribute failure to 'badness' (Cain & Dweck, 1995; Hebert, 1985; Heyman et al., 1992; Kamins & Dweck, 1999; Smiley & Dweck, 1994). A study by Heyman et al. (1992) found that 94% of children were not concerned about making mistakes on a task unlike children two years older. However, 39% of children demonstrated at least some aspect of a helpless response when an adult criticised the mistake. Dweck surmised that "young children have an

early form of the whole [mindset] model" and may not be as concerned about abilities as with issues of goodness and badness (Dweck, 2017, p. 141). Dweck and colleagues informally followed the children from their studies for two years and found significant stability in their beliefs about badness and in their helpless versus mastery responses to failure (Heyman et al., 1992; Smiley & Dweck, 1994). Similarly, two other studies in a series of experiments with preschool-aged children showed that various kinds of criticism and praise from adults directly influenced mastery-oriented hardiness or helpless vulnerability in children (Kamins & Dweck, 1999; Mueller & Dweck, 1998). Thus, a mastery-oriented child's sense of goodness is not affected by setbacks or criticism as they focus on learning goals. Conversely, the helpless children held a sense of goodness until a failure undermined their belief by telling them they were bad or unworthy. Therefore, young children do appear capable of forming views of themselves when faced with a learning challenge. These findings provide strong evidence that young children are affected by failure, criticism and praise.

Dweck and colleagues have shown that praise can affect the development of fixed or growth mindsets. The effects of praise on the development of a growth mindset have been well documented (Dweck, 2002, 2007; Gunderson et al., 2013; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Specifically, praise for effort or process encourages a growth mindset and can include praise for strategies, concentration, choices or persistence to help students remain motivated, confident and effective learners (Kamins & Dweck, 1999). In contrast, praise for intelligence, known as person praise, encourages a fixed mindset. Person praise reinforces a child's beliefs that their self-worth is contingent on their intelligence and ability to succeed at tasks. Dweck (2016b, para 15) concludes that, 'our job as teachers is to understand where children are at now, where they need to get to and what they will need in order to get there'.

Similarly, Hatch (2010) agrees that reinforcing the notion of becoming a more competent learner is what counts. Teachers in the early years regularly use praise and feedback to scaffold children's learning. Collectively, these findings provide evidence that the way early years educators praise children can form the foundations of a growth or fixed mindset for learning. Increasing awareness of mindset theory may enable early childhood teachers to effectively use feedback to develop a growth mindset in students.

2.9 Early Childhood Pedagogy and Mindset Theory

Assisting early childhood educators to understand and implement mindset theory may allow children to develop a capacity for lifelong learning and thus support the Australian EYLF (DEEWR, 2009). The nationally mandated documents—the EYLF (DEEWR, 2009) and the Australian National Quality Standard (NQS) (Australian Children's Education and Care Quality Authority [ACECQA], 2018a)—set the benchmarks for early education and care in Australia and direct teachers to develop children's capacity for lifelong learning. The EYLF (DEEWR, 2009) guides teachers, in partnership with families, to implement research-informed pedagogy to ensure that all children experience quality teaching and learning. The framework supports goal two of the Alice Springs (Mpwarnte) Education Declaration (Education Council, 2019), to assist all young Australians to become "successful learners, confident and creative individuals" and "active and informed citizens" (p. 5). The framework is underpinned by the view all children's lives are characterised as 'belonging, being and becoming'. Children experience *belonging* (i.e. knowing with whom and where they belong), *being* (i.e. the significance of the here and now in children's lives) and *becoming* (i.e. that "identities, knowledge and understandings, capacities, skills and relationships change during childhood" (DEEWR, 2009, p. 7). The EYLF (DEEWR, 2009) is based on three interrelated elements—principles, practices and outcomes—that provide guidance for

pedagogy and curriculum decision-making for early childhood teachers. The framework (DEEWR, 2009) recognises that:

Children actively construct their own understandings and contribute to others' learning. [The children] recognise their agency, capacity to initiate and lead learning, and their rights to participate in decisions that affect them, including their learning. Viewing children as active participants and decision makers opens up possibilities for educators to move beyond pre-conceived expectations about what children can do and learn. This requires educators to respect and work with each child's unique qualities and abilities. (p. 10)

All elements (i.e. principles, practices and outcomes) of the EYLF (DEEWR, 2009) support the development of a growth mindset for learning in the early years context in Australia; however, the development of a growth mindset for learning is not explicitly stated in the framework. Mindset develops as a result of socialisation and is influenced by various environmental variables including early years settings. The early childhood context provides the opportunity to foster the development of a growth mindset in young children as a stable trait (Haimovitz & Dweck, 2017). As children pursue their academic studies, achievement is an issue that gains importance over the school years. The development of a growth mindset in the early years may hold children in good stead for future years of academic success. The inclusion of mindset theory in the EYLF would direct teachers to focus on its inclusion (DEEWR, 2009). The perceptions of early childhood teachers regarding the teaching of mindset theory in Australia are unknown and are further examined in the present study.

2.10 Teacher Perceptions of Mindset in the Early Years

The views of early childhood teachers on teaching mindset in Australia are unknown to date. Yeager et al. (2013) contend that it is important to gauge teachers'

perceptions of mindset theory before customising messages for teachers in the early

childhood sector around growth mindset. A literature search for 'teacher perspectives on

mindset in the early years' on both educational and psychology databases revealed scant

research, hence the need for further studies. The search terms were broadened to

'teacher perceptions' and 'preschool' and the education databases returned a wider

range of articles. Of the three studies identified (Boyle, 2013; Cordoves, 2013;

Kilpatrick, 2012) all used a mixed method design that included a questionnaire to gather

initial data and then either interviews or focus group discussions. Questionnaires

consisted of Likert scale questions and open-ended questions. The three studies referred

to *perceptions* as beliefs. In another study Boylan et al. (2018) researched the

perceptions of 95 Australian early childhood teachers regarding mindset and found that

while the teachers believed it was part of their role to develop a student's growth

mindset they did not have the confidence or knowledge to do so. Understanding teacher

beliefs helps researchers understand teacher actions; however, the four studies

commonly found that what teachers believe and the practices used do not always align.

A mixed method study appears to provide a deep understanding of teacher perceptions

of mindset and thus offers a suitable approach to explore the teaching of mindset theory

in early education

2.11 Summary

Examination of the literature on the development of mindset in the early years

context identified key concepts. There is a requirement for teachers to develop 21st

century learners who will be able to succeed in work, life and citizenship, which

requires motivation, creativity, critical thinking, persistence and resilience. This is

supported by the goals of the Alice Springs (Mparntwe) Education Declaration

(Education Council, 2019), which directs schools to ensure that, "all young Australians

develop their capacity to play an active role in their own learning including being motivated to reach their full potential" (p. 5). A more stringent focus on the development of metacognitive skills may enhance children's perceptions of themselves as learners. Further, teaching mindset theory may develop a student's positive view of themselves as a learner.

Studies considering early education suggest that teachers' perceptions of fixed and growth mindsets are warranted. The early years provide an opportunistic time to develop a growth mindset in young students as a stable trait to support them during future years of learning and achievement. The literature review identified a paucity of literature available to support early years teachers in the implementation of mindset theory. The knowledge and attitudes of teachers is the key to practices used in early education settings, such as the development of mindset. The following chapter will present details of the conceptual framework that informs the present study in Chapter 3: Conceptual Framework.

Chapter 3: Conceptual Framework

3.1 Introduction

The inclusion of a conceptual framework allows the researcher to visualise concepts around a research project and to be explicit about the prominent features and relationships of importance (Leshem & Trafford, 2007). Huberman et al. (2014) define a *conceptual framework* as a visual or written product that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts or variables—and the presumed relationships among them" (p. 18). Weaver-Hart (1988) argues that conceptual frameworks are a research tool that can organise thinking and ideas into a useful structure that explains the intended research. The conceptual framework for the present study (see Figure 3.1) was developed by synthesising the information gleaned from the literature review and considering the research issue in relation to the research questions. There were two driving questions behind the development of the conceptual framework. First, what perceptions (i.e. knowledge and attitudes) do early childhood teachers have of mindset? Second, what could be included in a set of design principles to help early childhood teachers incorporate the teaching of mindset in a kindergarten to Year 1 classroom?

3.2 Conceptual Framework

The conceptual framework demonstrates the relationship between the qualities of effective 21st century learners and the skills and dispositions that enhance the development of a growth mindset (see Figure 3.1). The primary aim of the framework was to inform the development of a set of design principles to help teachers foster a growth mindset in students in the early years. The inner circle of the diagram (Figure 3.1) shows the identified qualities for students to be effective 21st century learners as identified by Kereluik et al. (2013). These are foundational knowledge, humanistic

knowledge and meta knowledge. Foundational knowledge refers to what students are required to know and encompasses modern and traditional disciplines including an interdisciplinary approach to facilitate deeper learning with themes of contemporary importance such as systems and design thinking (Kereluik et al., 2013). Meta knowledge refers to the 'process of working with foundational knowledge' (Kereluik et al., 2013) including the categories of "problem solving and critical thinking; communication and collaboration; and creativity and innovation" (p. 130). Humanistic knowledge pertains to one's identity as a learner in broader social and global contexts (Kereluik et al., 2013). Three categories were identified: (i) life, job skills and leadership, (ii) cultural competence and (iii) ethical and emotional awareness. The dotted lines indicate the interrelationship between the knowledge required for effective 21st century learners and the skills and dispositions that positively affect the development of a growth mindset.
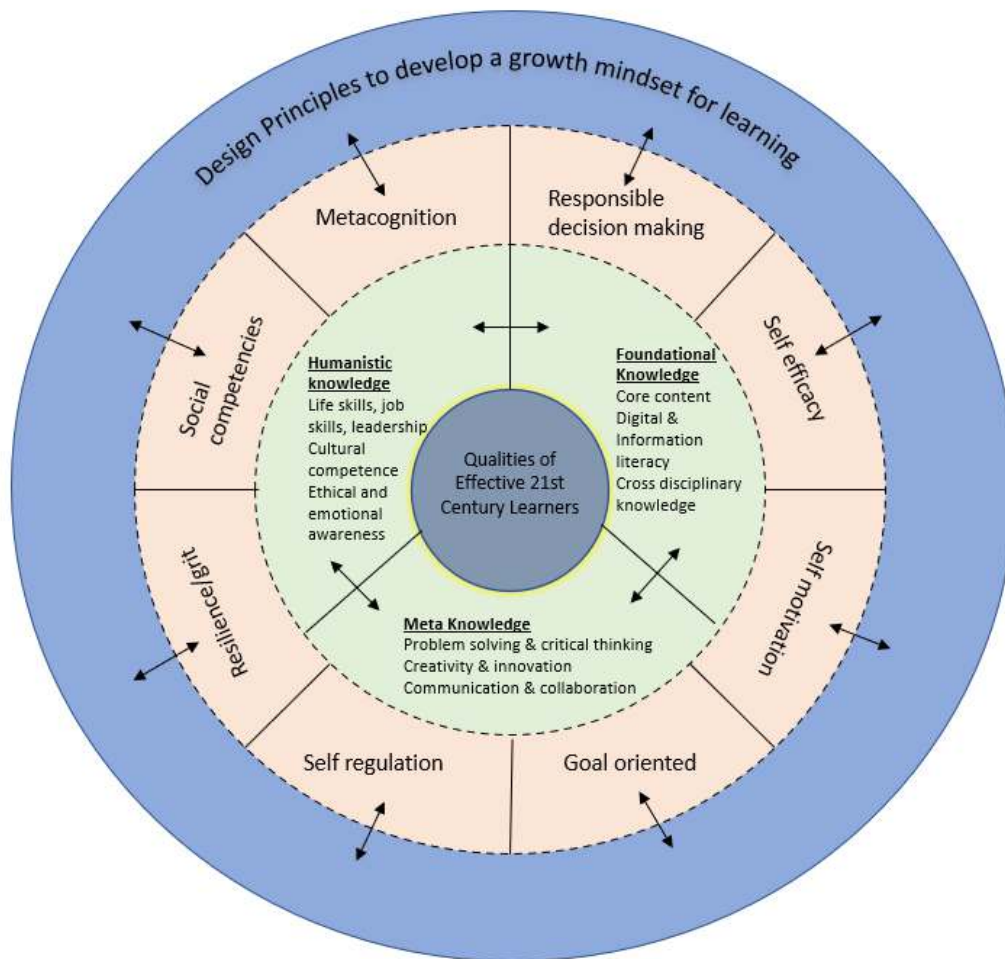
Figure 3.1

Conceptual Framework—the Development of a Growth Mindset

The outer circle represents the intended development of design principles to foster a growth mindset for learning. The circle within represents the skills and dispositions identified in the literature as being linked with a growth mindset, that is, metacognition, responsible decision-making, self-efficacy, social competence, resilience, self-motivation, self-regulation and being learning goal oriented. Additionally, the development of these skills and dispositions assists in the development of a growth mindset as represented by the dotted line of the circle. An explanation of each skill or disposition follows to justify its inclusion.

The development of a growth mindset is affected by one's self-efficacy, that is, the thoughts, feelings and actions affecting how individuals behave (Bandura, 1986). The foundations for human motivation, wellbeing and personal accomplishment are provided by one's self-efficacy beliefs about themselves. For instance, belief in ability improves self-motivation. Further, those with a growth mindset are more self-motivated. Ames (1992) explains that there are various motivational processes that initiate and regulate a student's cognition, affects and behaviours. Intrinsic motivation culminates when one finds the activity interesting and enjoyable and the behaviour is therefore motivated by inherent satisfaction (Deci & Ryan, 2000). Those with a growth mindset are more intrinsically motivated and learning goal oriented.

Goal orientation refers to the way individuals set either performance goals, where they strive to demonstrate their ability relative to others, or learning goals, where they focus on increasing their ability over time. Those with a learning goal orientation strive to master a skill for internal satisfaction, respond positively to setbacks or challenges and are more likely to maintain achievement behaviours (Ames, 1992). Learning goal orientation is central to the development of a growth mindset and requires metacognition to help the learner succeed.

Metacognition is explained by Zimmerman (1990) as the "focused goal oriented effort to influence one's own learning behaviours and processes" (p. 53). This includes strategies such as "setting goals, planning and problem solving, being aware of one's strengths and weakness, monitoring progress and understanding, and knowing when and why to use certain strategies" (Pintrich & Schunk, 2002, p. 21). Heckman et al. (2006) reason that these skills are more important than cognitive skills in explaining academic and employment outcomes. Thus, those with a growth mindset use metacognitive skills to make responsible decisions about their learning.

Responsible decision-making involves "the ability to make constructive choices about personal behaviour and social interactions based on ethical standards, safety concerns, and social norms" (Collaborative for Academic, Social, & Emotional Learning [CASEL], 2013, p. 9). It involves identifying problems, analysing situations, solving problems, evaluating, reflecting and taking ethical responsibility (CASEL, 2013). The learner with a growth mindset uses responsible decision-making to engage in positive social relationships with like-minded learners.

Social competencies refers to social interactions and relationships with others including leadership and social skills. Social skills are positive relationships with others and require effective communication skills, making friends, working cooperatively and showing empathy (Gutman & Schoon, 2013). Social skills affect an individual's ability to collaborate with peers to achieve their goals. The development of a growth mindset has been shown to improve social-emotional skills including self-regulation (Coates, 2016). Self-regulation is also known as self-discipline, delayed gratification and impulse control (Schunk & Zimmerman, 2012). Good regulators choose to set learning goals, monitor and assess their goal progress, which establishes a more productive environment for learning. They seek assistance regularly when it is needed, persist, adjust strategies and set more effective new goals when the present ones are completed. Finally, 21st century learners with a growth mindset require grit as one faces setbacks and strives to succeed.

Grit can be defined as "passions and persistence for long-term goals". Further, "individuals high in grit do not swerve from their goals, even in the absence of positive feedback" (Duckworth & Quinn, 2009, p. 166). Resilience can be defined as the ability to bounce back from adversity (Masten, 2001). A growth mindset requires an attitude of grit and resilience to bounce back from challenges. Additionally, the development of a

growth mindset can help students develop grit as they see the value of effort to improve achievement. These skills and dispositions will inform the development of the design principles.

The outer circle demonstrates the development, trialling and refinement of a set of design principles in collaboration with early childhood teachers that will enable them to teach mindset theory and thus foster the development of a growth mindset in students. The overall design of the conceptual framework illustrates the way the design principles will be constructed to foster a growth mindset to positively contribute to the development of effective 21st century learners.

3.3 Summary

The conceptualisation of the study as shown in Figure 3.1 demonstrates the relationship between the skills and dispositions for effective learning and the development of a growth mindset to develop learners ready for the demands of the 21st century. The development of design principles to teach growth mindset will be conceptualised and trialled. The principles will be evaluated and refined to result in a teacher driven conceptualisation of a successful way to teach growth mindset in the early years. The following chapter, Chapter 4: Methodology, describes the research design.

Chapter 4: Methodology

4.1 Introduction

Chapter 4 provides an overview of the methodology of the present study. The research aim and four research questions are presented followed by the theoretical framework, research design and methods. This study was conducted in four phases and the description of the participants, data collection methods and data analysis are provided for each phase. Finally, the rigour of the research and ethical considerations are addressed.

4.2 Research Aim

The aim of this study was to investigate early childhood teachers' perceptions (i.e. knowledge and attitudes) of mindset and develop a set of design principles to help early childhood teachers teach mindset theory and foster a growth mindset in students in kindergarten, pre-primary and Year 1 classrooms.

4.3 Research Questions

The research questions for this study were:

1. What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?

2. What attributes do early childhood teachers believe students require to be effective learners?

3. How do early childhood teachers support the development of a growth mindset for learning in students?

4. How effective are the design principles for guiding practice in the teaching of mindset theory?

4.4 Theoretical Framework

A pragmatist perspective underpins the research study presented in this thesis. A pragmatist worldview emphasises "actions, situations and consequences rather than antecedent conditions" (Creswell & Creswell, 2018, p. 10). Core to pragmatism is finding solutions to problems and understanding what works; therefore, effectiveness is a criteria to judge the value of research (Creswell & Creswell, 2018). Pragmatism emerged through the works of Peirce (1905), James (1907) and Dewey (1929) and considers reality to be constantly renegotiated, debated and interpreted in light of its usefulness in new situations (Creswell & Creswell, 2018). Dewey's pragmatic theory of knowing particularly influenced the present study.

Dewey purports a pragmatist theory of knowing, which argues that knowledge is a result of our actions and is gained through making connections between actions and consequences (Tashakkori, 2010). Learning is described by Dewey as an experience involving a process of trial and error directed by intelligent actions chosen by the learner (Tashakkori, 2010). Dewey's view acknowledges that everyone's experiences are equally real; therefore, knowledge is concerned with the conditions and consequences of a situation (i.e. organism-environment interaction) rather than being concerned with the world (Tashakkori, 2010). Design-based research (DBR) is supported by Dewey's thinking and focuses on a situation to build new knowledge.

The pragmatist theoretical framework supports the practical, interactive nature of DBR to design and enact interventions while extending theories and refining design principles. DBR utilises a systematic analysis of the situation and intelligent action to address a problem and build new knowledge (Herrington et al., 2007; Tashakkori, 2010). In this DBR pragmatic study, "knowledge and action are seen to be intimately connected" (Juuti et al., 2016, p. 57). The real world and theory are both drawn on

throughout the research to gain understanding and develop a practical solution. DBR and the pragmatist view identify the importance of shared activity between participants and the researcher to develop innovative solutions to a problem. In the present study, collaboration between teachers and the researcher developed, trialled and refined effective design principles to help teachers foster a growth mindset in students. Both qualitative and quantitative methods were used to gather data during the DBR process.

Pragmatists use methods that provide the best understanding of a research problem. The DBR process uses mixed methods to address a problem through the implementation of an intervention designed collaboratively with the research participants. Qualitative and quantitative methods were used in the present study to collect and analyse data and examine the research questions through empirical inquiry (Creswell & Creswell, 2018; Denscombe, 2008). The triangulation of data using mixed methods minimises researcher bias. The next section discusses the design of the present study in relation to DBR.

4.5 Research Design

The DBR used in the present study provided a methodology for understanding when, why and how educational innovations work in practice (The Design-Based Research Collective, 2003). DBR is entrenched in practice where the influence of context and the complex nature of outcomes is considered. Ørngreen (2015) highlights that DBR is a relatively new method in the learning sciences, which has been used increasingly in the education field particularly with technological interventions in the K–12 context (Anderson & Shattuck, 2012; Brown, 1992). DBR supports the exploration of educational problems that generate and extend knowledge to develop, enact and sustain innovative learning environments (The Design-Based Research Collective, 2003). Bradley and Reinking (2011) maintain that the use of DBR is

particularly well suited to early childhood contexts to address the challenge of implementing high-quality practices in diverse settings to close the gap between research and practice.

DBR is an approach credited to Brown (1992) and Collins (1992) and produces new theories, artefacts and practices that may affect learning and teaching in a naturalistic setting (Barab & Squire, 2004). Wang and Haffanin (2005) define DBR as:

A systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development and implementation, based on collaboration among researchers and practitioners in real-world settings and leading to contextually-sensitive design principles and theories. (p. 6)

Five characteristics identified by Wang and Haffanin (2005) are not unique to DBR but "the nature of their use varies and the approaches are often extended in design-based research" (pp. 7–8). These characteristics are explained in relation to the present study:

1. DBR is *pragmatic* as researchers refine both theory and practice to address a practical issue. This study is underpinned by a pragmatic world view in which innovative solutions are sought to the complex problem of how early childhood teachers assist students to develop a growth mindset in early years contexts.

2. DBR is *grounded in relevant research, theory and practice*. An examination of mindset theory and research identified a gap in the literature that provided the impetus for this study. The researcher and teachers worked collaboratively in the real-world classroom setting to conceptualise design principles teachers can use to develop a growth mindset in students in the early years. Insider and outsider perspectives of the issue aired during the collaboration benefited both parties as

the researcher learned from practitioners and vice versa (McKenney & Reeves, 2019).

3. DBR is *interactive, iterative and flexible*. McKenney and Reeves (2019) highlight that DBR is "conducted in collaboration with not solely for or on practice" (p. 14). The researcher and participants worked together flexibly in the present study in a process of iterative cycles of design, implementation and redesign to collaboratively refine the solution. Barab and Squire (2004) maintain that the highly invested role of the researcher in DBR can leave studies susceptible to multiple biases during analysis. Thus, triangulation of multiple data sources, as suggested by The Design-Based Research Collective (2003), was used in the present study to ensure that assertions were credible and trustworthy.

4. DBR is *integrative* as a combination of qualitative and quantitative methods are used throughout the phases as new needs and issues emerge (Orrill et al., 2003). The collection and analysis of quantitative data in the present study supported the qualitative collection and analysis of data to provide a rich description of different perspectives and increased corroboration of the data (Reams & Twale, 2008).

5. DBR is *contextual* as research results are connected with the design process and the setting; therefore, the content and depth of design principles varies. The research process, findings and changes from the initial design plan were rigorously documented in the present study to trace the emergence of innovation according to contextual factors (Wang & Haffanin, 2005).

Gathering perceptions and developing design principles with teachers requires a collaborative approach such as DBR. A doctoral study by Mantei (2008) used DBR to

explore the ways teachers conceptualise authentic learning experiences for primary school students to meet the needs of modern learners. Data were gathered from early career teachers (i.e. more than five years' experience) as they explored their professional identities in connection with a professional development model. The model was designed in response to themes emerging from the literature and collaboration with classroom teachers. Mantei (2008) found that DBR enabled collaboration in the intervention design and also acknowledged the teachers' pedagogical expertise. In the present study it was important that teacher perceptions were first gathered to provide an understanding of knowledge and attitudes of mindset theory. Additionally, the DBR method ensured both collaboration and identification of the pedagogical expertise of the participants (i.e. teachers). The use of DBR in early childhood studies was also investigated.

A scan of the literature showed some use of DBR in early childhood contexts. Two studies specifically used DBR in a preschool (0–4-year-olds) and kindergarten setting (3–5-year-olds). The first study, by Bradley and Reinking (2011), investigated how two strategies to increase the quality and quantity of oral language interactions could be integrated into a preschool classroom. A formative experiment was conducted using a mixed methods approach. The participants included a preschool teacher, para-professional and 20 preschool children. In Phase One, baseline data were collected through observations, semi-formal interviews, field notes and language assessment of the children to establish the context. During Phase Two (i.e. two iterations that lasted a total of 16 weeks), the teachers implemented the language strategies. Data collection included video and observation notes. In the final phase, the teachers participated in a semi-structured interview and the language assessment was re-administered to the children. A retrospective analysis was conducted to gain a deeper understanding of the

intervention. The study resulted in two design principles being developed to assist teachers to support young children's oral language development. Design-based research can also be referred to as developmental work research (DWR), which was used in the second early childhood study reviewed.

The use of DBR terminology can vary by sub-discipline with areas such as curriculum, learning and instruction, media and technology, and teacher education favouring specific terms such as design experiments, DBR and DWR (Van den Akker, 1999). Edwards (2007) used the DWR methodology to examine the appropriation of socio-cultural theory by a group of Australian early childhood teachers participating in a professional development program. The 13 teachers and one assistant worked in the preschool services program (3–5-year-olds) in Victoria. The DWR methodology is similar to DBR, in which the initial phase analyses existing practices and understandings of teachers. Subsequent phases involve cycles of modelling, examining, implementing, evaluating and consolidating a solution. Edwards (2007) findings suggested that changes in practice implemented during DWR or design research were more readily articulated to practice than if externally imposed on practitioners by researchers. Edwards (2007) argued that issues traditionally associated with the gap between theory and practice may be avoided when design research is used. Theory can then be utilised as a genuine driver of change during the research process. Design research provided a suitable methodology for the present study to produce both theoretical and practical constructs.

The DBR model has evolved over time and with different steps as evidenced by Collins (1992), Brown (1992) and Reeves (2006). The model developed by Reeves (2006; see Figure 4.1) is used in the present study as it contains a simplistic structure of

four phases. It also includes summative evaluation of the effectiveness of the

intervention and reflection on the process and product generated.
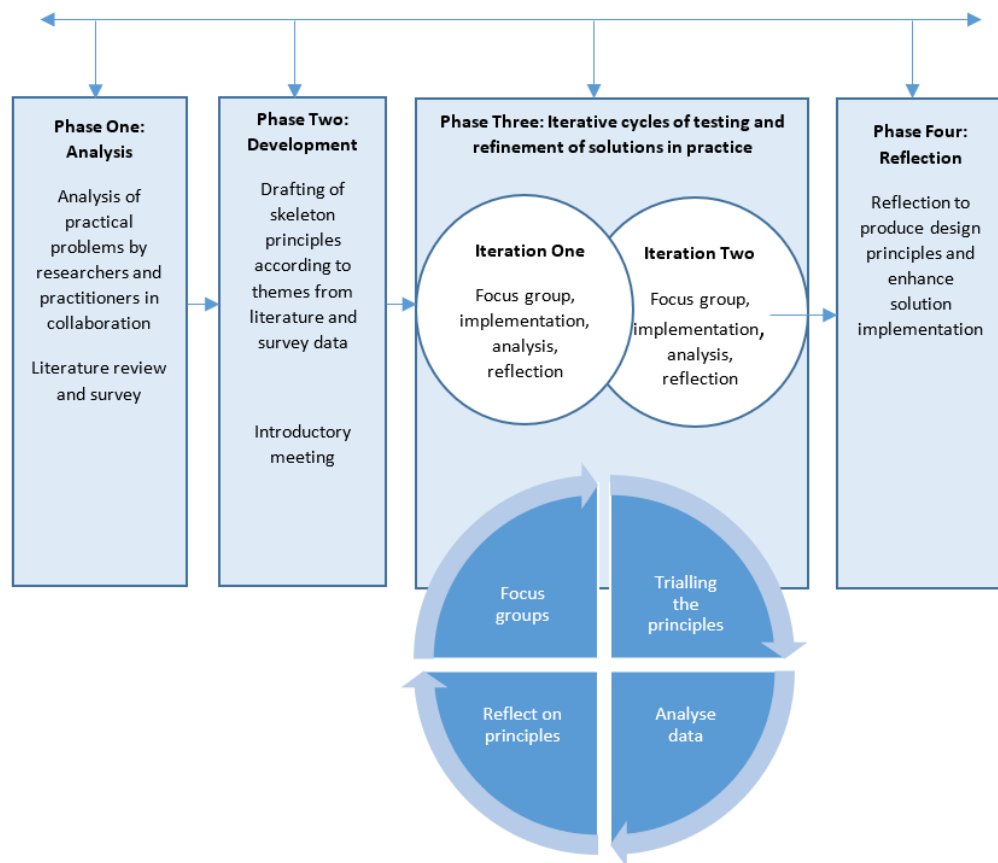
Figure 4.1

Design of this DBR Study

Phase One explored the problem and sought theoretical inputs. The term

problem "describes the discrepancy between the existing and desired situations"

(McKenney & Reeves, 2019, p. 93). Two main outputs resulted during Phase One as

suggested by McKenney and Reeves (2019). A literature review and survey were

conducted with participants to provide initial orientation and develop a broader

understanding of the problem and context. Both outputs led to the formulation of a

problem statement to be addressed in Phase Two.

Phase Two developed a skeleton design solution to the problem in the form of skeleton design principles, drawing on the literature review, conceptual framework and initial fieldwork. The fieldwork included an introductory meeting with a new group of participants to be engaged in Phase Two and Phase Three. The introductory meeting with a small group of teachers from one school explained the study further, established the participants' current understandings of mindset via a survey and provided a two-hour professional development session on mindset theory.

Using the literature review and data collected from the survey in Phase One and Two the researcher then developed a skeleton set of design principles, as part of the DBR process, based on existing theory of mindset teaching. The process of DBR is guided by robust existing theory and the skeleton principles are a record of the researcher's early thinking of a possible solution to the problem (McKenney & Reeves, 2019; Wang & Haffanin, 2005). The skeleton principles were not shown to the participants but were used to guide discussion to develop the principles for trial in Phase Three. In Phase Three, the principles were developed, tested and refined in collaboration with teachers over two iterations of implementation.

Phase Three focused on the design and construction of a solution and consisted of two cycles of five weeks of development, implementation and refinement in one school term. Prototypes of the design principles to address the research problem of how early childhood teachers can teach mindset theory to foster a growth mindset in students were developed, trialled and refined. Prototyping refers to "the draft versions of the constructed solution" (McKenney & Reeves, 2019, p. 146). Each cycle began with a focus group meeting to develop and refine the design principles. All focus group discussions were held at the school site over a 90–120 minute period. The focus group discussions were followed by collection and analysis of video diaries recorded by

teachers to reflect on the implementation of the principles. The principles were refined at the next focus group meeting with participants in light of the data analysis. Phase Three culminated in a set of design principles developed collaboratively with the participants to address the problem. Phase Four followed with evaluation and a structured DBR reflection with the aim of finalising a new theoretical understanding and practical solution to the problem of how early childhood teachers can teach mindset theory to foster a growth mindset in students.

In Phase Four, the researcher developed a deep and comprehensive understanding of the theoretical underpinnings of the design principles for the facilitation of growth mindset in the early years context. McKenney and Reeves (2019) state that the evaluation and reflection phase involves "active and thoughtful consideration of what has come together in research and development" (p. 183). A structured DBR reflection process, as outlined by Reyman et al. (2006), was used and is further described in the Phase Four methods section that follows.

4.6 Methods

The present study used a range of quantitative and qualitative methods to collect data, which is common in DBR. The methods may vary for each phase, as new needs and issues emerge, to maximise the credibility of the research (Wang & Haffanin, 2005). A description of the participants, data collection methods and data analysis follows for each phase (see Table 4.1).

Table 4.1

Overview of Sampling, Data Collection Methods and Analysis During the Four Phases
of the Study

	Phase One	Phase Two	Phase Three	Phase Four
Sample	Convenience sample: 95 early childhood educators	Purposeful sample: six K–1 early childhood educators from one independent school		
Data collection methods	Survey	Survey from Phase One Mindset quiz Jottings	Focus groups Video reflections Jottings Plus, minus, interesting (PMI) Questionnaire	Evaluation and structured reflection
Analysis	SPSS descriptive statistics	SPSS descriptive statistics (survey) Mindset quiz scored Thematic analysis using NVivo (jottings)	Transcribed video reflections and focus groups Thematic analysis using NVivo (video reflections, jottings, focus groups, PMI) Analysis of questionnaire responses in Excel	Effectiveness and impact of design principles

4.6.1 Phase One

Phase One Participants

    Data were gathered from early childhood teachers from kindergarten (i.e. a non-
compulsory year of school on school sites in Western Australia for which students are

usually aged 4 years) to Year 2 classrooms (i.e. where students are generally aged 7 years) in government, independent and Catholic schools in Western Australia. In Phase One, a convenience sampling technique was employed, which allows the "researcher to access individuals who are conveniently available and willing to participate in a study" (Liamputtong, 2013, p. 15). Participants were sourced through private Facebook groups Teaching Pre-Primary WA Australia, Teaching Kindy WA Australia, Teaching Junior Primary WA and Perth ECE (Early Childhood Educators). The administrators of the Facebook groups approve each member before they are given access to the Facebook site. All Facebook members worked in early childhood education contexts with children from birth to 8 years old. The survey participants ($n = 95$) had a range of experience from beginner teachers to teachers with over 25 years of experience. Participants taught in kindergarten (35%), pre-primary (35%), Year 1 (14%) and Year 2 (7%). The remaining teachers taught in split classes covering these year levels.

Phase One Data Collection Methods

Phase One of this study involved a literature review followed by information gathering via an online survey. The literature review was conducted to define the problem and ascertain that the study could contribute to new theoretical and practical understandings. The researcher sought information from teachers using a survey to gain a greater understanding of the problem to be addressed. The use of a survey was the preferred approach as it was economical and provided a rapid turn-around in data collection.

Teachers were invited to participate in a survey designed with Qualtrics software (version 2017) via links placed on the four Facebook groups listed above with the permission of the administrators of these sites (see Appendix A). An information letter describing the study and participant involvement formed the first page of the survey

(Appendix B). Informed consent was established by an 'I agree' button that indicated

consent to participate in the research. The survey was available for three weeks in

November 2017. Participants in Phase One were asked to provide their contact details

on the survey if they wished to participate in subsequent phases of the research.

Questions for the survey were developed from three of the four research questions:

1. What perceptions (knowledge and attitudes) do early childhood teachers have
   about mindset?

2. What attributes do early childhood teachers believe students require to be
   effective learners?

3. How do early childhood teachers support the development of a growth mindset
   in students?

The paucity of empirical research in relation to mindset in the early years meant

there were very few established survey instruments on which to base the items for the

survey. Survey questions were created by adapting questions developed by Yettick et al.

(2016) for a study on mindsets in the classroom for K–12 teachers for the Education

Week Research Center to suit the Australian schooling context. Permission to use

questions from this survey was gained from the Education Week Research Center in

Arizona, USA, via email (Appendix C). Some questions were altered to ensure the

respondents were provided with an option in the Likert scale to indicate they did not

have an opinion or did not know the information requested. Other questions were

modified to suit the early childhood context through altering the wording. Two open-

ended questions were also added to provide the opportunity for the participants to

include additional information. Sue and Ritter (2012) explain that open-ended questions

provide more valid responses rather than choosing a scaled response from a list of

questions. Further, a pilot study analysed the survey questions for their suitability and clarity.

Prior to distribution, the survey was refined following an initial pilot with six early childhood teachers. The pilot survey tested for clarity of instructions and questions, the length of time taken to complete the questionnaire and to enable the researcher to remove items that did not yield usable data. All pilot participants were known to the researcher and had early childhood teaching degrees with experience in teaching students from the ages of three to eight. The pilot survey helped the researcher understand how the questions were interpreted by the participants and improve the structure of the questions. The researcher made several changes following the pilot survey including removing a repeated question, changing three questions from agree/disagree to an importance scale (i.e. questions 11, 13 and 14), adding the option of NA (i.e. not applicable; question 17) and several questions were reversed to avoid participants selecting the first box every time.

The final survey design (see Appendix D) consisted of 19 questions. The first six questions related to the demographics of the participant including the year level they were currently teaching, type of school (e.g. government, independent or Catholic), length of time teaching, highest qualification and area of qualification (e.g. early childhood, primary, K–7). The demographic questions were followed by 11 Likert scale questions using a five-point scale. A five-point Likert scale ranging from *strongly agree* to *strongly disagree* was employed as it reduces the frustration level of respondents and increases response rates and response quality (Dawes, 2008). Three questions related to the teacher's familiarity with mindset. The questions were based on the key definition of mindset derived from the literature review. Six questions related to the teacher's beliefs of factors that affect student achievement. Two questions were open-ended to

allow the participants to list other factors they felt led to students' success in learning (question 12) and to list any other factors associated with developing a student's growth mindset for learning (question 15). Four questions related to the teacher's thoughts and practices about fostering a growth mindset.

Phase One Data Analysis

Data analysis of the survey was completed using IBM SPSS ver. 24.0 predictive analytics software. Descriptive statistics were used to summarise the data, and included calculating measures of central tendency such as mean, median, mode and standard deviation. The analysis of the open-ended questions followed Strauss and Corbin's (1990) constant comparison analysis stages, which involves 'chunking' data into small units and attaching a code to each unit. The codes are then grouped into categories and themes that express the content.

The main goal of the first phase of the study was problem definition through a literature review to investigate the available research on implementing mindset theory in the early years and a survey of participants. During analysis of the survey data, the researcher sought a greater understanding of participant knowledge and attitudes of mindset theory. In sum, what they knew about mindset theory, how important they felt it was for improving learning outcomes and whether they felt equipped to assist students to develop a growth mindset. Data collected in Phase One were used to inform the development of the skeleton design principles developed by the researcher in Phase Two.

4.6.2 Phase Two

Phase Two Participants

Purposive sampling was used in Phase Two to invite K–2 teachers from one school to participate. Initial contact was made through the Association of Independent

Schools of Western Australia (AISWA) to identify schools with prior knowledge and interest in developing a growth mindset in students in the early years. Four possible schools were identified that met these criteria. The list was refined via conversations with the principal of each school to determine suitability for the study. The final school was chosen due to their current interest in future-focused learning including incorporating mindset theory, their knowledge of mindset teaching and learning with students, their school values, which reflected the inclusion of mindset and a desire to expand their knowledge, and skills of mindset theory (Appendix K). Criteria for the selection of a school was essential to allow the researcher to gain rich information relevant to the research project by accessing knowledgeable people (Liamputtong, 2019). The principal of the chosen school was contacted via email for a personal meeting and invited to participate in the study. An information letter (Appendix E) was made available and the principal provided consent (Appendix F). The school was an independent girls' school located in the metropolitan area of Perth, Western Australia. An introductory meeting was held with the kindergarten, pre-primary, Year 1 teachers and one early childhood education support teacher where the focus of the research was discussed. At this meeting the principal informed the researcher that the Year 2 teacher in the school would not be participating.

At the introductory meeting, participants were provided with an information letter (Appendix G) about the study and asked for their consent to take part in the research (Appendix H). All K–1 teachers provided written consent and the participants are outlined in Table 4.2. The same participants continued into Phase Three.

Table 4.2

Overview of Participants

Participant (pseudonym)	Teaching qualifications	Years of teaching experience	Year level teaching	Age of students
Participant 1 (Anne)	Bachelor of Education ECE	0–5 years	Kindergarten	3.5–4.5 years
Participant 2 (Annalyse)	Bachelor of Education ECE	5–10 years	Pre-primary	4.5–5.5 years
Participant 3 (Jenna)	Bachelor of Education ECE	5–10 years	Pre-primary	4.5–5.5 years
Participant 4 (Fay)	Bachelor of Education ECE	10–15 years	Year 1	5.5–6.5 years
Participant 5 (Deidre)	Bachelor of Education ECE	10–15 years	Year 1	5.5–6.5 years
Participant 6 (Dionne)	Bachelor of Education Primary	10–15 years	K, 1 and 2	3.5–7.5 years

Phase Two Data Collection Methods

At the introductory meeting in Phase Two, initial survey data were collected on the teacher's current knowledge and attitudes of mindset theory using the Phase One survey instrument. After completion of the survey, a two-hour professional development session was delivered by the researcher. The session outlined mindset theory, recent research on neuroscience and brain development in young students, the importance of teacher mindsets, mindset and achievement, the effects of praise on mindset and details of this study (see Appendix L). Data collected during the session included a survey, mindset quiz, brainstorm notes and jottings. A description of each follows.

Survey—Teachers anonymously completed the survey offered in Phase One to provide baseline data on their knowledge and attitudes of mindset theory. The survey was designed with Qualtrics software (version 2017). Participants were provided with a link via email and consent was established via an 'I agree' button.

Mindset Quiz—The teachers completed an anonymous quiz sourced from Dweck's (2016a) book *Mindset: The new psychology of success* to determine each teacher's mindset tendency, that is, towards a fixed or growth orientation (see Appendix M). The quiz consisted of 20 statements and a four-point Likert scale comprising *strongly agree*, *agree*, *disagree* and *strongly disagree*.

Brainstorm—The participants completed a brainstorm using a 'told us, made us wonder' tool at the end of the professional development session to establish what the participants learnt and to capture further questions about mindset theory. These were collected and informed the development of the skeleton design principles.

Jottings—The teachers were asked to write down any perceived behaviours indicating a fixed or growth mindset they had observed in their classrooms. The jottings were collected and informed the development of the skeleton design principles.

Phase Two Data Analysis

Survey—Data analysis for the Likert scale questions in the Phase Two survey was completed using Microsoft Excel due to the small number of participants (i.e. six). The open-ended questions were analysed using Strauss and Corbin's (1990) constant comparison analysis stages, in which the data were chunked into small units and a code was attached to each unit. The codes were then grouped into categories and themes.

Mindset Quiz—The mindset quiz scoring guide developed by Dweck (2016a) was used to determine the participants' own mindset. The results provided insight into the mindset of the participants before commencing the implementation of the design

principles. Each question was scored and summed for a total score out of 60. Participant scores fell into one of four ranges:

- 60–45 strong growth mindset

- 44–34 growth mindset with some fixed ideas

- 33–21 fixed mindset with some growth ideas

- 20–0 strong fixed mindset.

Brainstorm and Jottings—The brainstorm responses to the 'told us, made us wonder' reflection and jottings of evidence of fixed and growth mindsets in classrooms were analysed using Strauss and Corbin's (1990) constant comparison analysis stages. The data were chunked into small units with the researcher attaching a descriptor or code to each unit. The codes were then grouped into categories and themes were developed that expressed the content of the categories. The themes were then used in combination with the literature review to inform an initial design proposition of a skeleton set of design principles.

The skeleton design principles developed in Phase Two were not shown to the participants, but were used by the researcher to guide discussion as part of the DBR process. In the next phase, Phase Three (Figure 4.2), the researcher collaboratively developed and trialled a prototype set of design principles with the participants. The term *prototype* refers to "successive approximations" of the solution (McKenney & Reeves, 2019, p. 146).

4.6.3 Phase Three

Phase Three Participants

All six K–1 participants from Phase Two continued in Phase Three (Table 4.2).

Phase Three Data Collection Methods

Data in Phase Three were collected over two implementation cycles of five weeks to gather evidence about the suitability and effectiveness of the design principles in assisting early childhood teachers to develop a growth mindset in students. Research methods of focus group audio recordings, teacher jottings, video diary reflections and a questionnaire were used in Phase Three (Figure 4.2).
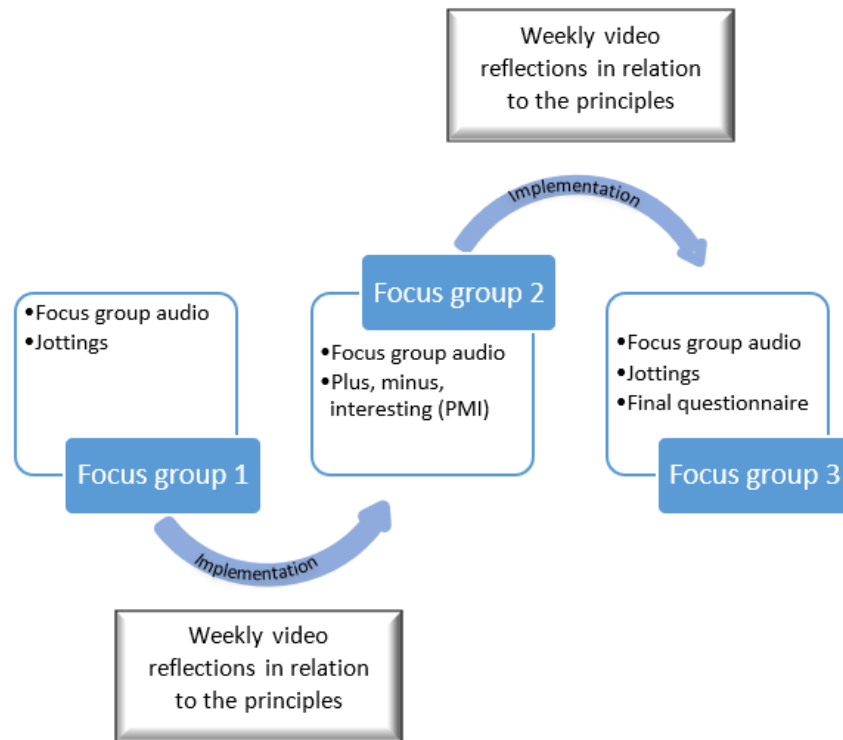
Figure 4.2

Phase Three Data Collection Methods

It was initially planned for teachers to use a Swivl roaming camera for short periods to record particular aspects of the implementation of the principles in the classroom. The Swivl camera follows the teacher to focus attention on their practice. An information letter (Appendix I) and consent form (Appendix J) were provided to parents; however, this data collection method was abandoned as few parents were

willing to give their consent. On further consideration it was decided the video reflections of individual teachers and focus group discussions would provide sufficient data on the implementation and refinement of the principles.

The teachers participated in three focus group discussions of 90 minutes each held at the school during one ten-week school term (Term 3). Focus group discussions were held at the beginning of cycle one, the end of cycle one (i.e. or beginning of cycle two), and at the end of cycle two. The focus group discussions were recorded with participant permission and then transcribed. In each focus group various data collection methods were used.

Focus Group Audio Recordings

Participants were asked for their consent to audio recording before each focus group session. Focus group protocols were used (Appendix O) to maximise engagement. Recordings are an unobtrusive way of collecting data and added to the rich description of the development of the design principles (Creswell & Creswell, 2018).

Video Diary Reflections

The teachers created a 5–10 minute video each week choosing to reflect on one or more of the design principles trialled during the implementation cycles. The use of video analysis as a data collection tool in DBR captures the multidimensional and complex nature of educational contexts, but is rarely used (Gössling & Daniel, 2018). The participants used a reflective framework (see Appendix U) based on a model developed by Rolfe et al. (2001) to assist in structuring a focused reflection. The framework is organised into three parts, 'What?', 'So what?' and 'Now what?'.

The prompts in the 'What?' section ask the participants to describe what happened (Rolfe et al., 2001) with questions such as: What happened? What did you learn? What did you do? What did you expect? What was different? What was your

reaction? In the 'So what?' section the teachers considered questions such as: Why does it matter? What are the consequences and meanings of your experiences? How do your experiences link to your academic, professional and/or personal development? What difference did you make? How do you know? The 'Now what?' section considers: What are you going to do as a result of your experiences? What will you do differently? How will you apply what you have learned? The video reflections were transcribed and entered into NVivo 12 qualitative data analysis software (QSR International, 2018) and deductively coded against the design principles. New codes were created using inductive coding where themes did not fit into existing codes. Video reflection data collected and analysed by the researcher were shared with the participants and helped the researcher and participants develop and refine the principles during the focus group discussions.

Jottings

In the first focus group at the beginning of cycle one in Phase Three, the participants were asked several guiding questions by the researcher to prompt discussion (see Appendix P) about design principles that could be used to reinforce a growth mindset. The guiding questions were based on the skeleton design principles the researcher developed using the literature review and data collected in Phase One and Phase Two. The participants were not shown the skeleton principles; however, they were used by the researcher to guide the teachers' thinking and discussion as per the DBR process. Two different types of jottings were collected. Firstly, the participants were asked what they currently do to assist students to develop a growth mindset. Responses were recorded on one large piece of paper and referred back to throughout the first focus group session to assist with development of the protype solution of a set of design principles (see Appendix W).

The researcher also conducted a classic brainstorm (Besant, 2016) and asked the teachers to consider what they thought a growth mindset teacher looked and sounded like. A classic *brainstorm* is 'an idea-generation process, where everyone shares their knowledge and insights' (Edwards & Martin, 2016). The participants called out their responses one at a time until each participant indicated they had nothing more to add. During the process all ideas were recorded, then participants looked for similarities between ideas. The ideas were grouped if the owner of each idea agreed they were similar. The list was refined to narrow the results to several general ideas used to develop the design principles.

In the second focus group at the end of cycle one (i.e. beginning of cycle two) jottings were collected to collaboratively reflect and refine the design principles in readiness for the second five-week cycle of implementation. A plus, minus, interesting (PMI) thinking tool developed by Edward De Bono (1985) was used to help the teachers brainstorm ideas, weigh the pros and cons, and reflect on and evaluate strengths and weaknesses of the design principles for future improvement (Appendix T). Each participant considered the positives (P) of the design principles (i.e. what the principles had added to their practice and the classroom environment), the minuses (M) or improvements to the design principles (i.e. what did not work so well) and the interesting (I) points of implementing the principles(i.e. what surprised them). Each participant shared their responses with the focus group to discuss, draw conclusions and refine the design principles for the second iteration of implementation.

Questionnaire

At the end of implementation cycle two in Phase Three teachers were invited to participate in a short survey designed to assess the overall effectiveness and impact of the design principles. The survey consisted of six questions developed by the researcher

and evaluated what worked and why (Appendix T). The survey was completed by hand by the participants at the final focus group. The survey comprised: two dichotomous questions requiring a yes or no answer, two Likert scale questions with a three-point scale, one multiple choice question with multiple response options and one open-ended question. All questions had the option to provide further comments. The data collected were analysed by the researcher to address research question four: How effective are the design principles for guiding practice in the teaching of mindset theory?

Phase Three Data Analysis

Throughout the design and construction phase of DBR (i.e. Phase Three) a process of refinement enables large, vague ideas to be sculpted into an operationalised solution. The refinement is guided by theory as well as participant expertise (McKenney & Reeves, 2019). Collaborative thinking over an extended period of time uses the process of *imagineering* (Imagineers, 2010) as referred to by Walt Disney. This term combines 'imagination' and 'engineering' to emphasise the creative and analytical processes occurring during the design and construction phase. In the present study, the participants worked together with the researcher to develop the prototype solution (i.e. a set of design principles). Strategies such as brainstorming, focus group discussions and video diaries facilitated collaboration, connection and refinement of the design principles over two iterations. During the two cycles of implementation, empirical testing of the principles identified how to move forward throughout the study. A description of the analysis of each data collection method follows.

Focus Group Audio Recordings

Each focus group transcript was analysed and a combination of inductive and deductive coding was undertaken using NVivo 12. Deductive coding requires a pre-defined list of codes against which data is coded, which in this study was the design

principles. Linneberg and Korsgaard (2019) state, "this approach helps focus the coding on those issues that are known to be important in the existing literature, and it is often related to theory testing or theory refinement" (p. 13). Inductive coding was also used to develop new codes if differences emerged or something new arose. The coding process followed several steps as outlined by Cresswell and Cresswell (2018). The researcher firstly transcribed and then read the data to gain a general sense of the information and overall themes. Chunks of data such as whole or part sections of each transcript were tagged with deductive codes which reflected the design principles, for example: Teachers teach students about how the brain works when you learn. Inductive codes were created for findings which were not anticipated and were based on a word or phrase which reflected the data. for example inquiry learning, persistence, resilience, growth mindset misconceptions. After each iteration the codes were reviewed to eliminate redundancy and overlap refine the themes. The deductive codes were altered to reflect changes to the design principles in each iteration. The inductive codes were reviewed and amalgamated in to the design principles if they fit that theme or remained as separate codes/themes until the final iteration to assess if additional principles should be devised. The analysis of the focus group transcripts helped better understand how the teachers were trialling and refining the design principles (Onwuegbuzie et al., 2009). Discussion points for focus group discussion one (Appendix P), focus group two (Appendix Q) and focus group three (Appendix R) are available in the appendices.

Video Diary Reflections

The video diary reflections were analysed using a combination of deductive and inductive coding using NVivo 12 in an ongoing process using the same process outlined for the focus group recordings. The reflections were deductively coded against the design principles and new codes were added if new themes arose. Hierarchy charts were

created at the end of each five-week cycle of implementation in NVivo to compare the number of codes in each node (i.e. each design principle) to determine the most and least prominent principles being used by the teachers. The charts were converted to a table for ease of viewing. The data analysis was discussed with the participants during each focus group to facilitate the refinement and modification of the principles. The design principles (i.e. nodes in NVivo) were modified accordingly.

Jottings

The jottings collected in all three focus group discussions were analysed and inductively coded by creating themes to gather emerging insights. Using Strauss and Corbin's (1990) constant comparison analysis stages, data were chunked into small units and a code was attached to each unit. The codes were then grouped into categories and themes were then developed that expressed the content of the categories. The themes developed were used throughout the three focus group discussions to inform the development and refinement of the design principles.

Questionnaire

Analysis of questionnaire data included the tallying of question responses that used a Likert scale and coding of open-ended questions and comments to construct themes. Due to the small sample size ($n = 6$), the results of the questionnaire were entered into a Microsoft Excel spreadsheet and analysed. The findings were used in Phase Four to evaluate and reflect on the effectiveness of the principles to create a final set of design principles.

4.6.4 Phase Four

Phase Four Analysis

The final phase did not involve the participants directly as the researcher completed a structured DBR reflection on the effectiveness and impact of the final

design principles in relation to the literature and data collected. Consideration of theoretical inputs, empirical findings and subjective reactions produced a new theoretical understanding (McKenney & Reeves, 2019). Conclusions were formed about the outcomes of the research and the specification of solving the problem with recommendations for future work also generated. The purpose and processes of evaluation and reflection are discussed further.

Evaluation

Evaluation may pertain to the testing conducted on or throughout the intervention (McKenney & Reeves, 2019). The design principles were collaboratively evaluated by the researcher and teachers during the focus group discussions. Additional evaluation was conducted using the questionnaire data collected at the end of Phase Three to identify the effectiveness of the design principles and feasibility of their continued use.

Structured DBR reflection

Design-based research (DBR) reflection was undertaken by the researcher to enhance the solution implementation and produce the finalised set of design principles (McKenney & Reeves, 2019). Factors that helped and hindered the conditions for success were analysed. This information was used to further establish the final design principles for the effective teaching of mindset in the early years.

DBR reflection involves "active and thoughtful consideration of what has come together in research and development" (McKenney & Reeves, 2019, p. 183). Design researchers view themselves as reflective practitioners throughout the DBR process (McKenney & Reeves, 2019). McKenney and Reeves (2019) suggest that researchers use two types of reflection, organic (i.e. intended contemplation) and structured DBR reflection. Organic reflection was completed by the researcher at the end of each phase

using a reflective model developed by Rolfe et al. (2001) to generate explanations for the results and refine the ideas being developed. A structured DBR reflection was completed in Phase Four, which enabled insights to be contextualised and integrated to improve the design principles.

The final DBR reflection in Phase Four used a structured reflection process as suggested by Reyman et al. (2006) and shown in Table 4.3. Kant's (cited in McKenney & Reeves, 2019) 'moments in judgement' to shape reflection preparation, image forming and conclusion drawing. These were then applied to Procee's (2006) four different reflective techniques of point (quantity), line (quality), triangle (relation) and circle (modality) reflections. Reyman et al. (2006) assert that preparation and image forming mainly involve looking into the past. Preparation requires the collection of relevant facts or observations to be considered. Image forming involves the selection and synthesis of those facts and observations. Conclusion drawing looks ahead and uses the results to inform what happens next. The reflections using Procee's (2006) Kantian epistemology focused on two main areas as asserted by Reyman et al. (2006): the design challenge and aspects of the research process.

As described in McKenney and Reeves (2019), a *point reflection* identifies one or more data points from which an unplanned insight may be gained. These are considered and 'Why?' questions are asked to formulate new hypotheses or questions for investigation. A *line reflection* takes an observed instance in time and considers one or more quality *norms* suspected to hold importance. The norms (i.e. something that is usual, typical or standard) are considered in light of the intervention and reflections made about the need for further investigation or changes to the intervention. The *triangle reflection* involves selecting a finding and considering the perspectives of others relevant to the finding. The researcher forms a hypothesis on the basis of the

experience and/or data and how the perspective is framed by meaning (McKenney &
Reeves, 2019). Reflections are made on what can be learned by considering other
perspectives. The *circle reflection* considers modality and identifies the methods used.
Issues, questions or problems are addressed in terms of what worked well and what did
not work well. The circle reflection considers what could be done differently, what
needs to be investigated further, what improvements can be made and what were the
powerful findings.

Table 4.3

Table removed due to copyright

Structured DBR reflections conducted during Phase Four considered how the educational environment changed as a result of the intervention and the unanticipated positive or negative effects of the intervention (McKenney & Reeves, 2019). Responding to these questions allowed the researcher to consider how an intervention may influence instructional practices beyond what was planned and further facilitated development of the final set of design principles. McKenney and Reeves (2019) outline that DBR results in two main outputs: "maturing interventions and theoretical understandings" (p. 86). Both outputs mature and improve over time. The intervention in the present study was the result of design principles developed to guide teaching mindset theory to foster growth mindset in students in early childhood contexts. The design principles also provide initial theoretical understandings or building blocks for future theoretical considerations.

4.7 Research Rigour

Liamputtong (2019) proposes that *reliability* refers to "the stability of findings" and *validity* as the "truthfulness of findings" (p. 59). The seminal work of Guba (1981) proposes four constructs to be considered by qualitative researchers to ensure trustworthiness of results: credibility, transferability, dependability and confirmability.

These criteria can be used to measure the quality of the research design, methods and analysis.

Credibility relates to internal validity and determines whether the research findings are trustworthy (Liamputtong, 2019).Trustworthiness refers to the level of confidence in the truth of the findings. Credibility has been enhanced in the present study by the adoption of multiple methods, triangulation of data from participants (i.e. teachers) at different points in time and different data sources (i.e. survey, video reflections, jottings and focus group interview transcripts). To validate the data collected, member checking was used to verify and assess the trustworthiness of the qualitative results (Doyle, 2007). Member checking involved interpreted data being discussed with participants to check for accuracy and resonance with their experiences and helped reduce the risk of researcher bias (Birt et al., 2016). The nature of DBR is that each phase of data collection feeds into the next. Ongoing data analysis was used to continually compare new ideas and themes as they arose. The inclusion of thick descriptions of participant accounts to support the findings and describe statistical data allowed the researcher to minimise personal biases.

Sufficient information about the context of the participants and conditions of the study was gathered to ensure that transferability or applicability can be made to other situations. The DBR process, while characterising the design in one context, also strives to show the relevance of the findings in other contexts. DBR aims to generate a set of theoretical constructs that eclipse the environmental particulars to be applicable in other contexts (Barab & Squire, 2004). The present study generated evidence-based claims about the design principles to further theoretical knowledge in the field. The researcher used detailed descriptions of the research setting, participants, methods and processes so

others may replicate the study in another setting and alter processes to suit an alternate context (Lincoln & Guba, 1985).

Lincoln and Guba (2013) argue that in a qualitative study the issue of dependability is addressed when the criteria of credibility is met. The present study addressed the criteria of dependability by engaging in an external audit with peer review during the data analysis. A researcher not involved in the research examined the process and product of the study. Preliminary findings and results were shared and feedback on the study was sought from supervisors, mentors and academic colleagues. The researcher used detailed descriptions of the methods, participants and theories to ensure the research process was logical and clearly documented.

Confirmability refers to the degree of neutrality of the findings (Liamputtong, 2019). DBR requires the researcher to adopt the joint role of researcher as designer and researcher. These dual roles are challenging because the researcher is not only observing interactions but also causing them (Barab & Squire, 2004). The typical phases and iterations of DBR result in an increasing alignment of theory, design and practice as partnership between the researcher and participants avoids misinterpretation of data. The reflective process the researcher engaged in ensured the findings were shaped by the respondents and not by researcher bias, motivation or interest. The researcher consistently acknowledged that the context and the creation of new theoretical constructs were the result of the participants' and researcher's ideas and experiences rather than just the preferences of the researcher. The inclusion of participant quotations in reporting findings provided evidence to support the interpretation of results. The use of triangulation to check the consistency of findings generated by different data collection methods also increased confirmability (Liamputtong, 2019).

4.8 Ethical Considerations

Ethical considerations are important to any research study to ensure the participants do not suffer harm by the research process or the researcher (Liamputtong, 2013). Throughout the present study the researcher sought to uphold a high standard of ethics in alignment with the university's Code of Ethics for researchers and research studies. Participants' informed consent was obtained, confidentiality was observed and participants were protected from risk or harm.

4.8.1 Phase One

Informed Consent

To respect the dignity and right of self-determination, informed consent ensures that the participants understand the purpose of the research, the procedures, potential risks and benefits so they can make a voluntary decision to participate (Liamputtong, 2019). Phase One ethical processes are outlined further.

The following processes were undertaken to ensure the ethical principles of informed consent were upheld for the Phase One survey conducted via Facebook:

- The researcher sought permission from the Facebook group's administrator before posting information about the research project;

- All four Facebook groups were closed and required permission by the administrator to be accepted into the group with the required criteria being working in the early childhood education field;

- The participants were invited to click on a link to the Qualtrics platform to complete the survey; and

- The first page of the survey explained the study and informed consent was established by an 'I agree' button and a statement that indicated that completion of the survey implied consent to participate in the research (see Appendix A).

Confidentiality

Confidentiality in the survey aimed to conceal the true identity of the participants. In this study, the confidentiality of the participants was preserved through the following processes:

- Those who decided to participate did so without others in the group knowing via the survey link the researcher provided;

- The participants were able to choose at the end of the survey whether they wanted to provide email contact details for further research purposes;

- The participants' real names and identifiable details were not used; instead, as suggested by Liamputtong (2013), the researcher used pseudonyms for the participants; and

- The researcher stored all forms of data, both digital and hardcopy, privately and securely as per university research storage guidelines.

Risk or Harm

Researchers have a responsibility to ensure the participants come to no physical, emotional or social harm during the research study. In the survey, the researcher engaged in the following measures to ensure the participants were not adversely affected:

- The impact on current members of the closed groups was considered and found to be negligible;

- As the researcher is a member of these groups, consideration was given to perceived coercion and was found to be negligible as participants could freely choose to participate via the posted survey link.

4.8.2 Phase Two and Phase Three

Informed Consent

In Phase Two and Phase Three, informed consent was sought from three parties: the school principal (Appendix E and Appendix F), the teachers (Appendix G and Appendix H) and the parents (Appendix I and Appendix J). All three parties were provided with an information letter to explain the purpose, procedures, risks and benefits of the study. After consent had been obtained from the junior school principal, teacher consent was gathered at the professional development session. Participants made a voluntary decision to join the study and signed the consent form to indicate their willingness to take part. All participants were provided with the option to discontinue with the study at any time without consequence. Parent consent was also sought via an information letter and consent form for their child to be a part of the study. Parent consent was later not needed as the use of Swivl video data collection was abandoned due to lack of consent.

Confidentiality

The real names and identifiable details of the participants and schools were not used. Instead, the researcher used pseudonyms for the participants. Special care was taken to protect the identity of participants when disseminating information and storing material. The researcher stored all forms of digital and hardcopy data privately and securely as per university research storage guidelines.

Risk or Harm

As this is a DBR project, clear protocols and procedures were made known to the group before beginning (see Appendix O). The protocols were developed as advised through the SAGE Research Methods Handbook (Greenbaum, 1998) on conducting focus group discussions. An environment of trust was created by the researcher in the

role as moderator to enable frank and free-flowing discussion among members of the group. Confidentiality was asked of all group members as a formality at the beginning of the session.

4.9 Summary

Chapter 4 began with the research aim and questions and then outlined the pragmatist theoretical framework underpinning this study. A description of the methodology followed including the participants, methods and data analysis for each phase. Data collection was undertaken using a variety of research methods, which is well suited to a DBR approach. Data collected from the Phase One survey, along with the literature review, assisted in defining early childhood teachers' perceptions of mindset theory and establishing the problem. The findings then informed the selection of a school to develop a set of design principles as conducted in Phase Two and Phase Three. In Phase Two, a skeleton design solution to the problem was developed by the researcher, drawing on the literature review and Phase One survey. A research team of participants was established in readiness for Phase Three and preliminary data on the teachers' mindsets and knowledge of mindset theory were gathered. Phase Three used a variety of data collection methods suited to each of the two cycles of implementation to develop, reflect, refine and evaluate the design principles. Phase Four methods of data collection consisted of structured DBR reflection and evaluation, which considered the empirical findings to refine the principles developed to assist teachers to support students in an early years context to develop a growth mindset. Finally, the issues of validity, reliability and ethical considerations were addressed. The results of the first phase of the study are presented in the next chapter, Chapter 5: Phase One Findings.

Chapter 5: Phase One Findings

5.1 Introduction

The present study aimed to investigate the perceptions that teachers have of mindset and to design a set of principles with teachers to facilitate the teaching of mindset theory in the early years (Figure 5.1). The results of Phase One of the study are reported in this chapter. Phase One reports on the findings of the survey completed with kindergarten, pre-primary, Year 1 and Year 2 (i.e. K–2) teachers. The researcher developed a survey from the literature to identify early childhood teachers' knowledge and attitudes of mindset theory.
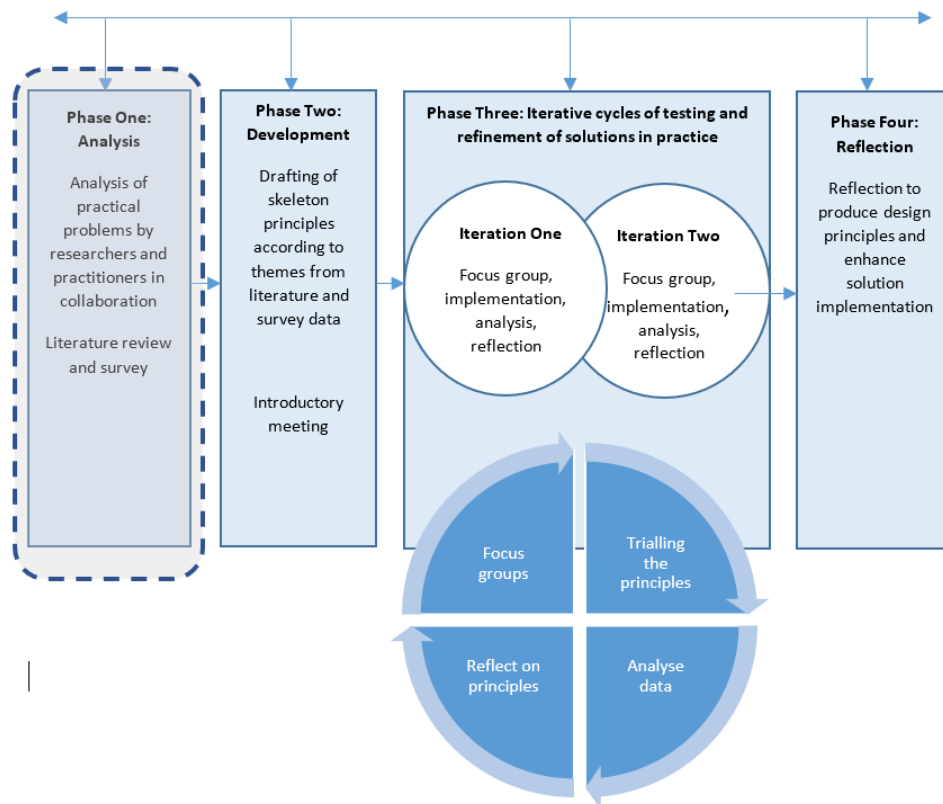
Figure 5.1

Design of this DBR Study—Phase One

5.2 Phase One Findings—Survey

The purpose of the survey was to gather information from Western Australian K–2 early childhood teachers about their perceptions of mindset, the attributes they felt students require for effective learning and how they support the development of these attributes. The Phase One data were analysed to interpret research questions one, two and three:

1. What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?

2. What attributes do early childhood teachers believe students require to be effective learners?

3. How do early childhood teachers support the development of a growth mindset in students?

5.2.1 Demographic Information

Participant Location

All participants in Phase One ($n = 95$) were members of one of the following Facebook groups: Teaching Pre-Primary WA Australia, Teaching Kindy WA Australia, Teaching Junior Primary WA and Perth ECE Teachers.

Participant Qualification

The teachers held a range of qualifications including Bachelor of Education Primary or ECE ($n = 68$), Master's degree ($n = 7$), Graduate Certificate of Early Childhood Education ($n = 4$), Diploma of Education ($n = 13$) and three teachers chose 'other' indicating another type of initial teacher qualification. The teachers' higher degree specialisations included early childhood ($n = 73$), primary ($n = 18$) and kindergarten to Year 7 ($n = 14$).

Setting

The teachers (*n* = 95) taught in a variety of settings including government (*n* = 73), private or independent (*n* = 9), or Catholic schools (*n* = 13). All were teaching in one or more of the early childhood years of kindergarten, pre-primary, Year 1 or Year 2 and possible split classes in these year levels as shown in Table 5.1. It is important to note that some teachers were teaching across multiple year levels.

Table 5.1

Year Levels Participants Were Teaching

Year level	Number of participants
Kindergarten*	34
Pre-primary	34
Year 1	14
Year 2	7
Kindergarten/pre-primary	5
Pre-primary/Year 1	4
Year 1/Year 2	2

Note. n = 95.

*Kindergarten refers to the non-compulsory year of school for students in WA in which students are 3.5–4.5 years of age. Kindergarten programs are mostly sessional and the government pays for 15 hours.

Teaching Experience

Participants indicated a range of teaching experience, as shown in Table 5.2.

Table 5.2

Number of Years of Teaching Experience

Number of years teaching	Number of participants
0–5 years	20
5–10 years	17
10–15 years	16
15–20 years	11
20–25 years	9
25+ years	22

Note. n = 95.

5.2.2 Teachers' Knowledge and Attitudes of Mindset

Questions six to nine were designed to discover the knowledge and attitudes teachers had about mindset to answer research question one. Over half (63%) of the teachers indicated that they had heard of a fixed or growth mindset, less than a quarter (20%) had not heard of this theory and 17% were unsure. Three descriptions of mindset were provided and teachers indicated how strongly they felt about each descriptor of mindset using a five-point Likert scale from *strongly disagree* to *strongly agree.* All three statements provided an adequate description of mindset so the question was designed to see which statement resonated most with teachers. The first descriptor stated that a mindset is 'a belief that orients the way we handle situations' and 49% of participants strongly agreed. The second descriptor aligned with Dweck's (2016a) definition that mindsets are 'the beliefs you have about your most basic qualities such as your intelligence, talents and personality' (p. 6) and 24% strongly agreed. The third descriptor stated that your mindset 'is a mental inclination or disposition, or a frame of mind' and 42% strongly agreed.

The teachers were asked how they rated the importance of a child's mindset as having an impact on their learning, using a five-point Likert scale ranging from

extremely important to *not at all important*. The majority (92%) of participants rated a child's mindset as important; over half (50.5%) rated mindset extremely important, 41.9% very important and none rated child's mindset as not at all important (Figure 5.2). To further investigate, participants were asked whether they use the term mindset in their work with young students. Despite 92% of the participants indicating that a child's mindset has an impact on their learning, only half (58%) indicated that they do not use the term in their work with students. Of the remaining teachers, 34% indicated that they do use the term mindset and 7.4% were unsure.
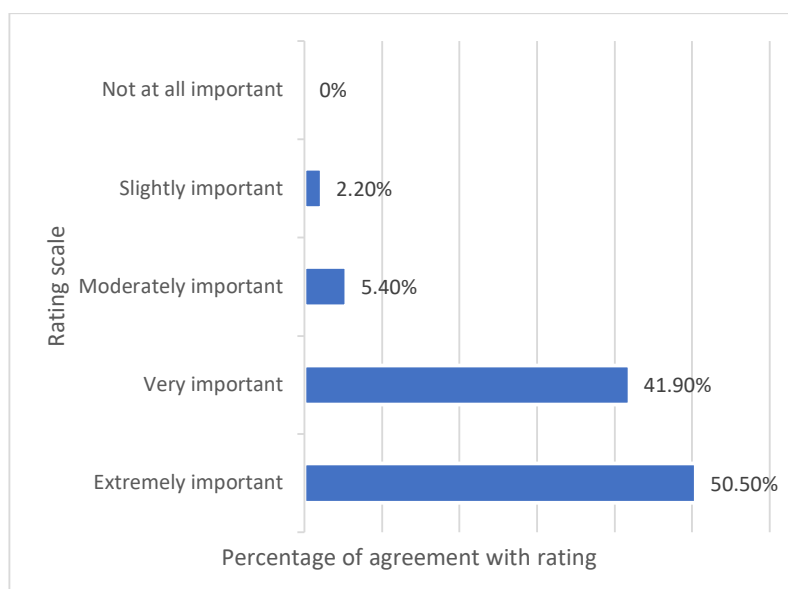
Note: *n* = 93.

Figure 5.2

Teacher Ratings of the Importance of a Child's Mindset Affecting Learning

Research indicates that particular student behaviours reveal either a fixed or growth mindset. The participants in the present study showed several misunderstandings of the behaviours associated with growth and fixed mindsets. Participants received a list of fixed and growth mindset behaviours that were not categorised in the survey question. Of the growth mindset behaviours (i.e. the first

seven items listed in Table 5.3), more than three-quarters of the participants strongly agreed that persistence in learning (77.3%), a willingness to make mistakes and learn from them (75.9%), and excitement about learning (75.3%) are linked to developing a student's growth mindset. The teachers did not strongly link a student's understanding of how their brain works with a growth mindset, with only 30.0% of the teachers strongly agreeing and 42.7% somewhat agreeing. The teachers did not feel as strongly that other growth mindset behaviours such as frequent participation in class activities (57.3%), high levels of effort towards learning experiences (48.3%) and responsible decision-making (47.2%) were indicative of a growth mindset. The teachers also demonstrated some understanding of fixed mindset behaviours.

Fewer teachers strongly agreed that the fixed mindset behaviours listed such as good grades (3.4%) and high standardised test scores (1%) were strongly linked with a growth mindset. However, close to a quarter (24.7%) of the teachers strongly agreed that students need to consistently complete their work to develop a growth mindset, which indicates a misunderstanding of this behaviour being linked with a growth mindset.

Table 5.3

Teacher Beliefs of Behaviours that Demonstrate Fixed or Growth Mindset

Mindset factors*	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
Growth mindset factors					
Persistence in learning	0	0	1.1	21.6	77.3
Willingness to make mistakes and learn from them	0	0	2.3	21.8	75.9
Excitement about learning	0	0	2.2	22.5	75.3
Frequent participation in class activities	0	0	5.6	37.1	57.3
High levels of effort towards learning	0	0	5.6	46.1	48.3
Responsible decision-making	1.1	2.2	11.2	38.2	47.2
Understanding how your brain works when you learn	3.4	4.5	19.1	42.7	30.3
Fixed mindset factors					
Consistent completion of work	1.1	0	22.5	51.7	24.7
Good grades	4.5	18.0	43.8	30.3	3.4
High standardised test scores	25.0	36.4	23.9	13.6	1.1

Note. n = 89. *The fixed and growth mindset factors were presented in random order in the survey question.

An open-ended question asked teachers to describe other factors they believed led to the development of a growth mindset. The ten responses received were grouped into two categories during analysis by the researcher: dispositions a child may have and teacher practices (Table 5.4). The teachers described how students need to have certain dispositions such as being aware of their abilities, and mentioned not just academic abilities but understanding students uniqueness in regards to these abilities. Being willing to try new things and resilience were also mentioned as important to developing a growth mindset. Additionally, teachers felt that practices such as modelling a growth mindset, using child-centred inquiry allowing exploration and discovery, rewarding students for effort, explaining to students the purpose of learning experiences and providing a positive environment were important.

Table 5.4

Other Factors Identified by Teachers that May Develop Growth Mindset

Student dispositions	Teacher practices
"A child's awareness of abilities and strengths across areas, not just academic"	"A teacher who models a growth mindset competently"
"A willingness to try new things, an enquiring mind"	"Develop students' knowledge of essential curriculum through child centred topics. Move on from what they know [and] always challenge and explore"
"Resilience"	"Being rewarded for effort"
"We are individuals"	"Providing the 'why' of what the student is being taught so they can see how they can use the information or knowledge in their lives"
	"An exposure to exploration and discovery"
	"A positive environment"

The final question in the survey revealed that nearly all (92.5%) of the teachers strongly or somewhat agreed that all students can and should have a growth mindset (see Table 5.5). Further, nearly all of the teachers (94.1%) strongly or somewhat agreed that it is their responsibility to foster a growth mindset in students. However, less than a quarter of the teachers (19.8%) strongly agreed that they are good at fostering a growth mindset and have adequate knowledge to do so (14% strongly agreed).

A key finding was that although most of the teachers agreed that it is their responsibility to help students develop a growth mindset, the teachers did not feel confident or have adequate knowledge to do so. A comparison of data between Table 5.4 and Table 5.5 provides strong evidence that teachers have some understanding of behaviours linked to the development of a growth mindset in students and strongly agree that students develop a growth mindset because it affects learning. However, the teachers evidently lacked the knowledge and confidence to implement practices to teach students how to develop a growth mindset in the early years.

Table 5.5

Teacher Responses to Statements About Growth Mindset

Teacher beliefs about growth mindsets	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
All students can and should have a growth mindset	2.3	1.2	3.5	39.5	53.5
Fostering a growth mindset in students is part of my job duties and responsibilities	0	0	5.9	35.3	58.8
I am good at fostering a growth mindset in my students	0	2.3	18.6	59.3	19.8
I have adequate knowledge to teach students how to develop a growth mindset	2.3	11.6	27.9	44.2	14.0

Note. n = 86.

The analysis of Phase One data showed that early childhood teachers have heard about mindset, have some understanding of mindset theory and have a developing knowledge of the practices and behaviours associated with the development of a growth mindset. The teachers also agreed that a growth mindset affects a child's learning; however, many did not use the term in their work with young students or have a good understanding of how to consistently use practices to teach students to develop a growth mindset. The important problem identified in these results was the lack of knowledge and confidence teachers have to implement practices that teach students to develop a growth mindset. A description of the attributes teachers believe students need to be an effective learner follows.

5.2.3 Teachers' Beliefs of Attributes Students Need to be Effective Learners

This section describes the findings from the survey that addressed the second research question: What attributes do early childhood teachers believe students require to be effective learners? Teachers were given a list of nine factors gleaned from the literature as important for students' success in learning with a growth mindset listed as one possible factor. Teachers were asked to indicate the extent to which they felt the factors were important for effective learning, using a five-point Likert scale of *not at all important* to *extremely important*.

Of the nine factors listed (see Table 5.6), over 85% of the teachers indicated that the first seven factors were very important or extremely important for students' success in learning. Closer inspection of Table 5.6 shows that feeling safe at school (81.1%), social-emotional learning (69.5%) and children's engagement and motivation (68.4%) were ranked as extremely important to successful learning. Fewer teachers ranked other factors listed, such as teaching quality (51.5%) and parental support and engagement (47.4%), as extremely important. Considered even less important by the participants were family background (26.3%) and school discipline policies (21.1%).

In comparison, the development of a growth mindset was ranked sixth overall, with 89.4% of the teachers believing that it is very (52.6%) or extremely important (36.8%) for students' success in learning. The findings indicate that most teachers recognise the impact a growth mindset has on learning but do not rate it as highly as students feeling safe at school, which more than three-quarters of the teachers (81.1%) indicated was extremely important.

Table 5.6

Factors the Teachers Rate as Important for Student Success in Learning

Factor	Not at all important (%)	Slightly important (%)	Moderately important (%)	Very important (%)	Extremely important (%)
Feeling safe at school	0	0	1.1	17.9	81.1
Social and emotional learning	0	0	1.1	29.5	69.5
Children's engagement and motivation	0	0	1.1	30.5	68.4
Teaching quality	0	0	4.2	44.2	51.6
Parental support and engagement	0	1.1	12.6	38.9	47.4
Developing a growth mindset	0	1.1	9.5	52.6	36.8
School climate	0	0	13.7	47.4	38.9
Family background	0	7.4	28.4	37.9	26.3
School discipline policies	1.1	6.3	31.6	40	21.1

Note. n = 89.

In an open-ended question, teachers provided 44 responses that described other factors they thought led to a student's success in learning. Table 5.7 presents the themes identified through constant comparison analysis. Teachers gave the highest priority to the importance of developing positive relationships with peers, parents and other staff. Survey participant (SP) 20 described this as, "the positive relationships established and maintained between teacher and student." The second most common theme was the implementation of age appropriate pedagogy. SP53 wrote, "quality learning environments, age appropriate pedagogies, focus on social-emotional learning", and

SP18 stated, "the opportunity to learn through play. Being able to make new concepts

concrete through guidance and repetition." The third most common theme related to

allowing students a sense of agency over their learning, described by SP7 as, "being

given choice and developing responsibility for their learning, using mistakes to identify

learning goals."

Table 5.7

Themes Identified by Teachers as Important for Student Success in Learning

Themes	Number of responses ($n = 44$)	Percentage (%) of responses
Children developing positive relationships with peers, teachers and parents	13	29.5
Implementation of developmentally appropriate pedagogy	10	22.7
Other factors (e.g. effective feedback, parenting styles, quality of teacher, language skills)	7	15.9
Allowing children to have agency over their learning	6	13.6
Children's health and wellbeing	6	13.6
Children's natural ability for learning	2	4.5

Teachers were asked to report their level of agreement on 11 different student

beliefs or attitudes that are important to success in learning using a five-point Likert

scale of *I strongly disagree* to *I strongly agree.* Of the first ten beliefs listed in Table

5.8, over 80% of the teachers somewhat or strongly agreed that these beliefs are

important for students to hold to be successful with learning.

More than 80% of the teachers strongly agreed that students should hold the

belief that to be successful in learning their teacher knows them and treats them equally

and fairly. Additionally, more than 70% of the teachers strongly agreed that students

should feel a sense of belonging and hold the belief they can be successful at school. Over 70% strongly agreed that students should hold the belief that seeking help will assist them with their learning. Fewer teachers (60%) strongly agreed that students need to hold the belief that failure is part of their learning experience and is required to be successful with their learning. Additionally, 56% of the teachers strongly agreed that students should hold the belief they can learn challenging material. The belief that doing well at school will lead to further success was strongly agreed on by 29% of the teachers.

Table 5.8

Teachers' Agreement with Student Beliefs That Affect Success in Learning

Student beliefs	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
My teachers know me	1.1	0	1.1	15.7	82.0
My teachers treat me equally and fairly	1.1	0	2.2	15.7	80.9
I can be successful at school	1.1	0	0	21.3	77.5
I feel a sense of belonging in my school community	1.1	0	0	25.8	73.0
Seeking help assists me with my learning	0	1.1	1.1	27.0	70.8
Failure is part of my learning experience	2.2	2.2	5.3	29.2	60.7
I have some autonomy and choice in my learning tasks	1.1	0	11.4	30.7	56.8
I have the ability to learn challenging material	1.1	1.1	6.7	34.8	56.2
My work at school is meaningful for me	0	2.2	3.4	40.4	53.9
My academic abilities will increase through effort	1.1	0	13.5	38.2	47.2
Doing well in school will lead to further success for me	1.1	3.4	18	48.3	29.2

Note. n = 89.

The analysis of the data addressed two important elements related to research question two. Firstly, the factors early childhood teachers rate as most important for students to be successful learners were feeling safe at school, the development of social and emotional skills, and engagement and motivation. The development of a growth mindset was ranked sixth out of the nine factors. The teachers suggested that positive

relationships with peers, teachers and parents were also important. Secondly, teachers views on the beliefs students need to hold for success in learning centre on teachers knowing them and treating them equally and fairly, so they can be successful at school. Interestingly, teachers did not rate highly the belief that failure is part of the learning experience, which indicated a lack of understanding of this belief and its role in developing a growth mindset. Teachers were also asked how they support the development of a growth mindset for learning.

5.2.4 Supporting Development of a Growth Mindset in Students

This section describes the results in relation to the third research question, how do early childhood teachers support the development of a growth mindset in students? Teachers were asked to indicate how often they have engaged in certain practices in the classroom that lead to the development of a fixed or growth mindset. On the list were five practices that may support the development of a growth mindset and four practices that may support the development of a fixed mindset (Table 5.9). The fixed and growth mindset practices were randomly listed in the survey questions. These responses shed light on the practices teachers use to facilitate learning, some of which may be more likely to foster a growth mindset.

Of the five growth mindset practices shown in Table 5.9, teachers most often praised student effort (99 %) and encouraged students to try new strategies when they were struggling (92 %). All five of the growth mindset practices were implemented often by more than 60% of the teachers. Of the four practices that foster a fixed mindset, two practices were used often by more than 50% of the teachers, including praising students for their intelligence and for earning good scores or grades. Over 70% or respondents reported that they occasionally or often used the first three practices that

foster a fixed mindset. These results may indicate a lack of awareness of the practices

teachers use that develop a fixed or growth mindset.

Table 5.9

Practices Utilised by Teachers in the Classroom

Teacher practices*	Never (%)	Occasionally (%)	Often (%)
Practices that foster a growth mindset			
Praising students for their effort	0	1.2	98.8
Encouraging students to try new strategies when they are struggling	0	8.1	91.9
Encouraging students who are already doing well to keep trying to improve	0	9.3	90.7
Praising students for their learning strategies	0	15.1	84.9
Suggesting that students seek help from other students on school work	0	37.2	62.8
Practices that foster a fixed mindset			
Praising students for their intelligence	16.3	25.6	58.1
Praising students for earning good scores or grades	14.0	33.7	52.3
Encouraging students by telling them a new topic will be easy to learn	10.6	54.1	35.3
Telling students it is alright to struggle, not everyone is good at a given subject	57.0	10.5	32.6

Note. n = 86.

*The fixed and growth mindset practices were randomly listed in the survey.

In another survey question, teachers were asked to comment on the frequency of

use of statements that may or may not assist students to develop a growth mindset (see

Table 5.10). Five statements were provided that reinforce a growth mindset and five that

reinforce a fixed mindset. Of the growth mindset statements, more than three-quarters

of the teachers (79%) indicated that they often told students they had worked hard and

their improvement showed it. Of the other four statements that foster a growth mindset,

over 50% of the teachers indicated they often used these statements. Over 50% of the teachers indicated that they occasionally used the five statements listed that foster a fixed mindset. Over 90% of the teachers occasionally told students they were one of the top students in the class, which is known to reinforce a fixed mindset. These results may indicate a lack of awareness of the way teacher feedback can affect a student's mindset.

Table 5.10

Frequency of Fixed and Growth Mindset Statements Used by Teachers

Mindset statements	N/A (%)	Never (%)	Occasionally (%)	Often (%)
Statements that foster a growth mindset				
You really worked hard and your improvement shows it	0	0	21.2	78.8
I love how you kept your concentration to keep working on that problem	0	3.5	23.3	66.3
Great job! You must have worked really hard on this	0	1.2	38.4	60.5
I really like the way you tried all kinds of strategies on that problem until you finally got it	0	2.3	39.5	58.1
Statements that foster a fixed mindset				
Look at how smart you are	5.1	39.7	55.1	0
See, you are good at this subject, you got an A on your last test	3.2	19.4	77.4	0
You are one of the top students in the class	1.4	5.6	93.1	0
This is easy, you will get this in no time	6.3	25	68.8	0

Note. n = 86.

Finally, using a Likert scale of *often*, *occasionally* or *never*, teachers were asked whether they integrated the teaching of a growth mindset towards learning into their practice. None of the teachers indicated that they did this often, 89% indicated they did this occasionally and 10.7% indicated they never did this. This finding reveals a contrast

between teacher perceptions of mindset and what they actually do in practice to reinforce a growth mindset. Teachers' perceptions about mindset in earlier survey questions revealed that they believe a growth mindset has an impact on a student's learning and that they have a responsibility to teach students how to develop a growth mindset. However, the teachers only occasionally included practices that reinforced a growth mindset and had some misunderstanding about which practices develop a growth mindset. To conclude Phase One, the researcher engaged in an organic reflection as part of the DBR process to summarise the theoretical and practical understandings developed.

5.3 Phase One—Organic Reflection

Researcher reflection occurs throughout the DBR process as the problem is identified and a solution is developed (McKenney & Reeves, 2019). An organic reflection as developed by Rolfe et al. (2001) was conducted by the researcher at the conclusion of Phase One to summarise theoretical and practical findings. The reflection was framed by three questions: 'What?', 'So what?' and 'Now what?'. The 'What?' section required a description of what happened, the 'So what?' section considered the consequences and meanings of what had happened and 'Now what?' addressed how to apply what has been learned as a result of the experience.

5.3.1 What?

In Phase One, 95 early childhood educators teaching in Western Australian kindergarten to Year 2 classrooms completed a survey consisting of 19 questions about their perceptions of mindset. Findings from the literature review and survey data were synthesised to produce a problem definition, long-range goals, partial design requirements and initial design propositions for the present study. It is important that design-based researchers view themselves as reflective practitioners throughout the

DBR process (McKenney & Reeves, 2019). Reflection of the Phase One survey data involved active and thoughtful consideration of theoretical inputs from the literature and empirical findings from the survey to illuminate new theoretical understandings. Phase One findings revealed that the early childhood teachers knew about mindset and believed it to be an important factor for success in learning and part of their job to teach students how to develop a growth mindset. However, the teachers did not feel they had the 'know how' or the confidence to do so.

5.3.2 So what?

The analysis of Phase One data followed the suggestion of McKenney and Reeves (2019) for the researcher to reflect on the problem, the context and the needs of the participants. In analysing the problem, the researcher considered questions such as how do the teachers perceive the problem, how does the problem manifest itself, what factors contribute to the problem and how is the problem related to policy, perceptions and practice? Contextual questions were also considered including what does current practice look like; what are the participants' feelings, beliefs, attitudes, knowledge and skills; what factors would enable a change; and within what constraints would a solution have to function? Finally, need-related questions were considered such as to what extent do the participants see this as a problem worth fixing and what are the participants' ideas for potential solutions?

5.3.3 Now what?

The analysis and exploration phase of the DBR process led to a greater understanding of the problem to enable the researcher to explore a feasible solution to address the problem. Reflection on the findings revealed that the core problem to be addressed in this study was how to support early childhood teachers to foster growth mindset in students? A long-range goal for the study was identified, to develop a set of

design principles that may be implemented by teachers to assist students to develop a growth mindset in early childhood contexts. Several initial design propositions for the study were developed by the researcher as a result of reflection on Phase One of the DBR process.

Firstly, the researcher would seek a smaller group of participants who had some knowledge of mindset theory for the next phases of the study. Secondly, the researcher would aim to establish the current practices used by the early childhood teachers to develop a growth mindset in students. Knowledge of mindset practices used by the teachers could provide initial ideas for the development of the principles. Thirdly, the researcher would work with the teachers in their real-world settings to develop the principles. A process of two five-week iterations of implementation and a focus group at the beginning and end of each iteration was suggested to develop a close partnership between the researcher and the participants. Fourthly, the researcher would consider the constraints that the participants felt may hinder the implementation of the principles. This data would be collected during focus group discussions. Finally, video diaries would be used to monitor the teachers' attitudes, knowledge and beliefs and gather feedback about the principles as they are developed and implemented.

5.4 Summary

Phase One consisted of a survey that was disseminated by sharing a survey link on four Facebook groups and completed by 95 early childhood teachers. The findings addressed research questions one, two and three to identify the problem to be addressed in the present study. The Phase One findings revealed that the early childhood teachers knew about mindset and believed it to be an important factor for success in learning and part of their job to develop growth mindset in students. The survey responses revealed that the teachers occasionally included practices that reinforce a growth mindset but

also had some misunderstanding about which practices develop a growth mindset. The problem identified for the present study was that the teachers did not feel they had the 'know how' or confidence to help students develop a growth mindset.

Chapter 6 outlines the findings of Phase Two of this DBR study in which the researcher developed a set of skeleton design principles as an initial design proposition.

Chapter 6: Phase Two Findings

6.1 Introduction

Chapter 6 reports on the findings from Phase Two as shown in Figure 6.1. The survey used in Phase One was repeated with six K–1 teachers from one school. Additionally, findings from a mindset quiz, reflective tool and jottings collected during a professional development meeting are outlined. The findings from Phase One and Phase Two are compared to inform the design of the skeleton principles (McKenney & Reeves, 2019). Finally, the skeleton design principles are described. These were classified as *skeleton* principles as they were in development and had not been trialled.
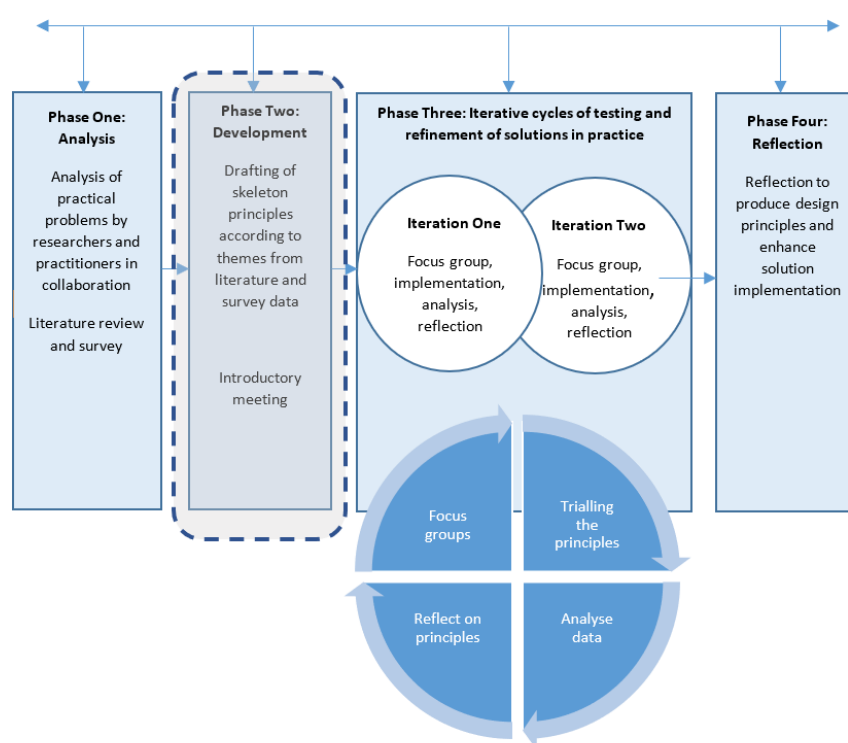
Figure 6.1

Design of this DBR Study—Phase Two

6.2 Phase Two Findings

In total, six early childhood teachers from an independent girls' school in Perth, Western Australia, formed the research team for Phase Two and Phase Three. The teachers were purposefully chosen as they had previous knowledge of mindset theory as indicated by their school values, which reflected inclusion of the teaching of mindset. All teachers indicated that they had been teaching for between 1 day and 15 years. The highest qualification held was a Bachelor of Education in either early childhood education ($n = 5$) or primary education ($n = 1$). This group will be referred to as the *focus group teachers* in Chapter 6 and Chapter 7 for ease of comparison with the Phase One teacher survey results. The teachers refer to the children as *students* and this term will used unlike a variation of terms used in the literature. The researcher asked the focus group teachers to undertake the same survey that Phase One participants completed. The six focus group teachers were also involved in a professional development session involving other data collection methods including a mindset quiz, brainstorm and jottings. In the next section, the results of the focus group teacher survey are discussed in relation to research questions one, two and three.

1. What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?

2. What attributes do early childhood teachers believe students require to be effective learners?

3. How do early childhood teachers support the development of a growth mindset for learning in students?

6.2.1 Teacher Knowledge and Attitudes of Mindset

The six focus group teachers were administered the same survey as the teachers in Phase One. The teachers completed this in their own time after they had attended the

introductory meeting. The first five questions in the survey collected demographic data. Questions six to nine in the survey were designed to establish the knowledge and attitudes the teachers had about mindset. All six teachers indicated that they had heard the term *growth mindset* previously. Four indicated that they used the term *mindset* with students and two did not. All six of the focus group teachers strongly agreed that your mindset is a belief you have about your most basic qualities such as your intelligence, talents and personality. All six teachers indicated (i.e. on a five-point Likert scale ranging from *not important* to *extremely important*) that a student's mindset has an extremely important impact on their learning.

In comparison with Phase One findings of the same survey with the larger sample, Phase Two results indicated that the six focus group teachers had greater awareness of mindset theory. All six Phase Two teachers had heard of mindset theory, whereas only 63% of the teachers who completed the Phase One survey had heard of fixed and growth mindset.

Comparison of the survey results in Phase One and Phase Two indicated that a high proportion of the teachers in both phases believed that a student's mindset affects their learning. In total, 92% of Phase One teachers rated a child's mindset as important (i.e. 50.5% as extremely important and 41.9% as very important) and none rated mindset as not at all important. Similarly, in Phase Two all six focus group teachers indicated that they perceive that a student's mindset is extremely important to their learning. Even though most teachers believed that mindset is important, only some used the term mindset with students. Over half of the Phase One teachers (58%) indicated they did not use the term in their work with students. Of the remaining, 34% indicated they did use the term mindset and 7.4% were unsure. The Phase Two survey results

indicated that four focus group teachers used the term *mindset* with students and two did not.

The focus group teachers were also asked to what extent they agreed with several factors associated with the development of a child's mindset for learning on a five-point Likert scale from *strongly disagree* to *strongly agree*. Table 6.1 shows that the majority of the focus group teachers had a good understanding of the factors that contribute to a growth mindset. The six teachers strongly agreed that persistence in learning and high levels of effort towards learning promote the development of a growth mindset. Five of the teachers strongly agreed that excitement about learning, willingness to make mistakes and learn from them, frequent participation in class activities and responsible decision-making also assist in the development of a growth mindset. Four of the teachers strongly agreed that an understanding of how the brain works leads to development of a growth mindset; of the remaining two teachers, one somewhat agreed and the other somewhat disagreed. Interestingly, three of the six teachers neither agreed nor disagreed that good grades lead to a growth mindset and two teachers neither agreed nor disagreed that high standardised test scores lead to a growth mindset, which indicates some uncertainty regarding the factors that influence a student's mindset. Similarly, in Phase One 43.8% of the teachers neither agreed nor disagreed that good grades lead to the development of a growth mindset and 23.9% neither agreed nor disagreed that high standardised test scores lead to a growth mindset.

A comparison of the Phase One and Phase Two results revealed that the Phase Two focus group teachers demonstrated a greater understanding of factors that contribute to a growth mindset. Fewer teachers in Phase One strongly agreed that factors such as high levels of effort (48.3%), responsible decision-making (47.2%) and an understanding of how your brain works when you learn (30.3%) contribute to a

growth mindset. In Phase Two, all six teachers either somewhat agreed or strongly agreed with the growth mindset factors listed except for one factor—an understanding of how your brain works when you learn. This factor appeared to present some uncertainty for the teachers regarding its effect on mindset.

Like in the Phase One survey results investigating the factors teachers believe contribute to a growth mindset(76.4%), five of the focus group teachers (83.3%) also indicated that consistent completion of tasks is a factor associated with the development of a growth mindset. This factor is actually more often associated with development of a fixed mindset, as it encourages a focus on the end product rather than the process of learning. Despite the focus group teachers showing a greater knowledge of mindset theory than the Phase One teachers, the Phase Two results indicated some inconsistency regarding understanding of the factors associated with the development of a growth mindset.

Table 6.1

Teacher Beliefs of Behaviours that Demonstrate Fixed and Growth Mindset

Behaviours*	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Growth mindset factors					
Excitement about learning	0	0	1	0	5
Persistence in learning	0	0	0	0	6
High levels of effort towards learning experiences	0	0	0	0	6
Frequent participation in class activities	0	0	0	1	5
Willingness to make mistakes and learn from them	0	0	0	1	5
An understanding of how your brain works when you learn	0	1	0	1	4
Responsible decision-making	0	0	0	1	5
Fixed mindset factors					
Consistent completion of work	0	0	1	2	3
Good grades	0	1	3	2	0
High standardised test scores	0	2	2	2	0

Note. n = 6.

*The fixed and growth mindset behaviours were presented in random order in the survey question.

The focus group teachers were given the opportunity, using an open-ended question, to describe any other factors associated with the development of a growth

mindset. Only one teacher commented stating, "a positive connection with the teacher, self-esteem and confidence, health and happiness and the ability to think creatively and problem solve." Comparable comments by teachers in the Phase One survey identified a willingness to try new things, an enquiring mind and creating a positive environment. In response to further questions the teachers then revealed their feelings about fostering a growth mindset.

The focus group teachers read several statements and indicated the extent to which they agreed on a five-point Likert scale ranging from *strongly disagree* to *strongly agree* (see Table 6.2). The majority of the teachers ($n = 5$) strongly agreed that all students can and should have a growth mindset with one teacher somewhat agreeing. Four teachers strongly agreed and two somewhat agreed that fostering a growth mindset in students is part of their job and responsibilities. The most striking finding, however, was that even though all the teachers believed that they were good at fostering a growth mindset in their students (i.e. five strongly agreed and one somewhat agreed), only two strongly agreed that they had adequate knowledge to teach students how to develop a growth mindset. The Phase Two data further supported the findings from Phase One, which showed that despite most teachers agreeing that it is beneficial for students to have a growth mindset and believing it is part of their job to foster a growth mindset they did not have adequate knowledge to do so. The six teachers were also asked what attributes they believe students need to be effective learners.

Table 6.2

The Extent to Which Teachers Agreed With Statements About Growth Mindset

Teacher beliefs about growth mindset	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
All students can and should have a growth mindset	0	0	0	1	5
Fostering a growth mindset in students is part of my job and responsibilities	0	0	0	2	4
I am good at fostering a growth mindset in my students	0	0	0	1	5
I have adequate knowledge to teach students how to develop a growth mindset	0	0	0	4	2

Note. n = 6.

6.2.2 Teacher Beliefs of Attributes Students Need to be Effective Learners

The focus group teachers rated their beliefs on a five-point Likert scale from *not at all important* to *extremely important* about factors that contribute to student success in learning (see Table 6.3). This question established that all of the teachers ($n = 6$) believed that student engagement and motivation, teaching quality, feeling safe at school, developing a growth mindset and social-emotional learning are extremely important while school discipline policies and family background are moderately or very important. The majority of the teachers (n = 4) viewed the school climate and parental support as extremely important. The findings indicate that the focus group

teachers viewed a growth mindset as just as important as other factors such as teaching quality, engagement and motivation to contribute to success in learning.

A comparison of the survey results in Phase One and Phase Two indicated that the teachers had similar responses. Both survey groups indicated that factors such as students feeling safe at school, teaching quality, engagement and motivation, social and emotional learning, developing a growth mindset, the school climate and parental support and engagement are all extremely or very important for successful learning. Fewer teachers in both surveys indicated that family background and school discipline policies are extremely important.

Table 6.3

Factors Teachers Rate as Important for Student Success in Learning

Factors	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Engagement and motivation	0	0	0	0	6
Teaching quality	0	0	0	0	6
Feeling safe at school	0	0	0	0	6
Social and emotional learning	0	0	0	0	6
Developing a growth mindset	0	0	0	0	6
Parental support and engagement	0	0	0	2	4
School climate	0	0	0	2	4
Family background	0	0	2	3	1
School discipline policies	0	0	2	3	1

Note. n = 6.

In an open question that followed, the focus group teachers indicated other factors they believe lead to student success in learning. One teacher said, "children need a connection and engagement to what they are learning, connections to teachers and feeling supported to develop resiliency skills." Similarly, teachers in Phase One also felt that developing positive relationships was an important factor for successful learning. One teacher mentioned factors such as, "a positive disposition for learning, happiness and a connection and engagement to what they are learning and teachers." Further, teachers stated their beliefs about what students need for successful learning.

Regarding 11 student beliefs or attitudes that are important for success in learning and/or reflect a growth mindset, the focus group teachers reported their level of agreement using a five-point Likert scale from *I strongly disagree* to *I strongly agree*. All six teachers strongly agreed that students need to feel a sense of belonging in their school community, believe that their teachers know them and feel that their academic abilities can increase through effort (see Table 6.4). The Phase One survey data similarly showed that most teachers in the larger survey strongly agreed that it is important for students to feel that their teachers know them (82%) and a sense of belonging (73%). However, in Phase One fewer teachers (47.2%) strongly agreed that students should hold the belief that their academic abilities will increase with effort. This finding indicates that the Phase Two focus group teachers had a greater understanding of the core value of effort for learning that students need to develop a growth mindset. Five of the six focus group teachers strongly agreed that failure is a part of learning, providing further evidence of teacher knowledge of growth mindset theory. Similarly, in Phase One 89.2% of the teachers somewhat or strongly agreed that students should hold the belief that failure is a part of successful learning. The belief that doing well in school leads to further success was not ranked as favourably with

only three teachers in the focus group strongly agreeing. Similarly, in Phase One only

29.2% of the teachers strongly agreed that doing well in school leads to further success.

The teachers were then asked how they support the development of a growth mindset

for learning.

Table 6.4

Teachers' Agreement with Student Beliefs that Affect Success for Learning

Student beliefs	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
I feel a sense of belonging in my school community	0	0	0	0	6
My teachers know me	0	0	0	0	6
My academic abilities will increase through effort	0	0	0	0	6
Failure is part of my learning experience	0	1	0	0	5
I can be successful at school	0	0	1	0	5
I have the ability to learn challenging material	0	0	0	1	5
My teachers treat me fairly an equally	0	0	0	1	5
I have some autonomy and choice in my learning tasks	0	0	0	1	5
My work at school is meaningful for me	0	0	0	2	4
Seeking help assists me with learning	0	0	1	1	4
Doing well in school will lead to further success for me	0	0	1	2	3

Note. n = 6.

6.2.3 Supporting Development of Growth Mindset in Students

The teachers were asked to indicate how often they engaged in practices that develop either a fixed or growth mindset in students on a three-point Likert scale from *often* to *never*. The practices were randomly listed in the survey question. The responses provided data to address research question three: 'How do early childhood teachers support the development of a growth mindset for learning in students?' The survey results showed that all six focus group teachers felt that they often praised students for effort and encouraged students who were already doing well to keep trying to improve (see Table 6.5). The teachers often encouraged students to try new strategies when they were struggling and praised students for their learning strategies. Most (over 80%) Phase One teachers also indicated that they often used these practices. A similar amount of teachers in Phase One (62.8%) reported that they often suggested that students seek help from other students on their work compared with the Phase Two focus group teachers ($n = 4$). Praising students for effort, encouraging students to try new strategies and suggesting students seek help from peers are all effective strategies to encourage a growth mindset.

Findings from the focus group in relation to fixed mindset practices revealed that two teachers indicated that they often and four teachers occasionally told students it is alright to struggle as not everyone is good at a given subject. The Phase One teachers also indicated that they did this occasionally (54.1%) or often (35.3%). Four focus group teachers in Phase Two indicated that they occasionally and one teacher often praised students for their intelligence. The Phase One results indicated that a higher number of the teachers often (58.1%) or occasionally (25.6%) praised students for their intelligence. All six focus group teachers in Phase Two occasionally praised students for earning good test scores but none indicated they did this often. Phase One teachers

indicated that they praised students for earning good test scores more regularly with 52.3% often and 33.7% occasionally using this practice. Factors such as praising students for intelligence, praising students for earning good test scores or grades and encouraging students by telling them a new topic will be easy to learn are all known to encourage a fixed mindset. A comparison of Phase One and Phase Two survey data indicates that the focus group teachers more often used practices that develop a growth mindset; however, fixed mindset practices were also occasionally used. This supports the earlier finding that few of the focus group teachers felt they had adequate knowledge to develop a growth mindset in students, highlighting a need for further guidance.

Table 6.5

Practices Utilised by Focus Group Teachers in Classrooms

Teacher practices*	Often	Occasionally	Never
Growth mindset practices			
Praising students for their effort	6	0	0
Encouraging students who are already doing well to keep trying to improve	6	0	0
Encouraging students to try new strategies when they are struggling	6	0	0
Praising students for their learning strategies	6	0	0
Suggesting that students seek help from other students on school work	4	2	0
Fixed mindset practices			
Telling students that it is alright to struggle, not everyone is good at a given subject	2	4	0
Praising students for their intelligence	1	4	1
Praising students for earning good scores or grades	0	6	0
Encouraging students by telling them a new topic will be easy to learn	1	1	4

Note. n = 6.

*The fixed and growth mindset practices were presented in random order in the survey question.

The focus group teachers were asked to indicate how often they used particular statements when encouraging students to learn on a three-point Likert scale of *often*, *occasionally* or *never* (see Table 6.6). These statements are known to reinforce either fixed mindset or growth mindset. All six teachers indicated that they often used statements that encourage a growth mindset such as "I really like the way you tried all kinds of strategies on that problem until you finally got it", "I love how you kept your concentration to keep working on that problem" and "Great job! You must have worked really hard on this." Fewer Phase One teachers from the larger cohort used these statements. The Phase Two survey indicated that five focus group teachers often and one occasionally told students they worked really hard and their improvement showed. Similarly, in Phase One 78.8% of the teachers often and 21.2% occasionally did this. This finding shows that teachers in the focus group had greater awareness of the feedback that reinforces growth mindset.

Teachers in the focus group indicated that they occasionally used phrases reported to encourage a fixed mindset, such as "Look at how smart you are" and "See you are good at this subject, you got an A on your test." Over half of the teachers in Phase One also occasionally used these fixed mindset statements. Focus group teachers in Phase Two indicated that they never used fixed mindset statements such as "You are one of the top students in the class" and "This is easy, you will get it in no time." However, in Phase One 93.1% of the teachers indicated that they occasionally told students they are one of the top students in the class. Overall, Phase One teachers indicated that they more regularly used fixed mindset statements than teachers in Phase Two indicating that Phase Two teachers had a greater awareness of the impact of these statements on mindset. Further questions investigated teacher beliefs about the development of a growth mindset in students.

Table 6.6

Frequency of Statements Used by Focus Group Teachers

Statements	Often	Occasionally	Never
Growth mindset statements			
I really like the way you tried all kinds of strategies on that problem until you finally got it	6	0	0
You really worked hard and your improvement shows	5	1	0
I love how you kept your concentration to keep working on that problem	6	0	0
Great job! You must have worked really hard on this	6	0	0
Fixed mindset statements			
See you are good at this subject. You got an A on your last test	1	2	2
Look at how smart you are	0	4	1
You are one of the top students in the class	0	0	5
This is easy, you will get it in no time	0	1	5

Note. n = 6.

Focus group teachers were finally asked to what extent they integrated the

teaching of growth mindset for learning into their teaching expectations and practice on

a three-point Likert scale of *often*, *occasionally* or *never*. All six teachers indicated that

they do this occasionally but none of the teachers did this often. These results are

similar to Phase One, in which 89% of the teachers indicated that they did this

occasionally and 10.7% indicated they have never done this.

In conclusion, the Phase Two survey results indicated that the six focus group

teachers understood what mindset is and had made attempts to incorporate practices to

encourage the development of a growth mindset in their students. However, the focus

group teachers appeared to have some misunderstanding of the beliefs students need

and the practices that encourage growth mindset. The findings demonstrate that the

focus group teachers did not have adequate knowledge to teach students how to develop

a growth mindset. These findings support those gathered in Phase One using the same survey with a larger number of teachers. Given that the chosen school for Phase Two and Phase Three was actively trying to develop a growth mindset in students, these findings add further support for the development of principles to provide guidance on mindset to early childhood teachers. During the professional development session that followed, further data were collected through a mindset quiz, reflective tool and jottings.

6.3 Phase Two Findings—Mindset Quiz, a Reflective Tool and Jottings

Three methods—a mindset quiz, a reflective tool and jottings—were used in Phase Two during the professional development session (i.e. part of the introductory meeting) to further explore the research problem by collecting data on the teachers' mindsets and their understandings of mindset. The introductory meeting was held at the teachers' school on May 1 2019. Appendix L provides further details of the professional development session.

6.3.1 Teacher Mindset Quiz

The focus group teachers anonymously completed a mindset quiz (Appendix M), adapted from Dweck (2016a), during the professional development session. In the quiz the teachers responded to 20 statements on a four-point Likert scale of *strongly agree*, *agree*, *disagree* and *strongly disagr*ee to determine their current mindset orientation. The results indicate that four of the focus group teachers had a growth mindset with some fixed ideas and two had a strong growth mindset (see Table 6.7). Teachers who have a growth mindset are more likely to role model growth mindset practices.

Table 6.7

Results of Mindset Quiz for Focus Group Teachers

	0–20	21–33	34–44	45–60
	Strong fixed mindset	Fixed mindset with some growth ideas	Growth mindset with some fixed ideas	Strong growth mindset
Teachers results			4	2

Note. n = 6.

6.3.2 'Told Us, Made Us Wonder' Reflection Tool

During the two-hour professional development session the focus group teachers completed a 'told us, made us wonder' reflective tool (Appendix N). This reflective point provided an important opportunity for teachers to take stock of their knowledge about mindset. The reflective tool provided the researcher with further information about the teachers' knowledge of mindset theory and highlighted any questions they had (see Table 6.8).

The data collected partway through the professional development session indicate that the focus group teachers had some understanding of mindset theory. Responses in the 'told us' section reflected accurate descriptions of elements of mindset theory. The 'made us wonder' section asked teachers to adopt reflective thinking to consider unanswered questions more deeply. The responses included speculation about how teachers can shift students' fixed mindsets, how teachers can work with parents to shift students' mindsets and desire for a more nuanced understanding of mindset theory. The researcher used these responses to inform development of the skeleton design principles and to help the teachers explore design principles that may support them in teaching mindset theory to foster a growth mindset in students.

Table 6.8

Focus Group Teachers' Responses to the 'Told Us, Made Us Wonder' Reflection

Told us	Made us wonder
Intelligence can change	Does this mean IQ? Or abilities in particular subjects or areas
We can change our mindset	
You create a mindset via your own experiences	What do we mean by intelligence?
Mindsets are imperfect models of reality	What is the impact of parents with fixed mindsets? No risk takers? Parent experiences with maths or music? Parent expectations comparing their child?
The importance of helping young children to develop a positive growth mindset	
The importance of connecting to problem solving in learning	What are some strategies to shift someone who has a fixed mindset?
Self-dialogue and low confidence in making mistakes effect your mindset	What are some phrases to use with students to change their mindset?
Two types, fixed and growth	How can I cater for individual mindsets in the classroom?
We have different mindsets	Can your mindset depend on the subject matter?
More aware of my mindset	Why do younger children fear failure?
Babies have less neural pathways and they develop and peak at 6 years of age	What kinds of resources can I use?
Fixed mindset is a belief that intelligence is something you are born with	
Growth mindset means one's belief that their intelligence can change	
Fixed mindset—give up when something is difficult, dislike change, do not like constructive criticism	
Growth mindset—persistent, accept challenges, inspired by others' success	

6.3.3 Jottings of Observed Fixed and Growth Mindset Behaviours

The focus group teachers were asked to note down examples of behaviours they observed in their classroom in which they thought fixed or growth mindsets were

demonstrated (Table 6.9). It is acknowledged that these behaviours may not be solely

attributable to a student's mindset, but may be may be influenced by other factors.

Table 6.9

Fixed and Growth Mindset Behaviours in Focus Group Teachers' Classrooms

Fixed	Growth
Cries when getting constructive feedback	Children encouraging each other (e.g. monkey bars)
Threatens to run away	Asks for more challenging work
Refuses to work—opts out	Saying 'hakuna matata'
Verbal—I can't do this	Persistence
Gestures—shrug of shoulders, sitting back reluctant to do work, crawling into shell	Attentive to instructions
	Having a go—sounding out words
Reluctant to start tasks	Taking risks
Fear of making a mistake	Enquiring
Negativity towards each other	Happiness, smiles
Needing comfort and attention	Open minded—have a go
Tantrums	Taking responsibility for their learning
Always choose other activities	Thinking outside the box
Avoidance strategies—saying they feel sick, going to the toilet, walking away, watching others, crying, asking can you do it for me, or will say 'I can't do it'	Celebration of persistence and goal achievement
Tears	
Negative put downs	
Reliant on teacher encouragement	
Distracted easily	
Time wasting	
Copying peers	
Limited attempts to complete tasks	
Will hold back	

Note. 'Hakuna matata' is a Swahili saying from the movie *The Lion King* that means 'no

worries'.

The observations described by the focus group teachers provided insight into the way the teachers interpreted student behaviours and the mindsets they believed they reflected. This information also informed the skeleton design principles developed as outlined in the next section.

6.4 Skeleton Design Principles

The skeleton design principles are a record of the researcher's early thinking of a possible solution to the problem. The list of skeleton principles provides 'rules of thumb' for teachers to use to assist students to develop a growth mindset in the early years. The researcher developed a skeleton set of design principles based on the literature review, the analysis of Phase One and Phase Two survey data and fieldwork conducted during the professional development session with the teachers (see Table 6.10). The field investigation with the focus group teachers conducted in Phase Two provided further analysis and exploration of the problem (i.e. teachers do not know how to reinforce a growth mindset) with the six teachers involved in the remainder of the study. The ideas developed by the researcher to form the skeleton design principles provided an initial design proposition as per the DBR process. The skeleton principles were not shown to the teachers but were used by the researcher to guide the focus group discussion when necessary. The focus group teachers refined the design principles in Phase Three.

Table 6.10

Skeleton Design Principles to Help Teachers Develop Growth Mindset in Students

Skeleton principles	Contributing findings
Teachers know their own mindset	Literature review, mindset quiz, reflective tool
Students have knowledge of how the brain works when we learn	Literature review, reflective tool, survey
Goal setting is important for each child	Literature review, jottings, survey
Process and perseverance are acknowledged	Literature review, jottings, reflective tool, survey
Students use strategies for struggle when learning gets difficult	Literature review, jottings, reflective tool, survey
Teachers provide feedback for effort	Literature review, jottings, survey
Teachers have high expectations of all students	Literature review, jottings, survey

The researcher referred to the skeleton design principles as needed in the first focus group meeting in Phase Three as the teachers and researcher collaboratively developed the design principles. However, the skeleton design principles were not explicitly shared with the participants. An organic reflection was completed by the researcher at the end of Phase Two to consolidate the theoretical and practical findings.

6.5 Phase Two—Organic Reflection

6.5.1 What?

A long-range goal for the study was identified as part of the DBR process in Phase One to develop a set of design principles over 10 weeks to be used by teachers to assist students to develop a growth mindset in early childhood contexts. The researcher was immersed in the context of one school in Phase Two to further analyse and explore the problem of how early childhood educators can help students develop a growth mindset. Six early childhood educators from one independent girls' school in Perth,

Western Australia, formed the focus group for Phase Two and Phase Three. The focus group teachers initially took part in a two-hour professional development session to provide data on their understandings of mindset and their own mindset orientation. Several data collection tools were used including completion of the Phase One survey, a teacher mindset quiz, a 'told us, made us wonder' reflection tool and jottings. The data collected informed the development of the skeleton design principles. Rather than developing a professional development model or set of lessons that may be implemented sporadically, the researcher chose to develop a set of design principles intended to guide teachers in teaching mindset theory to foster a growth mindset in students.

The Phase Two findings revealed that the six focus group teachers demonstrated some knowledge of mindset theory. Additionally, the focus group teachers already implemented some practices to assist students to develop a growth mindset. They believed that a growth mindset is an important factor for success in learning and all students should have a growth mindset. However, the findings also revealed that the focus group teachers did not have a nuanced understanding of mindset theory, using practices that also reinforce fixed mindset. The most striking result, however, was that even though the majority of the teachers strongly agreed that they are good at fostering a growth mindset in students only two teachers strongly agreed that they have adequate knowledge to teach growth mindset. This finding further supported the design principles.

A comparison of the Phase One and Phase Two survey results indicated that both groups believed that mindset affects learning but did not feel they had adequate knowledge to develop growth mindset in their students. This was further reflected in the finding that the Phase One and Phase Two teachers occasionally integrated the teaching

of growth mindset rather than often. Both groups of the teachers felt it important that students feel safe at school and develop positive relationships with teachers to be effective learners but did not believe that having a growth mindset was as important as these factors. The Phase One and Phase Two teachers used practices that reinforce both growth and fixed mindsets with Phase One teachers more regularly using statements that reinforce a fixed mindset. The findings indicate that the Phase Two teachers had greater knowledge of mindset theory including a greater understanding of factors associated with developing a growth mindset for learning.

6.5.2 So what?

In Phase Two, the researcher analysed the findings from Phase One and Phase Two and returned to the literature to assist in the design of the skeleton principles (McKenney & Reeves, 2019). The skeleton design proposition was used to guide the design of the solution as per the DBR process. The researcher chose not to show the skeleton principles to the focus group teachers to enhance the reliability of the findings. The skeleton design principles were referred to only by the researcher to sharpen the teachers' focus on the intervention and serve the theoretical goals of empirical testing to form new theoretical understandings (McKenney & Reeves, 2019).

6.5.3 Now what?

The skeleton design principles were used by the researcher to prompt discussion where necessary in the first focus group in Phase Three. During the first focus group the participating teachers collaboratively developed the draft design principles with the researcher to be implemented in two iterative cycles in Phase Three.

6.6 Summary

Chapter 6 reported the findings from Phase Two that resulted in the development of a set of skeleton design principles. The principles drew on the literature,

conceptual framework and initial data collected from six focus group teachers in one school context. Data collection tools included the Phase One survey, a mindset quiz, a reflective tool and jottings. The findings revealed that the focus group teachers had an awareness of mindset theory, some understanding of the factors and practices associated with the development of a growth mindset and believed a growth mindset affects learning. However, the focus group teachers did not believe they had adequate knowledge to teach students to develop a growth mindset. Given that this group of teachers was purposefully chosen for Phase Two and Phase Three as they were already implementing practices to develop a growth mindset, this finding is surprising and further supports a similar finding in Phase One. The teachers in Phase Two went on to develop, implement and refine the design principles in Phase Three. Findings from Phase Three are discussed in Chapter 7: Phase Three Findings.

Chapter 7: Phase Three Findings

7.1 Introduction

Phase Three reports on the findings of the development, trialling and refinement of the design principles with six early childhood teachers in their school setting during two iterative cycles of implementation as shown in Figure 7.1.
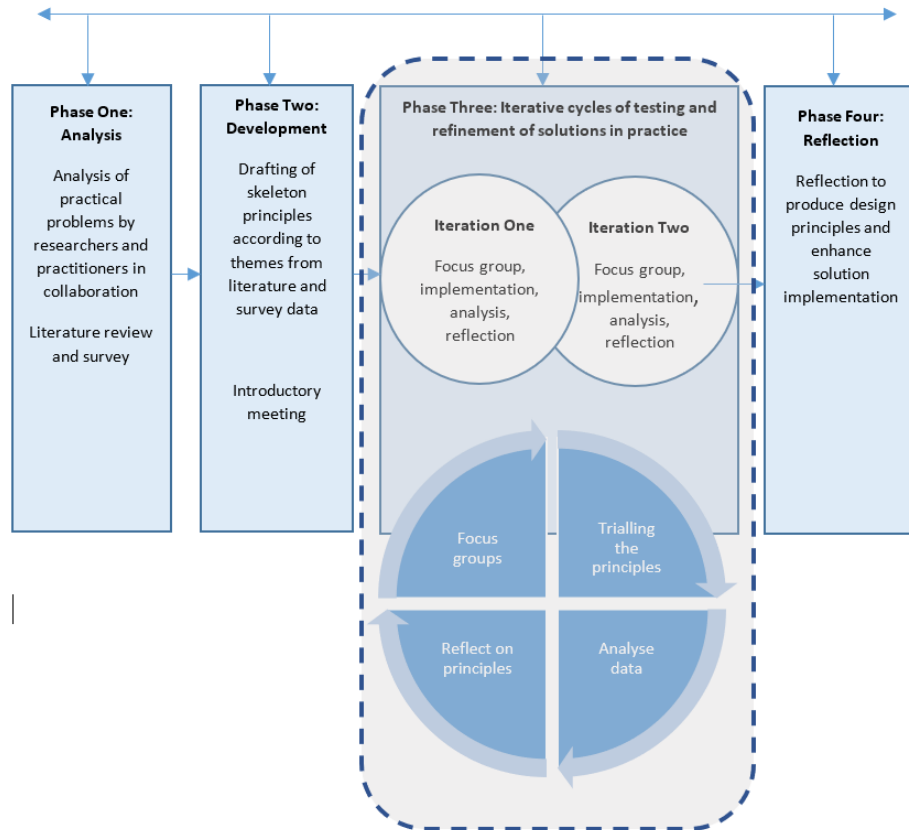
Figure 7.1

Design of this DBR Study—Phase Three

Each of the two iterations occurred over five weeks in one school term. Three focus group discussions were held at the school to refine the principles, the first at the beginning of Iteration One, the second at the end of Iteration One or beginning of Iteration Two and the third at the end of Iteration Two. In Phase Three, the research was

developmental in nature with the objective of the inquiry being to "improve rather than prove" (Reeves, 2006, p. 18). Iteration One findings were collected from the first and second focus group discussions and included jottings, focus group audio, PMI and video reflections. Iteration Two findings were gathered from focus group audio, jottings, video reflections and a final questionnaire (see Figure 7.2).
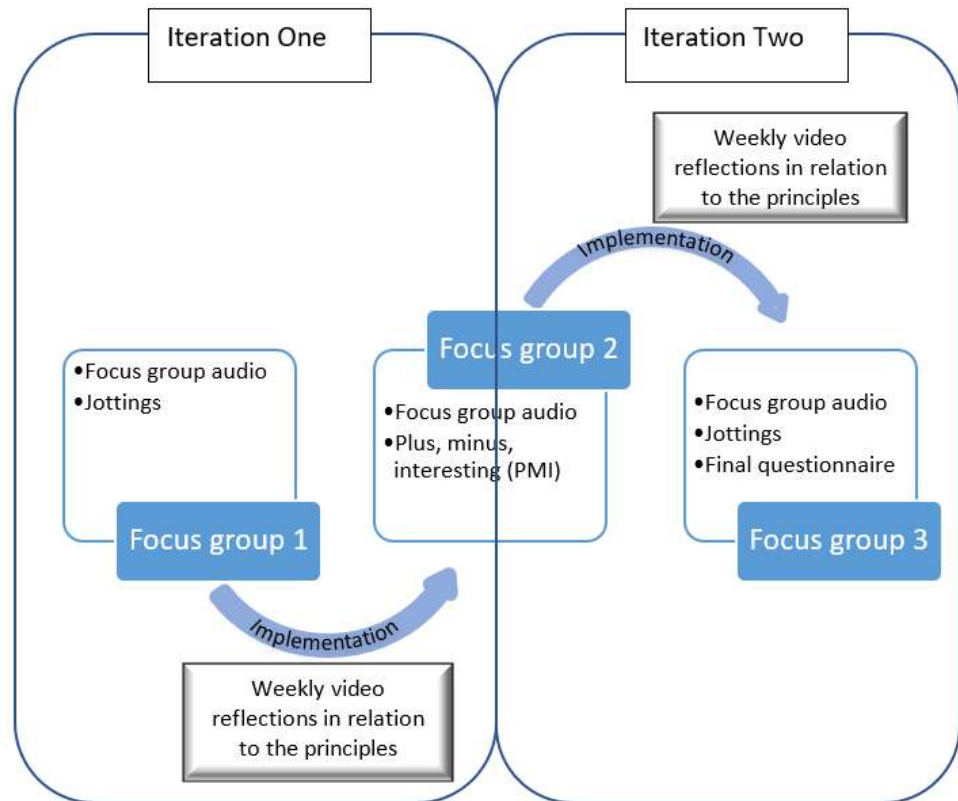
Figure 7.2

Components of Iteration One and Two

7.2 Iteration One

Findings from Iteration One were determined through data gathered during two focus group discussions and included group recordings, jottings and video reflections. In the first focus group discussion the teachers developed a draft set of principles. The

teachers trialled seven design principles for five weeks, after which they were refined

during the second focus group discussion. A description of the findings from data

collected and analysed in Iteration One follows.

7.2.1 Focus Group Discussion One Findings

The following section addresses the findings of the first focus group discussion

held August 31st, 2019. The aim of the first focus group discussion was to

collaboratively develop the design principles and explain the video diary reflection

process. The discussion points used during the first focus group discussion can be

viewed in Appendix P.

Focus Group Discussion One: Jottings

Teacher Beliefs of Factors Students Need to be Effective Learners

Findings from the first focus group discussion provided further data to address

research question two: What attributes do early childhood teachers believe students

require to be effective learners? While a question about attributes required for effective

learning had been asked in the survey, it provided a point of discussion to initiate the

development of the draft design principles. The resulting discussion indicated that the

focus group teachers had expectations of students as learners that align with many of the

attributes evident in students with a growth mindset. The focus group teachers were

assigned a pseudonym as outlined in Section 4.6.2, which are used in the reporting and

discussion of the findings. The teachers noted attributes such as resilience and a love of

learning (Anne), being responsible (Jenna), self-belief, a willingness to make mistakes,

enjoyment and engagement in learning (Annalyse), being in a safe learning

environment, experiencing success and communicating (Dionne), being able to

collaborate and persist (Fay), and being independent, ready for learning and a risk taker

(Deidre) as shown in Figure 7.3. These findings replicate some of the factors shown to

strengthen a growth mindset in the conceptual framework developed by the researcher and gleaned from the literature, which included resilience, self-efficacy, social competencies such as collaboration and communication, and self-regulation skills such as independence and persistence. Additionally, having a growth mindset can strengthen these skills and dispositions.

Figure 7.3

Teacher Beliefs of Attributes Students Need to be Effective Learners

How do Teachers Support Development of Growth Mindset?

The first focus group discussion also added findings to address research question three: How do early childhood teachers support the development of a growth mindset for learning in students? Analysis of teacher responses during focus group discussion one revealed five common themes (see Figure 7.4). The teachers modelled growth mindset, used goal setting with students, used commercial programs or class enquiries, used language to support a growth mindset and catered for individual needs. Focus group discussion one teacher responses are outlined in more detail in Appendix W.
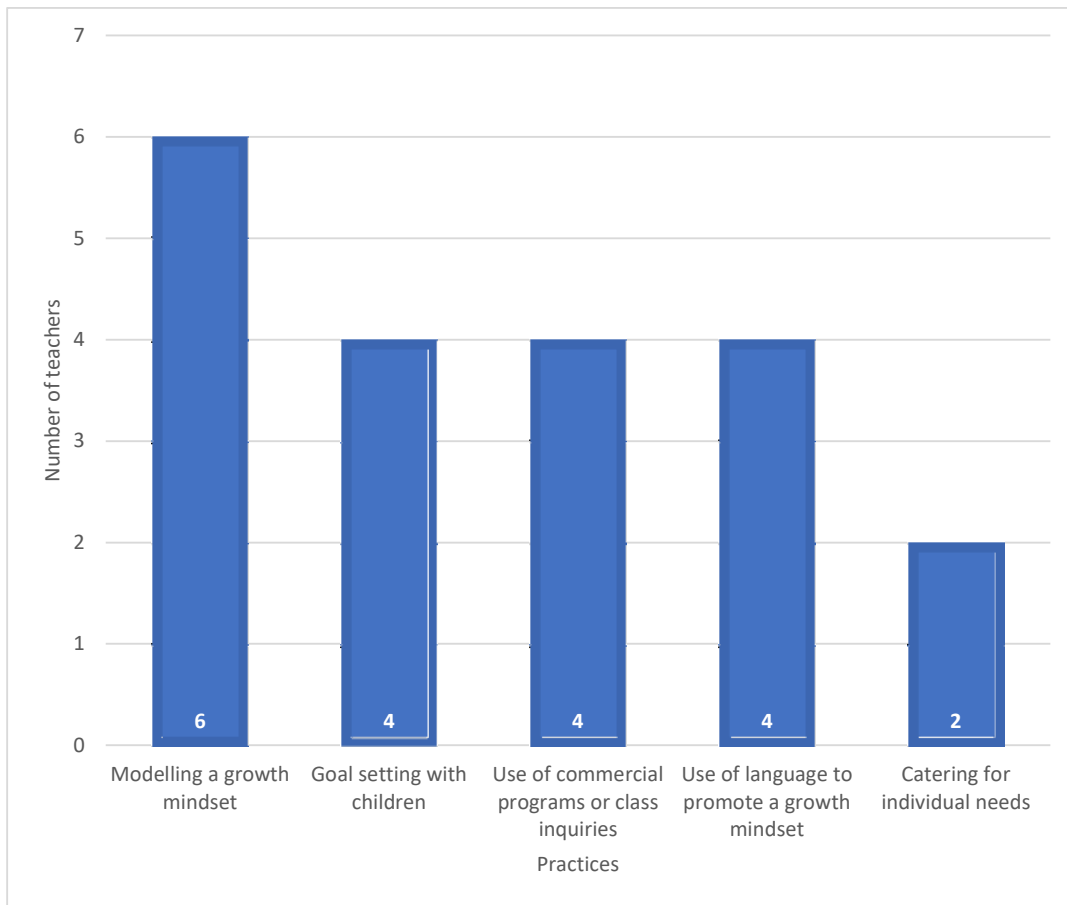
Figure 7.4

Practices Used by Teachers to Develop a Growth Mindset in Students

All of the participants revealed that the most common practice they engaged in was modelling a growth mindset ($n = 6$). Anne mentioned that she "model[s] a growth mindset. I talk about my thoughts and feelings openly" and also identified using particular language when modelling: "I guess it's the language and, as I said, modelling what we're doing in the classroom." Modelling a growth mindset is one practice the focus group teachers used to develop a growth mindset in students.

Goal setting ($n = 4$) with students was another practice used by the focus group teachers to develop a growth mindset. Annalyse and Jenna stated they had been "goal setting with our little ones, which was working well." Annalyse expanded on this,

suggesting that "the strategies [the students] put into place to reach their goals have been really wonderful." The focus group teachers developed a growth mindset in students by setting goals with them and "encouraging students to work towards their own goals and not compare to others" (Deidre). Setting goals for students was another practice used by the focus group teachers to develop a growth mindset.

The teachers mentioned several commercial programs ($n = 4$) they used such as Kimochi's (https://www.kimochis.com/home/) and You Can Do It (https://www.youcandoiteducation.com.au/), which they described as assisting students to develop a growth mindset. Fay mentioned,

> We use the [Komochis] as well as a tool to teach about identifying feelings and how talking about hard-to-feel feelings and feelings that are happy feelings and how we can make those hard-to-feel feelings smaller. So we're all going to feel those feelings at some stage or another but we need to be able to identify them, validate them and then have strategies in place to decrease the size of them.

Anne mentioned another program called Wabisabi Learning that the school had been using with Lee Wantabi-Crockett (https://wabisabilearning.com/):

> So for a few years now, we've been working with Lee Wantabi-Crockett on fluencies and the essential fluencies in the Early Learning Centre. We've done some great work putting the onus back on the students to guide their own learning.

Jenna commented that she had engaged her students in an inquiry about, "how we can ensure everyone thrives to reflect the school's values of heart, mind, body and spirit." While the programs mentioned do not specifically focus on developing a growth mindset in students, social-emotional programs can help students to manage feelings and dispositions associated with learning struggles such as frustration and mistake-

making. Inquiry learning may also assist students to develop a growth mindset as students struggle and discover their own way to figure out problems.

The use of language to promote a growth mindset ($n = 4$) was also used. Anne mentioned that she models "positive self-talk". Deidre also described the use of specialised vocabulary, stating that "encouraging the students to carry on using that language throughout the day as well. Being organised, being persistent but naturally just using those words during the day." The language teachers use sends a message to students about what teachers value; therefore, to foster a growth mindset teachers need to use language that promotes positive self-talk.

The focus group teachers ($n = 2$) indicated scaffolding individual student needs by differentiating to foster a growth mindset. Deidre mentioned that "we differentiate a lot in literacy and numeracy." One teacher raised the issue of managing student anxiety about learning. At times, the school psychologist was engaged to help students manage feelings of anxiety. Dionne said,

> I think this year, particularly with our new psychologist, we've talked a lot about the whole feeling of being a bit anxious and actually letting the students feel what anxious is and being able to identify it and know that you can actually move past that.

Recognising individual student needs and scaffolding to support students achieve success is a useful practice to develop a growth mindset. The teachers then described what a growth mindset teacher looks like.

What Does a Growth Mindset Teacher Look Like?

A brainstorm was used to elicit responses about what a growth mindset teacher looks like, in other words what the teacher does to foster growth mindsets in students. The ensuing discussion revealed three dominant themes through a constant comparison

analysis of data as shown in Figure 7.5. The participants identified the importance of the teacher creating a culture of growth, promoting a sense of purpose for learning and fostering a sense of belonging for students.

Create a culture of growth	Promote a sense of purpose for learning	Foster a sense of belonging
• Open minded, creative/ thinks outside the box/good at problem solving • Takes criticism • Plans exciting and engaging lessons/challenges and extends learning, scaffolds and guides learning, engaging, • Shows that mistakes are OK when learning, models risk taking • Provides specific feedback to individuals, small groups and whole group • Talks about their own personal goals • Flexibility • Provides a growth mindset role model • Uses a You Can Do It mentality – confident, resilient, organised, persistent and getting along	• Provides a purpose for learning tasks and makes it relatable to real life/learning intentions • Has a passion for teaching • Is a good listener and communicator • Encourages student agency – listens to students, values their thoughts and ideas	• Approachable, kind, easy to talk to, encouraging, warm and welcoming, honest • Encourages student agency – listens to students, values their thoughts and ideas • Is a facilitator rather than a dictator • Shares ideas and collaborates • Positive/happy, Sees the good in people, able to laugh at themselves/ has a good sense of humour • Appropriate tone of voice

Figure 7.5

Teacher Responses About What a Growth Mindset Teacher Looks Like

In the first focus group discussion, the teachers identified the importance of creating a culture of growth to support the development of students' growth mindset. The teachers mentioned creating a growth culture in different ways by role modelling a growth mindset including making mistakes, setting individual group and whole class goals with students, using specific goal-oriented feedback to assist students to reach goals and planning engaging lessons. Deidre said that "being a role model" contributes to creating a culture of growth and Annalyse agreed, saying that "[modelling] problem

solving as well is really important." Fay described how she modelled making mistakes and that not getting things right was part of the learning process: "[the teacher] guides or facilitates learning, shows mistakes are okay, models risk-taking and gives specific feedback." Anne talked about using specific goal-oriented and constructive feedback to assist students to improve, including "[using] specific feedback and talking about goals." Deidre refined the feedback she gave for "individuals, groups or the whole class." Fay also mentioned that she "talks about goals and encourages students to reach personal bests … a lot of talk about personal best." Anne thought that student engagement in lessons was important and teachers should plan "exciting, engaging lessons which challenge and extend students' learning." These findings suggest that a growth mindset teacher creates a culture of growth through a multifaceted approach.

The second theme of promoting a sense of purpose for learning was described in terms of actively listening to students and relating tasks to real life experiences. For example, Fay "listens to students and listens to their interests and allows them to have a voice when you're planning their learning tasks." Jenna agreed that she "provides a purpose for learning tasks and makes it relatable to real life/learning intentions." Anne also mentioned that the teacher needs to be "a good communicator and a good listener." Jenna suggested "valuing every student's ideas and thoughts. You value each individual because they're all special in their own way." The focus group teachers believed that a growth mindset teacher creates a sense of purpose for learning by listening to students, noticing their interests and creating learning experiences that relate to the students' real life.

Other responses reflected that a growth mindset teacher fosters a sense of belonging to support the development of growth mindset in students. The relational aspects of being a teacher were highlighted such as approachability, warmth, kindness

and being a good listener as Anne described, this as "approachable, kind, easy to talk to and smiling and encouraging, warm and welcoming, a good listener. Having the appropriate tone of voice and honest." Fay agreed that being "friendly, warm, positive, happy" is important. Deidre reiterated that teachers should be "friendly, warm, loving and welcoming, being a facilitator rather than a dictator." Thus, the focus group teachers suggested that a growth mindset teacher pays attention to the way they foster a sense of belonging to assist students to develop a growth mindset.

The focus group teachers indicated that a growth mindset teacher creates a culture of growth, a sense of purpose for learning and a sense of belonging. These findings provided additional data on the teachers' perceptions and assisted in the development of the design principles.

Focus Group Discussion One: Development of Draft Design Principles

After an initial discussion and the brainstorm, the participants and the researcher developed the draft design principles to be implemented in Iteration One as shown in Table 7.1. An outline of the collaborative development of the draft principles with the teachers follows.

Table 7.1

Draft Principles for Iteration One

Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.
Teachers hold high expectations of students and believe all students can learn and grow.
Teachers provide students with strategies for struggle through explicit teaching and normalising mistakes.
Teachers use language to promote a growth mindset including praising effort.
Teachers assist students to reflect on their learning by setting learning goals.
Teachers create a warm, safe and supportive learning environment where persistence, effort and mistakes are embraced.
Teachers teach students about how the brain works when you learn.

The researcher began by drawing the participants' attention to the points raised in the previous discussion and the brainstorm in the first focus group discussion about what a growth mindset teacher looks like. The participants were asked to view the brainstorm jottings and think of a 'rule of thumb' that may summarise one aspect of the list. The participants firstly mentioned the word *optimistic* as they described themselves as a group of early childhood teachers who were optimistic. Anne stated, "we're all really optimistic … it's always really optimistic talk." Considering this further, the participants related a positive attitude to knowing your own mindset before being able to teach students about mindsets. The first focus group discussion turned to the requirement for teachers to model a growth mindset to students. Faye described this by saying, "everyone's got talk going on in their head and you can be negative or you can be positive so modelling to this to [the students]." This idea led to the development of Principle One.

Principle One: Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.

Continuing to look at the brainstorm information about what a growth mindset teacher looks like and the practices teachers use, the researcher prompted discussion about the teachers' comments on scaffolding and guiding learning so all students can achieve their personal best. Fay said, "we need to have high expectations so students work to the best of their ability" and Anne agreed and extended on this by suggesting that "we need to also be modelling and showing how to take risks and make mistakes." Deidre suggested that teachers could do this by scaffolding student learning and said, "I guess that comes into the scaffolding part of it. We know as a professional that they can achieve that standard." The participants agreed that teachers have high expectations and scaffold learning for students, which led to the development of Principle Two.

Principle Two: Teachers hold high expectations of students and believe all students can learn and grow.

Further discussion ensued in focus group one about the importance of making mistakes to learn, modelling risk-taking and how teachers assist students when they hit a stumbling block during learning. Providing students with strategies for struggle was mentioned in the brainstorm when asked what a growth mindset teacher looks like. Fay responded stating, "challenge … [the students] need to have challenges to take risks," Anne agreed saying, "giving something a go, not saying you can't do something before you've given it a go." Dionne talked of offering multiple opportunities for students to practice new things as she stated, "we need to provide [students] with multiple opportunities." Jenna added that it is important that "the teacher models strategies to use when students are struggling to learn" and Fay added that "helping [students] to see that … normalising mistakes, that's how you learn." Deidre provided an example,

> I think we explicitly teach those strategies as well. For example, in Year 1, when
> it comes to writing, which is a big thing in Year 1, we teach the girls different

strategies to achieve where they need to go. So some can naturally write and have those creative ideas and flow but there are those girls that need those strategies, how to get their ideas on paper.

Anne talked about the age group and how talking out loud, and allowing space and time to do this, was important. She said, "young children often need to talk through the emotions they feel when they struggle." The teachers discussed how talking about struggling when learning needs to be done explicitly and Principle Three followed.

Principle Three: Teachers provide students with strategies for struggle through explicit teaching and normalising mistakes.

The focus group one discussion then turned to the language used in classrooms to develop a growth mindset and the emotions students feel when struggling with a new learning task. Fay said,

I think [learning struggles] would be quite emotion-driven as well. So if you're saying, that's making me feel scared, what is it about it that's making you feel scared and what can we do to make that feeling of scared smaller. Talk about the brave side of us that needs to come out and then break this all down into manageable tasks … a smaller goal within a goal or breaking a large goal down into smaller parts that students can achieve in a manageable way.

When children are faced with a learning struggle teachers can foster a growth mindset by using language that helps students reflect on effort, progress and emotions. Providing feedback for effort rather than ability acknowledges the small steps students take as they work towards achieving a goal. Principle Four resulted from this discussion.

Principle Four: Teachers use language to promote a growth mindset including feedback for effort.

Referring back to focus group discussion one and the practices teachers identified they used to develop a growth mindset, the researcher prompted discussion about goal setting. Fay mentioned that to develop a growth mindset "teachers should talk about goals and encourage students to reach personal bests." Goal setting requires students to reflect on their learning in terms of strategies used and progress made. Deidre stated,

> Reflection is a big part of it and also a focus on the emotions that you feel when you achieve a goal so that they understand that although something is scary at first, getting to an end point, they feel that success.

The teachers talked about drawing attention to the importance of explicitly setting goals 'with' and not 'for' students, which informed Principle Five.

Principle Five: Teachers assist students to reflect on their learning by setting learning goals.

The following discussion centred on the importance of ensuring that students feel safe and supported when learning, so they are comfortable to take risks and make mistakes. Fay suggested that teachers do this by creating a "warm, safe and supportive" learning environment to work towards their goals. Other participants also stated that the environment is "engaging", "inclusive" and include "the modelling of positive self-talk." Anne reiterated the freedom for learners to make mistakes by saying "making a mistake, it's not a bad thing … it's a learning opportunity." The participants agreed that the growth mindset teacher endeavours to create an environment where students feel comfortable to make mistakes. During the discussion the participants decided this should be a separate principle, Principle Six.

Principle Six: Teachers create a warm, safe and supportive learning environment where persistence, effort and mistakes are embraced.

The researcher raised the idea of teaching students about how their brain works as the literature showed it is an essential component for mindset interventions. Some participants noted that they had done this previously but others said they had not. Fay stated,

> I've never done that but I can now see the importance of doing it. We were at a PD just last week, a Komochi's PD and he said the same thing, that it's teaching the children about the brain and how different parts of the brain are responsible for different things.

Anne mentioned she had used a book called *Your fantastic elastic brain* (Deak, 2010) and Jenna agreed she had seen this book. While the teachers had not discussed teaching about the brain in their initial brainstorm, they decided it was important to describe as a principle.

Principle Seven: Teachers teach students about how the brain works when you learn.

The next stage of Iteration One was for teachers to trial the draft design principles. The participants recorded a weekly video diary reflection on one or more of the principles during the trialling. The findings are discussed in the next section.

7.2.2 Iteration One Video Reflections

The participants completed a weekly video reflection for five weeks on one or more of the principles, using the reflective framework model (Rolfe et al., 2001; see Appendix U). The participants uploaded video reflections to a cloud storage system endorsed by the university. The researcher then viewed and transcribed each reflection and deductively coded the transcription against the draft design principles and created inductive codes for unexpected findings using NVivo. The coding was analysed to look

for patterns such as principles with the highest amount of coding, those with the least coding and themes in the coding that did not fit with a design principle.

Teachers' Frequency of Reflection on Draft Principles

In total, 18 video diary reflections were uploaded in weeks one to five of Iteration One in Term 3. Each video was 5–10 mins long with total footage of 180 minutes analysed. A hierarchy diagram was constructed in NVivo 12 (see Appendix S) to analyse the frequency of coding to each principle. The hierarchy diagram shows the amount of coding to each principle with larger boxes indicating more frequent coding. Relationships between inductive and deductive coding are also represented by coding boxes within boxes. As new themes were presented during the data analysis the researcher created new codes as needed. The hierarchy diagram data from the video reflections for Iteration One are presented as a column graph in Figure 7.6 for ease of reading.
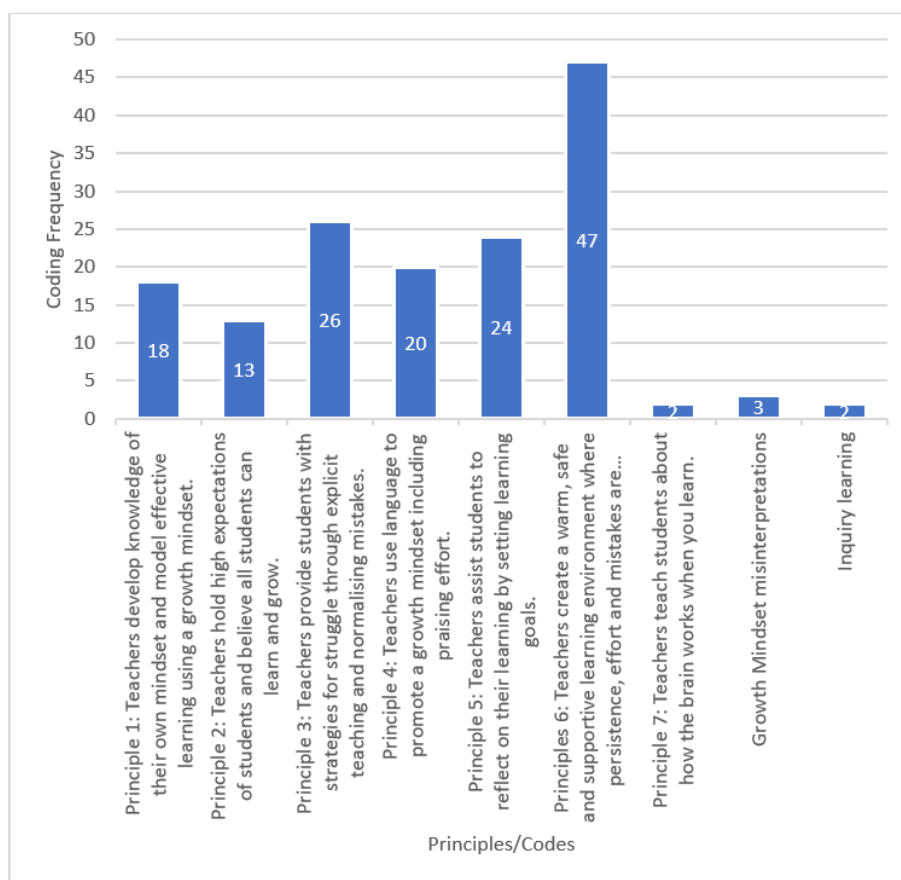
Figure 7.6

Frequency of Coding to Principles in Iteration One Video Reflections

The findings of the frequency of coding in the teacher video reflections to the draft principles indicated that Principle Six (i.e. Teachers create a warm, safe and supportive learning environment where persistence, effort and mistakes are embraced) received the most coding with 47 coding links and was therefore a major point of reflection for teachers in Iteration One. Principle Three (i.e. Teachers provide students with strategies for struggle through explicit teaching and normalising mistakes), Principle Five (i.e. Teachers assist students to reflect on their learning by setting learning goals), Principle Four (i.e. Teachers use language to promote a growth mindset including praising effort) and Principle One (i.e. Teachers develop knowledge of their

own mindset and model effective learning using a growth mindset) received similar coding frequencies of 26, 24, 20 and 18 coding links respectively. Principle Two (i.e. Teachers hold high expectations of students and believe all students can learn and grow) received the least with 13 coding links.

Principle Six was the most coded of all the principles during Iteration One. In one video reflection, Dionne reflected on Principle Six. She worked with small groups of students identified by the classroom teacher as needing further support with learning in pre-primary and Year 1. The students were withdrawn from normal classroom activities and taken to a separate room to receive support for a variety of reasons. She related how one student she worked with demonstrated high levels of anxiety that hindered her engagement in writing. She stated,

> During writing activities, [the] student frequently has meltdowns when she makes a mistake and she wants to rub it out immediately. And if she doesn't get her own way, she ends up using the end of the pencil to try to erase the mistake and makes a hole in the paper. Then, she asks to start her writing again. She becomes quite defiant during the meltdowns, and starts to yell out, flips her hands around and say I don't want to. Help me? You help me.

To address Principle Six, Dionne focused on modelling making mistakes in her own writing and explained how she managed the uncomfortable feelings associated with not getting things correct the first time. She provided the student with the strategy of underlining the words that were wrong and provided a fidget toy for the student to rub when she wanted to erase her writing. Dionne reported,

> Interestingly, on each occasion, after underlining the words, she rubbed her hand on the fidget toy and smiled and made the comment that she felt really happy,

which was great. But there were no meltdowns, which was really fantastic. Once she'd completed her writing task, she asked me to help her fix up the errors.

Other video reflections coded against Principle Six reflected strategies the teachers had used to create a culture of growth including how they made students feel safe and welcome in the classroom so they would feel comfortable making mistakes during learning. The high number of reflections indicated that Principle Six was a core focus for the teachers in their attempts to create a growth mindset in students.

In contrast, Principle Seven (i.e. Teachers teach students how the brain works when you learn) received only two coding references in Iteration One and was the least coded principle. During the discussion in the first focus group some of the participants indicated that they had not considered incorporating teaching students about how the brain works when you learn as a practice for developing a growth mindset. This may explain the lack of reference to Principle Seven in the first iteration.

Inductive coding created several other nodes (e.g. agency and inquiry learning) throughout Iteration One as they did not fit within the seven defined principles. These were discussed in focus group two for possible inclusion in the design principles. In Iteration One the teachers demonstrated some growth mindset misinterpretations so a node was created. Misconceptions were expected as the teachers expanded their knowledge of mindset theory over the course of the project.

After trialling the design principles during the first iteration of five weeks a second focus group was held to reflect on and refine the design principles further. A discussion of the refined principles follows.

7.2.3 Focus Group Two Findings

After five weeks the second focus group was held on September 9, 2019, to reflect and refine the principles. During the second focus group the teachers views on

the principles were collected in the form of a PMI reflective tool and the principles were then refined as outlined in the discussion points in Appendix V. A description of the findings from focus group two follows.

Focus Group Two: Teachers' Views on First Iteration of Principles

A PMI tool was used in the second focus group to assist the teachers to identify several positives, minuses and interesting reflections as a result of implementing the principles. Figure 7.7 summarises the PMI points suggested by the participants in the PMI reflection tool.

Plus
- Students and Teacher increased awareness and interest in the brain which allows students to understand how and why they feel certain ways when learning
- Students are listening to and more aware of the comments which strengthen /weaken the brain
- Filtering into other learning areas
- Positive talk between peers
- As the teacher I am thinking about the type of praise I give and the delivery
- Finding suitable resources
- The inclusion of teaching terminology such as growth mindset
- Reflecting on my current teaching practice and use of language – I already do some of this
- Setting expectations and future goals with students and assisting them to work towards them
- Students are more aware of their internal thoughts and how they can affect their learning
- Reinforcing the message of it's not what happens it's how you deal with negative situations

Minus
- Overlap of principles
- Time to fit it in
- Students are at different levels of understandings so teachers need to cater for this.

Interesting
- Mindfullness practice has improved
- Parents have commented on how students have been talking about the brain at home
- Children responding positively and using the terminology
- Reflection on how I have changed the way I teach. What am I doing differently?
- The students have been more reflective about their learning – they are more aware of what they are doing well and what needs improving
- They enjoy learning about the brain
- Changes in student language/dialogue in relation to learning struggles, their brain, having a go at new challenges
- Completing my own research on growth mindset

Figure 7.7

Summary of Plus, Minus, Interesting (PMI) Responses

Positive comments by the focus group teachers about the principles related more to principles One, Four, Five and Seven (see Table 7.2). Positives included that students showed an interest in what happens in the brain when they learn and developed an awareness of the self-talk that occurs when learning. The teachers were more reflective about practices they used to reinforce a growth mindset, praise and language used and modelling a growth mindset. The comments reflected the impact a more explicit focus on mindset had revealed through implementing the principles.

Findings from the video reflection analysis in Iteration One reflected a lack of frequency of coding to Principle Seven, which indicated minimal reflection by teachers on Principle Seven. However, the PMI data positive comments indicated that Principle Seven had raised teacher awareness to include teaching about the brain. Fay stated, "so I think, from my perspective, I'm developing a greater awareness of the principle which stated about brain function and growing mindset, and the growing brain." During the discussion in focus group discussion two, most of the teachers revealed that teaching about the brain is not something they had taught before; however, they had been attempting to do so. Dionne stated, "so for me, that's probably one thing I really need to focus a lot more on." The participants indicated that they struggled to know how to teach about the brain but were working towards improving.

Other positive comments reflected the impact of goal setting and student reflection. Deidre mentioned that when talking about the positives of the principles, "getting the girls to articulate their goals and their expectations on themselves as well, what they want to achieve." Fay stated,

> In terms of the girls' self-reflection as well, I think that's been a huge plus. I
> think that they're more aware of what they're doing really well, and what they

can work towards achieving better results at. Also, the dance teacher came to see me, and said, 'It's just amazing how your children actually reflect on things that they're doing within the dance class'. So that was good to hear, that it is actually built-in to other learning areas as well. She said that they were really good at looking for positives and also things that they can improve.

During focus group two the participants also discussed the impact of the principles on high-achieving students. Fay commented that her high-achiever students were "more aware now they've got goals they need to set as well" and she noticed a change in their language and gave an example when a student said, "I found doing this really, really hard. But because I've practiced, I've gotten better and now it's something I can do really well." Additionally, the participants came to the realisation that while teachers set goals for students, goals can be shared and developed together with students to make them meaningful to student learning. Fay commented, "because I've always, obviously, had goals that I set the children, but maybe not necessarily made them aware of what I wanted them to achieve." It was also noted that the relationships between students improved as they reflected on their peers' goal to provide encouragement.

Table 7.2

Narrative Voices: Positive Comments Related to the Design Principles

Related principle	Examples of positive comments
Principle One—Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.	"So I found that I'm definitely thinking about [my mindset] a lot more. And I'm reading a lot more about growth mindset. So doing more research." (Anne) "I've got more of like a personal view of reflecting on my current teaching practices, when I go back to the principles. And also what I currently do, how I can improve, how a lot of these cover what I already do, but it's just that kind of reflection, that's the right path." (Deidre)
Principle Four—Teachers use language to promote a growth mindset including praising effort.	"And just that whole terminology thing, isn't it? [The students are] talking growth mindset and fixed mindset. They know the terms now, whereas I've never used those terms." (Dionne) "And it's made me think more carefully about the type of praise, and I how I deliver my praise." (Dionne) "I think, also, talking to the girls naturally as well, showing them the mistakes and how things are hard." (Deidre) "Yeah, it's interest in the brain, that's been amazing to see. I think that [the students are] listening to and are more aware of comments which strengthen and weaken the brain. So we've been using these in the class, where if we hear a comment and the child says it strengthens the brain, they do the little muscle sign. And if it weakens it, we do the thumbs down." (Fay) "I said reflecting on my own practice. I'm thinking a lot deeper about the language I'm using a lot more. So when I'm talking to the girls and thinking about what … especially conflict resolution with the girls, I'm thinking, 'What language should I be using?' for their own mindset, making sure that I'm using words which are not like 'You shouldn't have done this'." (Anne)
Principle Five—Teachers assist students to reflect on their learning by setting learning goals.	"And getting the girls to articulate their goals and their expectations of themselves as well, what they want to achieve." (Deidre) "And, yeah, it's more like just the importance of setting expectations and goals, and allowing … like, this might be your weakness, but we're going to try and strive for this goal." (Deidre)

Related principle	Examples of positive comments
	"So in terms of the goal setting, I think that's become really important within the classroom. We've been using it in particular within writing, where we talk about up levelling our text, and I think that that's where I've really seen a huge, positive gain in what they're achieving in their writing." (Fay)
	"In terms of the girls' self-reflection as well, I think that's been a huge plus. I think that they're more aware of what they're doing really well, and what they can work towards to achieve better results at. Also, the dance teacher came to see me, and said, "It's just amazing how your children actually reflect on things that they're doing within the dance class". So that was good to hear, that it is actually built-in to other learning areas as well. She said that they were really good at looking for positives and also things that they can improve." (Fay)
Principle Seven— Teachers teach students how the brain works when you learn.	"So I think, from my perspective, there's a greater awareness of the principle which stated about brain function and growing mindset, and the growing brain. They're so intrigued by it." (Dionne)
	"And I found that teaching them about the brain, they've been just talking about it so much." (Anne)

Minuses (i.e. challenges) the teachers revealed included the overlap of some principles, time to implement the principles and catering for different students' understanding of mindset. Anne described how "time was a challenge, to fit in the things I wanted to do." Fay suggested there was some overlap between the principles and some of them needed to be "more specific" or to "simplify' them."

Regarding interesting points, the teachers described improvements to students' mindfulness practice, students' shared knowledge of mindset with parents and being more reflective when learning. Further, students had begun to change the language they used to reflect growth mindset theory. The teachers had also engaged in their own professional development to learn more about mindsets. Jenna shared that she "found that mindfulness practice had really improved." She added that this was because,

We've been talking about the brain, and the importance of having rest time for our brain, that little bit of mindfulness. And all of a sudden they're really taking it seriously, which is really nice.

The focus group teachers noticed teaching about mindset had a positive impact on mindfulness.

One teacher mentioned how the parents had commented that students were practicing things at home to work towards their goals. Jenna said, "parents have commented on how the students have been talking about the brain at home. So that's good." Fay agreed, stating that "a lot of my girls go home and anything that we learn in class, they go home and practice and then bring it back and show everyone in the classroom." Anne commented on how she had noticed "changes in the students dialogue, like language" when the students faced a learning challenge. The students used more positive self-talk such as "I'm going to try, I can have a go and I'm going to tell my brain I can do it." The implementation of the principles at school led to students sharing mindset theory with parents.

Other interesting comments from the focus group teachers included reflection on the way they teach, expanding their own knowledge of mindset through further reading and the students reflecting on their learning. Fay mentioned that she had noticed even the high-achieving students were recognising the need to set goals to challenge themselves describing how "they are aware now they've got goals they need to set as well. They might be different to other people's goals, but everyone needs to have a goal." Fay also commented about the language the high-achieving students used and provided an example of a student saying "I've really tried to up level my writing, can you have a look over it?" Fay described how one high-achieving student had been working on a program at home on the computer and said "I really found something

hard", which she had never said to Fay before. The student added "I found doing this really, really hard but because I've practiced, I've gotten better and now it's something that I can do really well." Fay suggested that implementing the principles "has had a really positive impact on those children that find learning easy." The teachers noticed that while implementing the principles the students were more reflective about their learning, more aware of what they were doing well and what needed improving. The PMI reflection tool provided valuable thinking on modifications to the principles as described next.

Focus Group Two: Refinement of Draft Principles

During the discussion of the minuses in the PMI, the participants identified some changes they wanted to make to the draft principles. The frequency of coding against the principles in Figure 7.7 was also shared with the participants to identify any adjustments needed.

Principles Three and Five were combined after discussion of the way they overlapped (see Table 7.3). Fay suggested, "could we combine setting learning goals [Principle Five] with the strategies [Principle Three]?" Fay followed up by saying "so educators provide students with strategies for struggle. Because I guess the goal should be connected with strategies to achieve that goal." The concept of normalising mistakes in Principle Three was discussed and teachers suggested removing it as it was already mentioned in Principle Six. The setting of learning goals, the teachers decided, would assist students and teachers to devise strategies for students to use when facing a learning struggle; therefore, these two principles were combined.

The teachers described Principle Six as too wordy and as containing too many concepts. Anne stated, "when I was reading it, I was trying to reflect on that outcome, but then I thought it's too wordy, I just kind of read it as an environment where

151

mistakes are embraced." It was suggested by Fay that the principles should be more "specific". Fay mentioned that Principle Six "sort of matches up with Principle Four." Fay said, "things like the warm, safe supportive learning environment are what a teacher does anyway." Dionne disagreed,

> I actually like the warm, safe, supportive environment. Because I think in an early childhood classroom you need to do this … that's a main one. Even before you even start doing any sort of teaching, I think [the students] have got to feel safe and secure. This is in terms of growth mindset. A teacher should have that warm, supportive environment.

> From the teachers' deliberations, Principle Six was reworded to place the focus on effort, persistence and normalising mistakes. The beginning of the principle was reworded and the inclusion of the pedagogy of creating a warm, safe and supportive environment was identified as being shown through normalising mistakes.

> The teachers also discussed Principle Two, which was a point of regular consideration in the video reflections. A conversation about high expectations ensued with Fay stating, "[high expectations of students] motivates us, doesn't it, as teachers?" In reply Jenna said,

> [I] would say not from you guys, but I've definitely had teachers say, 'Oh, she's just not good at that'. And that's not in that they're saying that to the child, but in their own conversation with colleagues, they'll say, 'Oh, she's just not that bright'.

> Anne then responded, "I think the word 'high' in there is good. You could say educators hold expectations of students. So we always do that. But the fact that you've got the word 'high', that's really pinpointing this whole growth mindset." Principle Two

was therefore not adjusted as the teachers suggested it was important keep it the same to develop a growth mindset.

As Principle Three and Principle Five were combined, the revision of the principles resulted in a reduction from seven principles to six for Iteration Two.

Table 7.3

Changes to the Design Principles for Iteration Two

Iteration One design principles	Changes made	Iteration Two design principles
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.	None made	1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.
2. Teachers hold high expectations of students and believe all students can learn and grow.	None made	2. Teachers hold high expectations of students and believe all students can learn and grow.
3. Teachers provide students with strategies for struggle through explicit teaching and normalising mistakes.	Principles Five and Three were combined and reworded	3. Teachers assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching.
4. Teachers use language to promote a growth mindset including praising effort.	None made	4. Teachers use language to promote a growth mindset including praising effort.
5. Teachers assist students to reflect on their learning by setting learning goals.	Principle Five combined with Principle Three	
6. Teachers create a warm, safe and supportive learning environment where persistence, effort and mistakes are embraced.	Principle Six was reworded to place the emphasis on effort, persistence and normalising mistakes.	5. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.
7. Teachers teach students about how the brain works when you learn.	None made	6. Teachers teach students about how the brain works when you learn.

In summary, the results for Iteration One showed that while all of the principles had been implemented to some degree, the focus group teachers suggested some minor changes to reduce the wordiness and draw attention to particular core practices that develop a growth mindset. The refined principles were then implemented in Iteration Two for another five weeks. A description of the findings from Iteration Two follows.

7.3 Iteration Two

Iteration Two immediately followed Iteration One for another five-week period. During the five weeks the participants continued to record a video reflection once a week on one or more of the principles using the reflective framework provided to them. A third and final focus group discussion was held at the end of Iteration Two to complete a final review of the principles. The participants completed a survey to evaluate the effectiveness of the principles and collated suitable strategies to support each principle. A description of the findings for the video reflections, survey and suggested strategies follows.

7.3.1 Iteration Two Video Reflections

Teachers' Frequency of Reflection on Principles

In total, 14 teacher video reflections were uploaded during Iteration Two (i.e. which lasted 4.5 weeks). The videos were 5–10 minutes long with a total of 140 minutes of video data. The number of video reflections was less than the first iteration as two staff members were unwell for over two weeks during Iteration Two. Another hierarchy chart (see Appendix T) was produced using NVivo 12 to analyse the frequency of coding to the revised principles in the second iteration. The hierarchy chart data is represented by a column graph in Figure 7.8 for ease of reading.
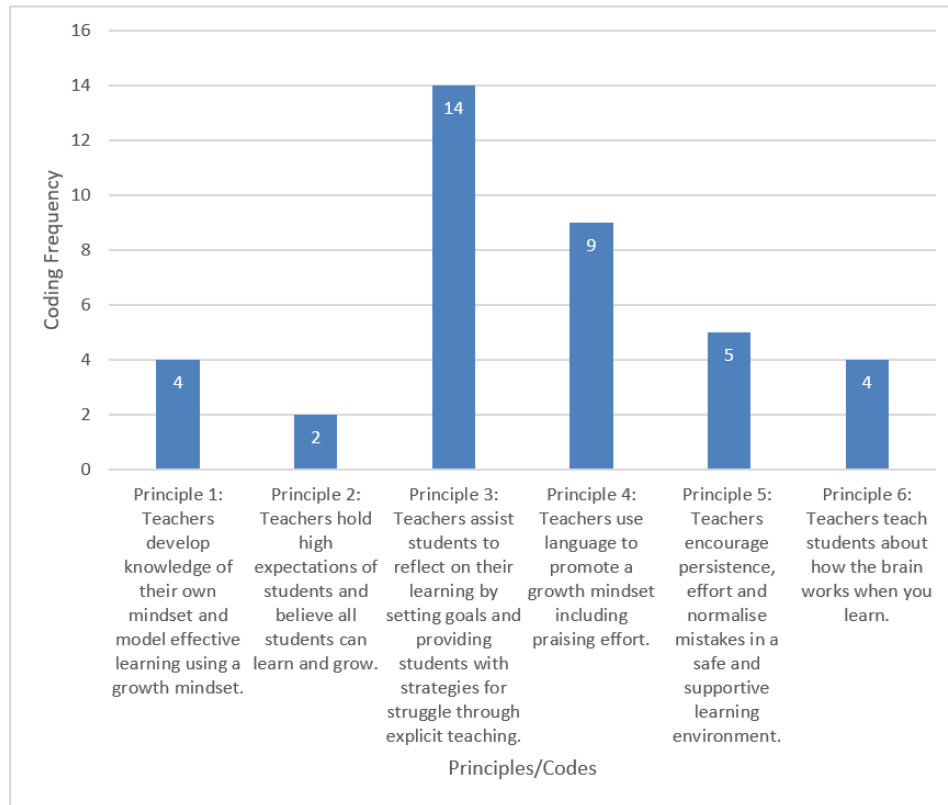
Figure 7.8

Frequency of Coding to Principles in Iteration Two Video Reflections

Closer analysis of the frequency of coding for Iteration Two revealed that Principle Three (i.e. Teachers assist student to reflect on their learning by setting learning goals and providing students with strategies for struggle) received the most coding with 14 links for Iteration Two. Principle Two (i.e. Teachers hold high expectations of students and believe all students can learn and grow) received the least coding of two links. Interestingly, Principle Six (i.e. Teachers teach students how the brain works when you learn), which received the least coding in the first iteration, showed an increase in coding in the second iteration. This may be because the teachers were becoming more familiar with how to incorporate Principle Six in their practice. Another difference between Iteration One and Iteration Two coding was an increased

focus on Principle Four (i.e. Teachers use language to promote a growth mindset including praise for effort). This was also reflected in the PMI data collected in focus group discussion two, during which the participants indicated increased awareness of having high expectations of all students and being more aware of the language they use and how it affects mindsets.

The participants commented that the design principles reminded them to strive for a continued focus on the practices that reinforce a growth mindset. Fay commented that at the start of the year she listened to parent concerns about children not taking risks in learning as they strived for perfectionism. She described how, "at the beginning of the year, we did do a lot of work on normalising mistakes as a positive part of learning that can actually help to strengthen our brain and help with our progress." But she then described how, "since that first term, we haven't, I haven't done any explicit teaching regarding perfectionism." Fay went on to mention that in response to the principles, she had renewed her focus and used children's literature to address perfectionism and risk-taking when learning. Fay commented that her students enjoyed reading the books and she noticed a change in their language and the way were monitoring her language. Fay stated,

> I've really noticed a difference in their language and also on how they pull me up on what, the things I say as well. There have been a few times where I've said practice makes perfect. And of course they have pulled me up every single time and spoken about there is no such thing as perfect and we could change the saying to practice makes better or practice makes progress.

Fay concluded her reflection by stressing that "I think that the explicit teaching of normalising mistakes and nobody is perfect is really important to encourage growth

mindset in the early years." Providing strategies for struggle was also mentioned in the reflections.

Principle Three (i.e. Teachers assist students to reflect on their learning by setting learning goals and providing students with strategies for struggle) was mentioned in several reflections as indicated by the high number of coding frequencies. Deidre related an instance where she noticed a student sitting away from the others as she watched them skipping. She spoke to the student to ask whether she would like to skip, too. The student responded with, "no, I don't like skipping. I only like watching." When asked why, she gave a few reasons: "one, it hurts my hands; two, one day I tripped over the rope." When Deidre delved a little deeper the student commented, "she didn't like skipping because she wasn't very good at skipping." Deidre then supported her to have a go by getting a long rope and showing her how to jump over it while it was slowly being swung side to side by another educator and a student. Deidre also called out "jump!" every time the rope came past her feet. The student then decided to have a go by herself and completed three successful jumps. Deidre described how the other students clapped her success. Deidre commented,

> Here we had a shy little girl who was extremely reluctant in the beginning.
> Definitely not a risk taker. By providing a safe and supportive environment,
> along with strategies to overcome struggle she gained the confidence to have a
> go. As an educator, I was so happy that this little girl had experienced success as
> a result of her persistence.

The teacher also reflected on the impact of teaching students simple neuroscience to understand what happens in your brain when you learn.

Principle Six (i.e. Teachers teach students how the brain works when you learn) received an increase in coding in Iteration Two with four coding links compared with

two in Iteration One. Anne mentioned that she talked with kindergarten students about the brain and the negative and positive self-talk that occurs when learning. She gave examples of both, and the students commented,

> You should never give up because that means that you don't learn anything. It's really important that you, no matter how hard it is, that you just try and because your brain learns and it grows.

The students related this back to a book they had read. Anne concluded her reflection commenting, "it's amazing to hear the change in [the students'] language and how they are thinking that way to develop a growth mindset."

Following the second iteration and the implementation of the refined principles, a third and final focus group meeting was held to make further revisions to finalise the design principles. Additionally, questionnaire data were gathered to answer research question four about the effectiveness of the design principles for guiding practice in the teaching of mindset. An outline of the findings follows.

7.3.2 Focus Group Three

The main aim of the third and final focus group discussion held on September 25, 2019, at the end of Iteration Two was to finalise the design principles and conduct an evaluation of the effectiveness of the principles. The discussion points used for focus group discussion three can be viewed in Appendix T and a description of the findings follows.

Focus Group Three: Finalisation of Draft Principles

The participants indicated that principles One, Two, Five and Six were adequate. Feedback collected through a questionnaire was sought from the participants on the design principles and final revisions were made collaboratively as outlined in Table 7.4. Annalyse highlighted the importance of Principle One (i.e. Teachers develop knowledge

of their own mindset and model effective learning using a growth mindset), saying, "that's really important because [the students] definitely copy things that you do." Regarding Phase Three, Fay reflected on "the importance of the teachers developing knowledge of their own mindset to assist them to understand mindset theory." All other participants agreed.

When discussing Principle Two (i.e. Teachers hold high expectations of students and believe all students can learn and grow) all teachers agreed that it was effective as it was. Deidre commented,

> We have students in our class who do struggle … we need to provide them with help. We've got opportunities to move them forward with a positive mindset we have developed.
>
> Principle Two remained the same.

Principles Three and Four were much discussed as the participants described how each one was complex and multifaceted. As a result, Principle Three and Principle Four were each separated into two principles to ensure the focus was not lost. The finalised Principle Three became: Teachers assist students to set goals and reflect on their learning. Principle Four was adjusted to: Teachers provide students with strategies for struggle as they work towards achieving a goal. Dionne commented, "it's made me think more carefully about the type of praise, and I how I deliver my praise." Dionne reflected in the final survey,

> I now have more awareness of some of the language I used prior to my involvement in the study, for example, 'clever girl' or 'that's great'. The type of feedback I provided wasn't always geared towards a growth mindset.

When asked about the strategies used to address Principle Four, Jenna said they "provided students with specific feedback" and Deidre used praise such as "I can see how hard you are trying, I'm very proud of you."

In relation to Principle Three, discussion about whether students need to struggle to achieve goals arose. Fay said, "could it just be [that] educators assist students to set goals?" Deidre then replied,

> I don't think you need to say struggle [in the principle] because that's why we
> set goals. Maybe simplifying that. And naturally we provide them [with]
> strategies to reach those goals.

Fay then commented, "Is it struggle or is it just striving to achieve a goal and working out how you're going to get to that goal?" Annalyse replied,

> I guess there's sort of two things. Strategies on how to cope with difficulties
> when they struggle and then strategies on how to reach your goal. All the steps
> you take.

The word 'struggle' was much discussed. Deidre said, "Is there a different word than struggle?" The word "strategies" was suggested to replace the word struggle but the teachers described how it was important to acknowledge that working towards a goal can be hard. Fay commented, "a goal should be difficult, it shouldn't be easy. Could you do a challenging goal?" Dionne then commented,

> This [principle] almost has two points within this context, it's setting goals and a
> second point there is you explicitly teach strategies for struggle, you know,
> that's actually a separate thing to develop a growth mindset. One, you learn to
> reflect on your learning and set goals, and the second where you need actual
> strategies for when it gets hard.

In the discussion the researcher reminded the teachers that in Iteration One Principle Three had been two separate principles, which the teachers had combined in focus group two for use in Iteration Two. Fay said,

But I think goal setting in itself is so important … that should be a point on its own. But there also is the part where you explicitly have to teach strategies to be resilient.

The teachers agreed that Principle Three be separated back into two principles, one to address the setting of goals and another for providing students with strategies for struggle to assist them in working towards a goal.

The teachers decided that Principle Four, which states teachers use language to promote a growth mindset including praising effort, be split into two separate principles. Fay raised the point that the principle could say, "you're praising effort not achievement." It was suggested that if you were new to learning about growth mindset it would be important to acknowledge that feedback for effort is more important than feedback for achievement. Dionne commented,

But if you're setting goals, I mean, every child's goals are going to be different, so if you're praising effort, then they will achieve their goals at their level, so could you put something in like that.

Fay then said, "could you spell out that you are praising effort not talent or ability?" The other teachers agreed. The teachers finally decided to have one principle that stated teachers use a common language to teach students about fixed and growth mindset and another principle that stated teachers praise effort rather than talent or ability (Table 7.4).

The idea of using a common language was raised by Fay as she said, "what about promoting a common language then so it will be consistent amongst the year

levels." Jenna agreed and said, "I think that is a great idea … to have what it means, so anyone's clued in as soon as you start reading [the principles]." It was decided that Principle Five include the term 'common language' to ensure consistency across year levels. Anne stated, "and I think with the shared language it would help the students to make connections." The teachers felt it was important to use the term 'common language' in Principle Four to ensure the language was consistent among year levels and to provide continuity of teaching about mindsets.

The teachers added the word 'resilience' to Principle Five. Annalyse raised the need to put "resilience" in because "when you make a mistake you bounce back". The researcher checked to clarify whether Annalyse meant that persistence and resilience mean the same thing. Annalyse stated, "when you make mistakes you need to bounce back and be resilient." Annalyse offered that the words "persistence" and "resilience" are different and the word resilience was added to Principle Five after all teachers agreed.

Principle Six (i.e. Teachers teach students how the brain works when you learn) remained unchanged. Fay commented that she had, "explicitly taught [about] the brain and I think the girls responded really well." Annalyse described how she "role-played a fixed mindset." Deidre agreed that it was important to talk about fixed and growth mindsets, commenting, "we talked about it as what strengthens our brain, what can we say that strengthens it and what can we say that weakens it." Fay mentioned that she "didn't use those exact words, but what we did use is what can we say that would make our brain grow and what can we say that would make our brain shrink." The teachers shared some ideas about how they had incorporated Principle Six in their teaching and suggested that teaching about the brain was something they would continue to improve on. The final list consisted of eight design principles (see Table 7.4).

Table 7.4

Summary of Changes to the Design Principles in the Final Focus Group Discussion

Iteration Two principles	Changes made	Final design principles
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset	None made	1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset
2. Teachers hold high expectations of students and believe all students can learn and grow	None made	2. Teachers hold high expectations of students and believe all students can learn and grow
3. Teachers assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching	Principle Three was split into two separate principles	3. Teachers assist students to set goals and reflect on their learning 4. Teachers provide students with strategies for struggle as they work towards achieving a goal
4. Teachers use language to promote a growth mindset including praising effort	Principle Four was split into two separate principles and reworded to emphasise the use of a common language when teaching mindset	5. Teachers use a common language to teach students about fixed and growth mindset 6. Teachers praise effort rather than talent or ability
5. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment	Added the word resilience	7. Teachers encourage resilience, persistence, effort and normalise mistakes in a safe and supportive learning environment
6. Teachers teach students how the brain works when you learn	None made	8. Teachers teach students about how the brain works when you learn

During focus group three, questionnaire data were collected to assess the effectiveness of the principles. A discussion of the findings follows.

Focus Group Three: Effectiveness of Principles

A questionnaire (Appendix X) was completed by the six participants in the final focus group discussion (September 25, 2019) to gather data on research question four: How effective are the design principles for guiding practice in the teaching of mindset theory? The results of the questionnaire are described in Table 7.5, which is followed by an examination of the findings.

Table 7.5

Questionnaire Responses on Effectiveness of the Design Principles

Questions	Responses ($n = 6$)
1. Do you feel you know more about growth mindset now than before you used the principles?	Yes = 6 No = 0
2. How effective were the principles in assisting you to create a classroom environment where students are more growth mindset oriented towards learning?	Highly effective = 5 Somewhat effective = 1 Not at all effective = 0
3. Were there any unexpected outcomes from implementing the principles in your classroom?	Open question with comments
4. How practical did you find the principles to use in the classroom?	Very practical = 4 Somewhat practical = 2 Not at all practical = 0
5. Did you find one or more principles particularly effective at promoting a growth mindset in the classroom?	Principle One = 3 Principle Two = 2 Principle Three = 3 Principle Four = 2 Principle Five = 1 Principle Six = 4
6. Will you continue to use the principles in the future?	Yes = 6 No = 0

Note: $n = 6$.

All of the participants in their responses to question one (i.e. Do you feel you know more about growth mindset now than before you used the principles?) indicated that they knew more about the teaching of growth mindset after implementing the principles. Deidre commented, "I certainly have a greater awareness of a growth mindset. I use the language associated with the principles." Fay agreed with this sentiment as she also said, "[I know more about] specific language use associated with growth mindset and also the relationship between growth mindset and the brain."

In question two (i.e. How effective were the principles in assisting you to create a classroom environment where students are more growth mindset oriented towards learning?) nearly all of the participants ($n = 5$) described the principles as highly effective in helping them create a classroom environment where students were oriented to a growth mindset for learning. Anne, however, expressed concern about the influence of the home environment stating, "they have been beneficial to a degree; however, environment, parents and the language they use at home can outweigh this." Deidre added, "I am now more reflective of my practice, which impacts on the learning opportunities provided". Fay mentioned that, "the principles were well scaffolded to allow for implementation in a manageable way."

The findings from question three of the questionnaire (i.e. Were there any unexpected outcomes from implementing the principles in your classroom?) indicated that there had been unexpected outcomes from implementing the principles. The teachers had a better awareness of the language and feedback that promote a growth mindset. Deidre stated,

> I am now more aware of some of the language that I used prior to my involvement in the study, for example, 'clever girl' or 'that's great'. The type of feedback I provided wasn't always geared towards a growth mindset.

Annalyse agreed, stating, "you become more aware of the language you use day to day with your students." Fay reflected on her use of language and realised how much she used the word "perfect", but "the girls now pick me up every time with the correction of practically perfect."

Additionally, the teachers observed improved relationships between the students and they also showed more interest in learning about their brains. To highlight this Fay commented that there were, "improved relationships between students through language

they adopted when reflecting on their peers goals." Anne agreed, stating, "students are encouraging each other to be more positive and to tell their brain they can do it." Fay stated that "the students were more interested in their brains" and Deidre agreed, commenting that "teaching the students about their brains was very effective."

Other comments by the teachers suggested that the principles had a positive impact on mindfulness. Fay mentioned, "the students valued mindfulness sessions more as a way to rest their brains." Others agreed with this comment.

Findings in relation to question four regarding the practicality of the principles (i.e. How practical did you find the principles to use in the classroom?) indicated that two-thirds ($n = 4$) of the participants found the principles to be very practical to implement and two teachers felt they were somewhat practical. Practicality refers to the possibility of putting the principles into practice. Fay said, "all the principles had a clear purpose and could be implemented effectively." Anne indicated that time was a hindering factor in teaching about the brain, stating that the principles were "easy to implement—the hard part was finding the time to teach about the brain." While most teachers found the principles practical to implement, time was a hindering factor identified by one teacher.

Question five sought information about the effectiveness of the principles at promoting a growth mindset (i.e. Did you find one or more principles particularly effective at promoting a growth mindset in the classroom?). The teachers indicated that principles One, Three and Six were the most effective (see Table 7.5). In the final survey, the participants commented on Principle Three to clarify how they set goals with students. Some ideas were personal goals written on student desks, writing or setting strategies for 'how' you will achieve your goal at beginning of sessions—WALT (what are we learning today?)—and revisiting goals at the end of the session.

Interestingly, Principle Six, which required teaching students about the brain, was found to be challenging for the teachers to implement in Iteration One but was utilised more regularly in Iteration Two. Fay found that,

Teaching students about their brain was very eye opening. They were engaged, reflective and genuinely interested. It was also lovely to see the girls took this knowledge home and discussed it with their families.

Fay commented further that student interest in the brain has been "amazing to see. I think they are listening to and are more aware of comments that strengthen and weaken the brain."

Annalyse valued all of the principles and commented that Principle Three was especially valuable: "I particularly like the 5Rs—very catchy. You could link it to a puppet like a lion 'rrrr' who is brave." The 5Rs developed by the researcher were designed to assist teachers to provide guidance when students faced a learning struggle and are:

- recognise the problem

- remind yourself of your growth mindset self-talk

- resolve the struggle by trying a new strategy

- review how effective the strategy is at achieving your goal

- retry with a new strategy if needed.

Indeed, feedback from the participants in focus group discussion three indicated that these were highly useful to teachers. Annalyse stated, "the five Rs, they're great. It's easy to remember, like, recognise, remind, resolve, review, retry."

It can be seen from the responses to question six (i.e. Will you continue to use the principles in the future?) that all ($n = 6$) participants indicated that they would continue to use the principles in the future (see Table 7.5). This is significant and

indicates the overall effectiveness of the principles. Deidre commented, "I really enjoyed reflecting on the principles. I think the principles are a clear guideline to promote a growth mindset for individuals." Fay agreed that the principles had been of benefit to students and said, "my students and I have greatly benefitted from implementing the growth mindset principles."

In summary, the finalisation of the design principles in Iteration Two resulted in simplification of the principles but with no changes to the core foci. Rather, slight alterations were made to ensure ease of understanding for teachers with a final list of eight design principles (see Table 7.6). The participants lastly provided strategies they had used for each principle.

Table 7.6

Iteration Two Design Principles

Final design principles
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset
2. Teachers hold high expectations of students and believe all students can learn and grow
3. Teachers assist students to set goals and reflect on their learning
4. Teachers provide students with strategies for struggle as they work towards achieving a goal
5. Teachers use a common language to teach students about fixed and growth mindset
6. Teachers provide feedback for effort rather than talent or ability
7. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment
8. Teachers teach students how the brain works when you learn

Focus Group Three: Suggested Strategies to Embed Design Principles

The participants were asked in focus group discussion three to provide a description of strategies used to implement each of the principles. A summary of the teachers' suggestions is shown in Table 7.7.

Table 7.7

Strategies for Each Principle Suggested by the Teachers

Principle	Strategies
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset	Games—discuss winning and losing
	Personal stories—children can relate to your own struggles
	Role-play examples of what a growth mindset is and what it looks like
	Research online
	Reflecting on self—own mindset
	Completion of initial growth mindset quiz to assess my own mindset
	Modelling during everyday teaching when problems arise and using 'thinking aloud'
	Professional reading—*Flourish* by Martin Selligman
	Read *Pete the cat* to teach how to brush it off
2. Teachers hold high expectations of students and believe all students can learn and grow	Verbalising belief that students can achieve their goals
	Providing personalised motivational strategies (pep talks, songs, dances, puppets, high fives etc.) and encouragement to persist
	Discussions about growth mindset—what does it look like?
	Individual goal setting
	Ongoing student assessment
	Reflection on appropriate or differentiated goals for all students
	Explicitly teaching the students what is the outcome of the learning experience.

Principle	Strategies
	Clear voice
	Positive language
	Providing goals students will be able to achieve
	Providing organised and effective lessons
3. Teachers assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching	Students learn the goal chant and we form the success train to celebrate their achievements
	Personal goals on students desks, writing or setting strategies for 'how' you will achieve your goal
	Drawing/making a plan—writing it down
	Pep talk on what a goal is
	Set your own teacher goal and work on it with the children
	Goal setting at beginning of sessions—WALT (what are we learning today?)
	Revisiting goals at the end of the session
	Role-play what strategies for struggle looks like
	Explicitly teaching what a goal is, why we need to have goals, how to set a goal and strategies to work towards achieving a goal
	You can do it program
	Kimochi program and characters
	Using positive language
	Constant discussions with students as they work towards their goals
	Debriefing our personal teacher goals
4. Teachers use language to promote a growth mindset including praising effort	Demonstrate positive language and growth mindset activities to help students develop a growth mindset
	Positive tone of voice
	Using different methods of praising—non-verbal and verbal
	Age appropriate language to praise student effort

Principle	Strategies
	Language focus when providing specific feedback
	Role-playing with Kimochi's character demonstrating a growth mindset
	Using terms that specifically relate to mindset
	Students being challenged—teacher providing support and steps to meet the challenges
	Positive language, songs, poems
	Demonstrate positive language and growth mindset activities
	Group discussions on mistakes, having a go, telling your brain you can do it
	Praise—I can see how hard you are trying, I'm very proud of you, well done you tried and that's the most important thing
5. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment	Role-playing
	Having a good relationship with the student so they feel safe to make mistakes
	Relationship with teacher assistant is equally as important
	Texts—Beautiful Oops, Nobody's perfect
	You can do it—persistence
	Positive rapport with all students
	Make mistakes yourself and model strategies/self-talk for struggle/resilience
	Positive self-talk
	Praising effort
	Point out, discuss and examine mistakes when they arise (your own)
	Catchphrases such as 'hakuna matata' to normalise mistakes in a novel way
	Openly speak of teachers not knowing how to spell every word
	Demonstrate strategies to work out a problem
6. Teachers teach students how the brain works when you learn	YouTube—provided by the researcher
	Class research

Principle	Strategies
	Texts—Fantastic elastic brain, Bubble gum brain, Pete the cat, The girl who never made mistakes, Dot, Beautiful oops, Bucket filler, A box, A line can be, I am human
	Role-play scenarios and self-talk that weakens and strengthens the brain
	Show children a model of the brain—scientific model
	Barry the brain puppet—you can pull the different parts apart
	Link with sensory play for younger ones like making slime and show how you can stretch and change your brain

The strategies provide useful ideas to support the practical implementation of each principle. An organic reflection was conducted at the conclusion of Phase Three to reflect on theoretical and practical findings.

7.4 Phase Three Organic Reflection

7.4.1 What?

During Phase Three, the teachers developed, trialled and refined the design principles over two five-week iterations, focus group discussions and implementation of the principles. During implementation of each iteration the teachers provided one video reflection per week on one or more of the principles using a reflective framework (Rolfe et al., 2001). The researcher viewed and transcribed each video reflection and coded them against the design principles using NVivo 12. Across Iteration One and Iteration Two, three focus group discussions were held. The first at the beginning of Iteration One, second at the end of Iteration One and third at the end of Iteration Two. All focus group discussions were held at the school over a 90–120 minute period. In the first focus group discussion the design principles were drafted and the video diary process

explained. During the second focus group discussion, after the teachers had time to implement the draft principles over a five-week period, the researcher and participants collaboratively refined the design principles. The final focus group discussion finalised the design principles and evaluated their effectiveness.

7.4.2 So what?

Phase Three consisted of two iteration stages encompassing the design and construction part of the DBR process. This phase saw the refinement of vague ideas to solve the problem that teachers do not have the 'know how' or confidence to help students develop a growth mindset (McKenney & Reeves, 2019). Innovations tend not to be 'eureka' moments but rather the result of collaborative thinking over time as was the case in the present study (McKenney & Reeves, 2019). Collaborative thinking is underpinned by strong communication between the researcher and participants to interact productively. Findings of the literature review, comparisons to the conceptual framework as well as the expertise of the participants guided the work to check the feasibility of the principles. The results of Phase Three led to both new theoretical understandings and a practical solution in the form of eight design principles.

7.4.3 Now what?

The culmination of Phase Three was the development of a potential solution to the perceived problem that teachers do not have the 'know how' or confidence to support a growth mindset in their students. The solution was the development of eight design principles to assist the teaching of mindset theory to foster a growth mindset in students in the early years (Table 7.8). In the evaluation of the finalised design principles two teachers described time as an obstacle to practicality. They described not having enough time to implement some of the principles. Teachers are often time poor,

which poses a challenge to the researcher to consider how to address this in future research.

During Phase Four the researcher conducted a structured reflection process to further reflect on and refine the design principles according to theoretical understandings.

7.5 Summary

Chapter 7 reported on the findings from Phase Three in the present study, which culminated in a finalised set of eight design principles to assist teachers to teach mindset theory to foster a growth mindset in students. Six early childhood teachers at one school developed, trialled and refined the principles over two five-week iterations in one school term. The principles were refined during three focus group discussions held at the beginning of Iteration One, the end of Iteration One and the end of Iteration Two. During each iteration, as teachers implemented the principles they provided one video reflection per week on one or more of the principles. Data collected during the focus group discussions included jottings, focus group audio, PMI analysis and a final questionnaire. Findings from Phase Three indicated that all six teachers knew more about mindset after implementing the principles and five found the principles to be highly effective. Significantly, all of the six participants indicated that they intend to continue to use the principles in the future, which further signifies the overall effectiveness of the principles. A structured reflection process was conducted in Phase Four and a description of the findings follows in Chapter 8: Phase Four Findings.

Chapter 8: Phase Four Findings

8.1 Introduction

The findings of Phase Four are presented as four reflections conducted by the researcher and the final set of design principles. The purpose of the final phase of DBR is retrospective reflection where the researcher considers what has come together in both research and development to produce new theoretical understandings as shown in Figure 8.9.
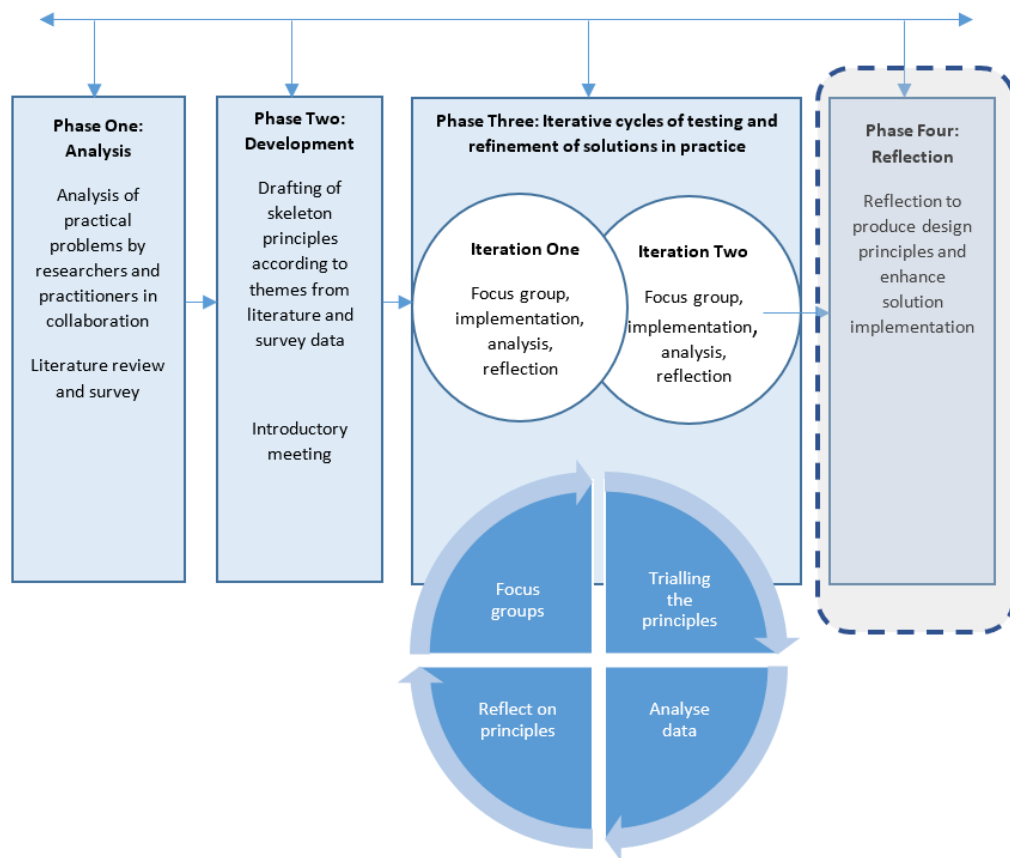
Figure 8.1

Design of this DBR Study—Phase Four

The researcher reflected on the design principles in relation to the findings of the previous phases alongside the pertinent literature with the aim of producing the final set of design principles. The reflection process is important as the researcher considers findings and processes with the aim of understanding how and why the principles worked (McKenney & Reeves, 2019). It is also important to note that reflection happened throughout the DBR process, as periods of fieldwork were offset by periods of review and redesign with the teachers during the focus group discussions. Reflection also occurred through researcher engagement in further reading that added a different lens for reflection of the data analysed.

The final reflections outlined here in Phase Four used a structured reflection process as suggested by McKenney and Reeves (2019) based on Kant's moments of judgement. Procee's (2006) Kantian epistemology of reflection uses the "process of preparation, image forming and conclusion drawing" and was applied to Kant's four moments in judgement (cited in McKenney & Reeves, 2019, p. 186). They are point (i.e. quantity), line (i.e. quality), triangle (i.e. relation) and circle (i.e. modality) reflections.

8.2 Point Reflection (Quantity Induction)

The aim of the point reflection is to identify one or more data points from which an unplanned insight has been gleaned and ask the question—were there unanticipated processes through which the participants were highly engaged? Then, consider why the participants were so engaged? Lastly, a conclusion is drawn on how this reflection may be put to use or the question asked, 'Do the design requirements need revision?' (McKenney & Reeves, 2019). Several findings were considered for the point reflection; however, the noticeable change in the participant perceptions regarding Principle Eight warranted further reflection.

Principle Eight (i.e. Teachers teach students about how the brain works when you learn) was found to be one of the most effective principles to reinforce a growth mindset in the final evaluation despite initially providing challenges for teachers to implement. During Iteration One, Principle Eight had the least coding during analysis of the teacher reflections. However, during Iteration Two, after sharing ideas on implementation, Principle Eight was reflected on and coded more regularly. During the first focus group discussions, conversations revealed that even though the teachers recognised Principle Eight to be important, they were unsure how to contextualise and teach young students about the mechanics of the brain when learning, as it can be viewed as a complex concept with complex language. Fay commented,

> It's difficult teaching the children about the brain and how different parts of the brain are responsible for different things. But that was the second time in a month that I heard about how important it was to teach the kids about it.

The video reflections for Principle Eight increased during Iteration Two and indicated a more concerted effort by the focus group teachers to implement teaching about the brain. During focus group discussion two the teachers shared examples of the language they used and resources such as books and short videos. The sharing of ideas and resources resulted in higher engagement and reflection on the implementation of Principle Eight. Fay stated during the second focus group, 'so I think, from my perspective, there's a greater awareness of the principle that stated about brain function and growing mindset, and the growing brain'. Supporting this was the findings gathered through the questionnaire in the final focus group of Phase Three. Four of the six teachers indicated that Principle Eight was one of the most effective principles. Students were more interested in their brain and more aware of the language they use when learning, as Fay commented, "it's [the students'] interest in the brain, that's been

amazing to see. I think that they're listening to and are more aware of comments that strengthen and weaken the brain." Research by Dweck and colleagues (Yeager et al., 2019) has shown that teaching students about their brain affects students' ability to develop a growth mindset. Pascal et al. (2019) agree that there needs to be an increased focus on the development of metacognitive skills for students to develop positive learning habits. The finding from this point reflection revealed that the teachers found the inclusion of teaching students about the brain and what happens in the brain when we learn to be one of the most effective principles in helping students develop a growth mindset. On reflection, it was deemed important to retain Principle Eight and provide strategies to assist early childhood teachers to implement teaching students about simple neuroscience for learning.

8.3 Line Reflection (Quality Norms)

The line or quality reflection considers a point of view that may be helpful to reflect on elements or choices made during the DBR process. The reflection takes an observed instance in time for the actor, process or product. In that instance, the reflection considers 'norms' (i.e. something that is usual, typical or standard) that relate to one another and may assist in the refinement of the solution to the problem (McKenney & Reeves, 2019). Reflection on the impact that these norms may have had on the intervention leads to questioning: Do the norms enable or disable the intervention? Conclusions are then made as to whether the norms need to be investigated further or whether changes to the intervention are necessary. The moment in time chosen for the line reflection in the present study was a video reflection submitted during the implementation of the principles in Iteration Two. Fay described how she observed two students sitting together with one student supporting the reading skills of the other. In this instance, the actors were the students, the process was peer

tutoring and the product was students taking ownership of their learning. This particular moment in time during Phase Three was chosen for the line reflection as it demonstrated the powerful effect of the norm of teacher modelling as a strategy to help students develop a growth mindset and have more agency over their learning.

The teacher outlined how one student was helping the other student with her goal of getting better at reading to move up to the more challenging reading group (i.e. process). The students were copying a strategy they had seen the teacher implement where the more able student read a page and then the two students read it together. The peer reading strategy was modelled by the teacher to the class during literacy instruction. The teacher reflected on what a positive collaborative moment this was for both students where they were taking ownership of their learning and seeking and implementing strategies to work towards achieving their goals using their own initiative (i.e. product).

On reflection, teacher modelling of strategies to assist students to work towards their goals is an important practice to help students when they are faced with a learning struggle. Modelling strategies for struggle is of particular importance in the early years as students may not have the ability to break difficult tasks into smaller steps. The peer reading example provides evidence of the way students use the strategies modelled to them by their teacher to take agency over their own learning. The finding from the line reflection revealed that the design principle of providing students with strategies for struggle encouraged teachers to model a wide variety of practices. Teacher modelling assisted students to build a repertoire of strategies to draw on when faced with a learning struggle. This reflection highlighted the importance of including Principle Three.

8.4 Triangle Reflection (Relation Perspectives)

The triangle reflection required examination of different perspectives most relevant to a finding. Issues, questions or problems that have been insufficiently addressed are described (McKenney & Reeves, 2019). Conclusions are drawn about what can be done differently and what needs to be investigated further to make improvements. The finding chosen to consider for the triangle reflection was the evaluation of the effectiveness of the principles, as not all teachers described them as highly effective.

The majority of the focus group teachers responded to question two in the final questionnaire with the indication that they felt the principles were highly effective in assisting them to create a classroom environment that fostered a growth mindset towards learning. One participant (Anne, 25/9/19), however, expressed her concern about the influence of the home environment stating, "[the principles] have been beneficial to a degree; however, environment, parents and the language they use at home can outweigh this." The influence of the home environment on a child's mindset should not be underestimated as schools and parents work together to assist a child to develop a growth mindset for learning. This study raises questions about the importance of sharing growth mindset messages with parents and carers to optimise development of positive dispositions for learning. Fay (25/9/19) stated, "it was also lovely to see that the girls took this knowledge home and discussed it with their families." The students were transferring new learning about mindsets home to share with their families. During the last focus group, the teachers discussed how to share mindset theory in their school community to assist parents and carers develop a home environment that fosters a growth mindset for learning and an additional principle was added to reflect this

finding. The finding of the triangle reflection here revealed that further research is needed to identify strategies to assist parents to foster a growth mindset in children.

8.5 Circle Reflection (Modality Process)

The circle reflection considers the methods used and describes issues and questions insufficiently addressed and those addressed well. Consideration of what could be done differently and the methods that yield powerful findings lead to the circle reflection (McKenney & Reeves, 2019). A variety of tools were used to develop and test a set of design principles to assist early childhood teachers to develop a growth mindset in students. The data collection methods were all effective in generating insights into the data and refining the principles. Coding against the principles provided valuable data about the implementation of the principles without the researcher spending long periods of time observing in situ. The teachers also described feeling less pressured not having the researcher present. However, the video reflections had initial teething problems as some teachers did not want to film themselves. The researcher resolved this by suggesting that the participants cover the camera on the iPad as only the audio was needed. The participants' concerns were alleviated and the video reflections revealed powerful findings necessary to refine the principles.

Originally, a Swivl camera was planned to capture video data of the teachers implementing the design principles in the classroom. The collection of video footage quickly became an issue as parental consent was required even though the video focus was the teacher and many parents did not agree to the use of the cameras in case their child was captured in the video footage. An information newsletter about the use of the camera was provided to parents; however, it did not change the rate of parental permissions, so this data collection method was abandoned. While this was

disappointing, the video reflections and focus group discussions provided a rich source of data to develop, implement and refine the design principles.

The effectiveness of the design principles to solve the problem of assisting teachers to help students develop a growth mindset was considered in this study. While the data collected indicated that the principles were effective from the teachers' perspective, the data collected did not include the impact of the principles on the students' mindset. With tools that measure a change in students' mindsets over a longer timeframe, pre- and post-test data of students' mindsets may have yielded insight into these changes. Additionally, as this study only used one context (i.e. a high socio-economic status girls' school), further research is needed to test the effectiveness of the principles in a wider variety of school contexts. This is an avenue for further research.

Three important findings were revealed from the circle reflection. Firstly, initial teacher hesitancy to use the video in the reflections was overcome to provide powerful audio data for the study. Secondly, the inability to use the Swivl cameras to capture classroom footage due to lack of parent consent was rectified with the use of video reflections and focus group discussions. Lastly, further avenues for research were identified to gather students' perspectives of the design principles and to investigate whether context makes a difference to the implementation and effectiveness of the design principles.

8.6 Final Set of Design Principles

After engaging in the reflection process, the researcher refined the final set of design principles for use by early childhood teachers to assist students to develop a growth mindset for learning. Principle Nine was added by the researcher to address the reflective point that the teachers wanted to share mindset theory and practices in their school community to assist parents and carers to develop a home environment that

fosters a growth mindset for learning. One participant (Anne) mentioned, "it is important to have home and school continuity when teaching students to have a growth mindset so positive mindset messages received at school are not negated by negative or fixed mindset messages received at home." Table 8.1 lists the final set of principles.

Table 8.1

Final Design Principles for Early Childhood Teachers

Final design principles
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.
2. Teachers hold high expectations of students and believe all students can learn and grow.
3. Teachers assist students to set goals and reflect on their learning.
4. Teachers provide students with strategies for struggle as they work towards achieving a goal.
5. Teachers use a common language to teach students about fixed and growth mindset.
6. Teachers provide feedback for effort rather than talent or ability.
7. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.
8. Teachers teach students about how the brain works when you learn.
9. Teachers share mindset theory and practices with parents/carers and the community.

8.7 Summary

Chapter 8 reported the results of Phase Four, which were determined through Procee's (2006) Kantian epistemology of reflection using four reflective elements—point, line, triangle and circle reflections. These elements provide a deeper understanding of the effectiveness of the principles, how they worked when implemented and the effects they yielded. The structured reflective process provided important insights to the study. During the reflective process in Phase Four one further principle was added to address the finding that teachers wanted to share mindset theory

and practices in their school community to assist parents and carers to develop a home environment that fosters a growth mindset for learning. Mindsets are developed through messages students receive about their abilities from many contexts including home and school. Mixed mindset messages may hinder the development of a growth mindset for learning. Principle Nine was added and states that teachers share mindset theory and practices with parents and carers and the community. The results from the study are discussed in relation to other research in the next chapter, Chapter 9: Discussion.

Chapter 9: Discussion

9.1 Introduction

Chapter 9 presents a discussion of the themes that align with each research question in relation to the findings and literature. The study aimed to investigate early childhood teachers' perceptions of mindset and develop a set of design principles to assist early childhood teachers to teach mindset theory to foster a growth mindset in kindergarten, pre-primary and Year 1 students.

The research questions were:

1. What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?

2. What attributes do early childhood teachers believe students require to be effective learners?

3. How do early childhood teachers support the development of a growth mindset in students?

4. How effective are the design principles for guiding practice in the teaching of mindset theory?

The literature review discussed the development of a growth mindset and the way it helps students take on more challenges (Dweck & Leggett, 1988; Hong et al., 1999), persist in the face of setbacks (Nussbaum & Dweck, 2008) and optimise academic achievement (Blackwell et al., 2007). More specifically, developing a growth mindset in the early years can strengthen agency over their learning to become competent, adaptive learners who can drive their own learning processes that last a lifetime (Masters, 2014). Haimovitz and Dweck (2017) argue that teachers use practices that encourage students to be more growth mindset oriented than fixed mindset oriented. The motivation for the present study arose out of a significant need to support early

childhood teachers to teach mindset theory to foster a growth mindset in students. The remainder of the discussion chapter is aligned with each research question. The discussion in the next section pertains to the first research question, 'What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?'

9.2 Early Childhood Teachers' Knowledge and Attitudes of Mindset

The survey conducted in Phase One with 95 teachers included questions to gather data on the knowledge and attitudes teachers have of mindset. The same survey taken in Phase Two by six early childhood teacher revealed similar findings. Teachers knew of mindset and agreed that developing a growth mindset is an important factor in successful learning. However, most early childhood teachers surveyed did not believe they were good at fostering a growth mindset or have adequate knowledge to teach students how to develop a growth mindset. A discussion of teacher knowledge and attitudes of mindset follows.

9.2.1 Teacher Knowledge of Mindset Theory

Phase One and Phase Two of this study found that early childhood teachers are familiar with the term mindset, have some understanding of behaviours that indicate a growth mindset and know it can have an impact on students' success in learning. However, the majority of the participants did not use the term 'mindset' with students or feel they have adequate knowledge to teach students how to develop a growth mindset. Teaching about mindset requires use of the term 'mindset'. Existing resources such as MindsetKit (https://www.mindsetkit.org/topics/teaching-growth-mindset), designed to assist teachers in the primary years to teach students about mindsets, begin with the teaching of what your mindset is and the difference between a fixed and growth mindset. In the Phase One survey only one in 10 teachers strongly agreed that they had adequate knowledge to teach students how to develop a growth mindset. Similarly, in

Phase Two only two out of six focus group teachers strongly agreed that they had adequate knowledge to teach students how to develop a growth mindset. This result is consistent with previous studies (Nestor, 2017; Yettick et al., 2016) that examined K–5 and K–12 teachers' perspectives of mindset and revealed comparative findings. In both studies teachers revealed they had some knowledge of mindset theory but did not feel they were good at teaching it. However, Australian policy directs teachers to teach mindset theory to develop a growth mindset in students.

Current education policy direct teachers to develop lifelong learners who will be prepared for living and working in the 21st century, in which skills such as communication, collaboration, resilience, creativity and self-regulation are required (Education Council, 2019). A recent review into Australia's education system (DET, 2018, p. x) stated the desire for all students to develop a growth mindset during their schooling. Despite increasing research in this field, few interventions have been designed for the early childhood years with the majority of research conducted with adolescents (Blackwell et al., 2007; Romero et al., 2014; Yeager, & Dweck, 2012). It has been acknowledged that there is an urgent requirement for the customisation of the teaching of mindset theory for the early childhood context (Yeager et al., 2013). The present study provides further evidence that early childhood teachers do not have sufficient knowledge of mindset theory to include the teaching of mindset in their classroom practice despite knowing of its existence and value for learning. Early childhood teachers knowledge of the behaviours associated with fixed and growth mindsets was also investigated in relation to research question one: 'What perceptions (knowledge and attitudes) do early childhood teachers have about mindset?'

9.2.2 Teachers' Knowledge of Learning Behaviours Associated With Fixed and Growth Mindsets

A teacher's knowledge of learning behaviours associated with fixed and growth mindsets enables them to recognise student mindsets. Phase One and Two findings from the present study indicated that the teachers had some knowledge of the behaviours associated with fixed and growth mindsets; however, knowledge gaps were evident. Dweck's (1999) research found that the behaviours students display when learning are indicative of the core beliefs they hold about their talents and abilities, which indicate either a fixed or growth mindset. A discussion of the behaviours the teachers indicated are associated with a growth mindset follows.

Teachers in the present study indicated that behaviours such as persistence in learning, a willingness to make mistakes and learn from them and excitement about learning are strongly associated with a growth mindset for learning. This finding is consistent with other studies that found these behaviours are strong indicators of growth mindset (Dweck, 2010; Dweck & Leggett, 1988; Yeager et al., 2019; Yeager & Walton, 2011). Students with a growth mindset are excited about learning, will persist in the face of setbacks and challenges and are not affected by making mistakes (Yeager et al., 2019). Feedback is used to set new goals and try new learning strategies. Teachers in the present study also had misconceptions about other growth mindset behaviours.

Other growth mindset behaviours that were not as strongly associated with a growth mindset included frequent participation in class activities, high levels of effort towards learning, responsible decision-making and an understanding of how your brain works when you learn. This is in contrast to other findings from several studies that have shown these behaviours do in fact indicate a growth mindset (Dweck, 2010; Dweck & Leggett, 1988; Yeager & Walton, 2011; Yeager et al., 2019). A growth

mindset is predominantly associated with a focus on process-oriented effort and an understanding of the neuroscientific processes in the brain that occur when learning something new (Blackwell et al., 2007; Dweck, 2010; Dweck & Leggett, 1988; Henderson & Dweck, 1990; Kamins & Dweck, 1999; Mueller & Dweck, 1998).

The National Study of Learning Mindsets conducted recently by Yeager et al. (2019) further supports earlier studies by Blackwell et al. (2007) that evaluated a growth mindset of intelligence intervention to address the beliefs of adolescents about the nature of intelligence. A random sample of 65 regular public schools in the US included 12,490 Grade 9 adolescents who completed a growth mindset intervention between August 2015 and February 2016. Results from the study show a short (i.e. less than one hour) online growth mindset intervention improved grades among lower-achieving students and increased overall enrolment to advanced mathematics courses. Importantly, the intervention results indicate that intellectual abilities can be developed, ensuring that students had a good understanding of how your brain works when learning. Included in the intervention was the analogy that your brain is like a muscle and grows stronger and smarter when it undergoes rigorous learning experiences.

Knowing that applying effort during learning helps to strengthen the brain is an important understanding associated with a growth mindset (Yeager et al., 2019). The findings of the present study demonstrate a knowledge gap in teacher understanding of mindset theory. The results indicated a lack of teacher knowledge of behaviours associated with a growth mindset such as applying high levels of effort towards learning, responsible decision-making and knowing how your brain works when you learn. It may be suggested that early childhood teachers require grounding in mindset theory to enable a greater understanding of the behaviours associated with a growth mindset for learning.

Teachers in the current study did not perceive a strong link between behaviours such as getting good grades and high standardised test scores and a growth mindset. Previous studies have shown that these behaviours are associated with a fixed mindset (Ames, 1992; Blackwell et al., 2007; Yeager et al., 2016). A possible explanation may be because early childhood teachers focus on the development of the whole child (DEEWR, 2009) and grades and standardised testing are not given the same focus as in older year levels of school. In an early childhood context, rather than fixed measures of ability such as grades or test scores, the processes of learning are reinforced such as setting goals, applying effort and making mistakes (Haimovitz & Dweck, 2017; Yeager et al., 2013).

The National Study on Learning Mindsets with adolescents used a growth mindset intervention aimed at reducing students' negative beliefs (that trying hard or asking for help means you lack ability) (Yeager et al., 2019). The study reinforced that effort and strategy revision are behaviours through which students can develop their abilities and thereby achieve their goals. The findings of the study showed that lower-achieving adolescents earned higher grades in core classes at the end of the Grade 9 when assigned to the growth mindset intervention. Some schools place a heavy focus on students achieving high grades, which may be at the cost of students applying effort and taking risks in learning (Yeager et al., 2019). While the study was conducted with adolescents, Haimovitz and Dweck (2017) identified the early years as the ideal time to focus on developing competent learners who understand the power of effort for learning. Developing a growth mindset in young students in the early years may form the basis of a stable trait to hold students in good stead for the challenges of academic learning that lay ahead. Other behaviours such as consistent completion of work were also thought to be aligned with a growth mindset by teachers in the present study.

A quarter of the teachers in the Phase One survey of the present study perceived a strong association between the consistent completion of work and a growth mindset. Teachers choose tasks because they are within the students' capabilities and therefore are more likely to be completed successfully. However, this belief is erroneous and does not reinforce a growth mindset as tasks may not be challenging enough to stretch students to take risks and apply effort in learning. Martin et al. (2013) studied the relationships between interest in a task, persistence and attainment in 3- to 5-year-olds in a low income sample. They found that persistence and interest predict children's early academic skills at age 5.

Several studies have shown that if teachers want to help students develop a growth mindset they focus on learning goals rather than performance goals such as consistently completing work (Dweck, 2007, 2010; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Studies have reported that a fixed mindset may ultimately lead to poorer performance and lower achievement (Ames, 1992; Blackwell et al., 2007; Yeager et al., 2016). Providing tasks within a student's success range reinforces the fixed mindset belief that when they consistently complete work it makes them look smart. Challenges and mistakes are seen as threats to a student's ego rather than opportunities to improve. A focus by teachers on providing tasks that convey high expectations of students supported with strategies to achieve learning goals fosters a growth mindset.

These collective findings identify that early childhood teachers in the present study did not have a comprehensive understanding of mindset theory. While they had some understanding of behaviours that indicate a growth and fixed mindset, a more nuanced understanding is required to successfully teach mindset theory and foster a growth mindset in students; however, currently there are very few resources available to bridge the gap between theory and practice to assist early childhood teachers to do so.

An important issue then becomes to discover how teachers can be supported to learn and incorporate mindset theory in early childhood classrooms. To know how to support teachers' knowledge of mindset theory, teacher attitudes of mindset theory were examined and are discussed in the next section.

9.2.3 Teacher Attitudes to Mindset Theory

Early childhood teachers agree that students can and should have a growth mindset but early childhood teachers do not know how and/or do not feel they are good at fostering a growth mindset. In this study nearly all the early childhood teachers who participated in the Phase One and Phase Two survey were found to strongly agree that students can and should have a growth mindset. In addition, nearly all of the teachers agreed that fostering a growth mindset is part of their responsibility; however, teaching mindset theory posed significant challenges for many of the teachers. Studies by Nestor (2017) and Yettick et al. (2016) similarly found that two-thirds of teachers believe that students can and should have a growth mindset and it is part of their job to teach them; however, less than 20% of teachers felt they are good at doing so. Boaler (2013) further supports this finding, indicating teachers are 'totally on board' (p. 145) with the idea of mindset but do not know how to include the teaching of mindset in schools. Teachers often have difficulty transferring theory to practice, which is acknowledged by Álvarez Álvarez (2015) as the 'knowledge to practice gap'. This can also be referred to as *praxis* and is defined as 'the use of a theory or belief in a practical way' (Oxford Learners Dictionaries, n.d.). In education, praxis can involve reflection and action that leads to transformative change (Nolan & Raban, 2015). Teachers are best placed to adopt and embed new concepts such as mindset theory. Indeed, Schmidt et al. (2015) identified that teachers are an important factor in sustaining positive outcomes for mindset interventions to effect systemic change. Mindset is still poorly understood by teachers

(Boylan et al., 2018) and Dweck (2017) acknowledges that there is still much research to be done to improve teacher praxis of mindset theory. Research on how to teach mindset theory to foster a growth mindset in students in early childhood classrooms is urgently required to improve student learning and achievement.

Currently, support for early childhood teachers to help students develop a growth mindset is scarce as has been shown in the present study. Baker et al. (2017) contend that teaching of mindset can be meaningfully applied in early childhood contexts just as it can in the primary and adolescent years. Yeager et al. (2013) agree and argue that teachers can create improvements in academic outcomes, when armed with a precise understanding of mindsets, customised for the early years. One such program developed in the US, the Growing Early Mindsets program, blends growth mindset, social-emotional learning and mindfulness (Coates, 2016). A two-year multi-wave efficacy study found that students who had participated in the program had higher social-emotional behaviour than the control group. However, the Growing Early Mindsets program was designed to be implemented in a lesson format rather than using principles to assist teachers to create a growth mindset culture in their classroom every day. Coates (2016) acknowledges that the success of Growing Early Mindsets is dependent on the assumption that teachers implement the practices as intended and designed. In the present study, the early childhood teachers' knowledge and attitudes to teaching mindset theory positively changed in Phase Three after being involved in a professional learning community to develop the design principles. All six teachers indicated that they knew more about the teaching of mindset theory from the development and implementation of the design principles. The design principles assisted early childhood teachers to create a growth mindset environment that permeated every interaction and learning experience. Further discussion of the

effectiveness of the design principles on teacher praxis is addressed in Section 9.5.6. The next section addresses research question two: 'What attributes do early childhood teachers believe students need to be effective learners?'

9.3 Teacher Beliefs of the Attributes Students Need to be Effective Learners

Two questions were analysed to develop findings that related to research question two, 'What attributes do early childhood teachers believe students need to be effective learners?' Firstly, what attributes do early childhood teachers believe students need to be successful learners and, secondly, what beliefs do teachers perceive students need to be a successful learner? The findings regarding these questions provided important information about the value the early childhood teachers placed on certain teacher and student beliefs about learning, including a growth mindset. Additional findings from the survey established that the early childhood teachers' beliefs about learning were guided by strong links with quality early childhood pedagogy and practice.

9.3.1 Teacher Beliefs of the Factors Students Need to be Effective Learners

Teachers in the present study indicated that for students to be effective learners they need to develop social-emotional skills, be engaged and motivated, develop supportive relationships and feel safe at school. A discussion of these findings follows.

The development of social and emotional skills was considered by the teachers in this study to be an important factor for effective learning. Successful learners use social and emotional skills such as self-regulation to control their learning environment (Dweck et al., 2014; Goodman et al., 2015; Moffitt et al., 2011; Schoon et al., 2015). Chalkiadaki's (2018) recent analysis of a 21st century framework indicated that the development of self-regulation skills is needed for 21st century learners to take charge

of their own learning. The Australian Student Wellbeing Framework (Education Council, 2018) emphasises the importance of social-emotional skills such as self-regulation for positive developmental outcomes. Therefore, it can be suggested that teachers who understand emotional regulation are able to better equip students for learning both now and for the future. The conceptual framework underpinning this research, developed from the literature review, includes self-regulation and social competencies and demonstrates the synergistic relationship between the development of a growth mindset and social-emotional skills. Student engagement and motivation was also seen to be an important factor for successful learning.

Teachers in the Phase One and Phase Two surveys of this study consider that students need to be engaged and motivated to be successful learners. Similarly, Wacker and Olson (2019) argue that strengthening students' motivation to learn complements the focus on standards, curriculum and assessment. Recent reviews (Pascal et al., 2019; Payler et al., 2017) highlight the importance of the development of executive functions such as self-regulation, which includes motivation for learning. The reviews point out that the development of executive function is more important than IQ and the critical period for the formation of these dispositions is between birth and 5 years (Pascal et al., 2017, 2019). The research on mindset by Dweck and colleagues over the past 30 years has focused on how student beliefs affect motivation and achievement (Dweck, 1999; Dweck & Leggett, 1988; Dweck & Sorich, 1999; Henderson & Dweck, 1990). Results have shown that students with a growth mindset are more engaged and motivated to take on challenging work, persist in the face of setbacks and achieve at higher levels (Paunesku et al., 2015; Yeager et al., 2016, 2019). Teachers can enhance student engagement and motivation for learning by teaching mindset theory to develop a growth

mindset. Building positive relationships was also identified by teachers as a factor that leads to successful learning.

Developing positive relationships with students was identified by teachers in the present study as important for learning. Establishing positive relationships reflects a core principle of the EYLF (DEEWR, 2009), a national framework for Australian early childhood teachers, which is utilised to develop secure, respectful and reciprocal relationships with students and families. Research has shown that creating warm, supportive relationships with responsive caregivers shapes the architecture of the brain to develop social, emotional and cognitive competencies (Center on the Developing Child, 2016; Osher et al., 2018). Findings indicate that responsive relationships lead to better school engagement and performance, better emotional regulation, social competence and a willingness to take on learning challenges (Osher et al., 2018). Strengthening students relationships with teachers is an important element of pedagogy. In Australia this is supported by the EYLF (DEEWR, 2009), which is underpinned by three core ideas, 'belonging, being and becoming', which develop a positive sense of worth and identity as a learner. The EYLF (DEEWR, 2009) states, "belonging acknowledges children's interdependence with others and the basis of relationships in defining identities", "Being recognises the significance of the here and now in children's lives" and "Becoming reflects the process of rapid and significant change that occurs in the early years as young children learn and grow" (p. 7). A student's achievement in learning can be influenced by messages from the environment including relationships with their teacher and peers that shape a student's mindsets about their value in the school environment (i.e. belonging, being and becoming). Providing students with a culturally safe, nurturing and positive environment supports students' identities and sense of wellbeing (Blanchet-Cohen & Richardson/Kinewesquao, 2017).

Teachers in the present study also described utilising strategies appropriate for young students as important for successful learning.

Other factors suggested by the teachers that students need for successful learning were strategies appropriate for young students. The pedagogical practices early childhood teachers use reinforce the development of a growth mindset; however, without sufficient knowledge of mindset theory teachers may be unaware of these links. These findings reflect core principles and practices as outlined in the EYLF (DEEWR, 2009), such as adopting holistic approaches and learning through play to develop student agency. Houen et al. (2016) agree that teachers make curriculum decisions that promote students agency. The EYLF (DEEWR, 2009) provides a vision for Australian teachers to "provide young children with opportunities to maximise their potential and develop a foundation for future success in learning" (p. 5). The framework puts children's learning at the core and guides early childhood teachers' professional practice, curriculum decision-making, teaching and learning. Baker et al. (2017) point out that there are inherent links between early childhood educational theory, practice and positive psychology, which includes mindset. One such similarity is early childhood theory and practice recognises child wellbeing as critical to education with a focus on 'belonging, being and becoming' (DEEWR, 2009). The instructional practices teachers use in their daily interactions with students influence learning behaviours and identity as a learner.

A recent synthesis of research on the science of learning and development identified four main principles and implications for educational practice (Darling-Hammond et al., 2020). These are (i) the provision of a supportive environment to promote strong attachments between teachers and students, (ii) having a system of support to meet student needs, (iii) using productive instructional strategies to develop

concepts and metacognition, and (iv) developing students' social-emotional skills including mindsets. These principles support the factors identified by the teachers in the present study and the principles and practices of the EYLF (DEEWR, 2009) to assist teachers to support students' wellbeing, healthy development and learning behaviours.

The development of a growth mindset was ranked equally as important by the teachers in Phase Two and Phase Three as students feeling safe, teaching quality, engagement and motivation, and social-emotional learning. Phase One teachers ordered growth mindset as the sixth most important skill. One explanation for the low ranking may be a lack of teacher knowledge of the benefits to learning when students develop a growth mindset. These benefits include increased motivation for learning (Dweck, 1999, 2007), the development of social-emotional skills (Coates, 2016) and a sense of belonging in which students feel psychologically safe and connected to others (Stephens et al., 2014; Walton & Cohen, 2007). A recent report by Jacovidis et al. (2020) highlights the interrelationship between mindset, metacognition and academic resilience and the benefits of developing growth mindsets in students. The experience of failure, setbacks and mistakes are inevitable aspects of learning. Student responses to setbacks draw on growth mindsets and metacognitive thinking to make adjustments, be resilient and persevere to achieve a learning goal (Jacovidis et al., 2020). These factors highlight support for teachers to cultivate a greater understanding of the benefits of growth mindset for students and teachers.

In summary, the early childhood teachers in the present study placed importance on many factors that influence learning, particularly the pedagogical beliefs and practices reflected in the EYLF (DEEWR, 2009). However, developing a growth mindset was not an attribute teachers recognised as being as important as others.

Highlighting the need for the development of a growth mindset in early childhood curriculum and policy documents would draw teachers' attention to this.

9.3.2 Teachers' Views on Student Beliefs that Affect Learning

Teachers in this study identified a number of beliefs that students require to be successful learners. Over two-thirds of the teachers strongly agreed that students need to believe that their teacher knows them and treats them equally and fairly, and that they feel they belong and can be successful learners at school. Research by Steele et al. (2002) and Canning et al. (2019) found that when students believe they are not treated equally and fairly their performance decreases. Research highlights that a sense of belonging in which students feel socially connected, supported and respected increases student motivation and success (Dweck et al., 2014; Elliott et al., 2017). Other student attitudes essential to the development of a growth mindset were believed to be less important for successful learning by the teachers in the present study.

Many teachers in the present study exhibited a lack of understanding of some of the core beliefs that students need to develop a growth mindset. This finding provides further evidence that early childhood teachers' knowledge of mindset theory is inadequate and support is required. Significantly, fewer teachers in the Phase One survey strongly agreed that students need to believe that failure is part of learning (60.7%), they can learn challenging material (56.2%) and their academic abilities can increase with effort (47.2%) to have a growth mindset. This finding contrasts with studies that have established these beliefs as integral to growth mindset (Blackwell et al., 2007; Dweck, 1999; Dweck & Leggett, 1988; Hong et al., 1999; Nussbaum & Dweck, 2008). Further, this finding provides direct evidence that teachers lack knowledge about mindset theory and justifies the vital need to develop a comprehensive resource for early childhood teachers including an explanation of student beliefs linked

with growth mindset. The development of the design principles in phases Two, Three and Four of the present study addressed the need for a more explicit awareness of mindset theory and focused on expanding teachers' knowledge to foster a growth mindset in students. The teachers were asked how they support the development of a growth mindset in students.

9.4 Supporting the Development of a Growth Mindset in Students

The findings in this section relate to research question three: 'How do early childhood teachers support the development of a growth mindset in students?' The results indicated that the early childhood teachers used practices that reinforce growth and fixed mindsets.

9.4.1 Teachers Use Practices that Reinforce Fixed and Growth Mindset

Teachers in this study consistently used practices that reinforce fixed and growth mindsets. The teachers often used growth mindset practices such as praising effort, encouraging students to try new strategies when they are struggling and encouraging students who are doing well to keep trying. Indeed, research supports the importance of goal setting, feedback, using language that models a growth mindset, the teacher modelling a growth mindset and giving students agency over their learning to foster a growth mindset (Kamins & Dweck, 1999; Mueller & Dweck, 1998). However, teachers in the present study were found to use practices that foster a fixed mindset such as praising students for their intelligence and for earning good grades, and telling students that it is alright to struggle and not everyone is good at a given subject. A growth mindset classroom climate is demonstrated when the teacher believes all students can master the class material using hard work, are encouraged to use effective learning strategies and ask for help when required (Canning et al., 2019).

Recent PISA results (OECD, 2019) indicate that students who disagreed with the statement 'Your intelligence is something about you that you can't change very much' (i.e. students with a growth mindset) scored higher in reading and expressed less fear of failure than students who believe their abilities are fixed. In Australia, 62% of students worry about what others think of them when they fail. The incorporation of growth mindset practices such as teaching students you can change your intelligence, providing praise for effort and teaching students that mistakes are part of the learning process may help students set up growth learning orientations. It appeared that early childhood teachers in the present study may have been unknowingly sending mixed messages to students by using practices that reinforce fixed and growth mindsets. This teacher uncertainty reinforces the need for the design principles developed to assist the teaching of mindset theory to students. Teacher feedback to students was also investigated as it has been shown to develop either a fixed or growth mindset.

9.4.2 Teachers Use Feedback Statements that Develop Fixed and Growth Mindset

Teachers in this study used feedback statements that foster fixed and growth mindsets. In the Phase One survey teachers indicated that they often used statements such as 'you worked hard and your improvement shows it', which promotes a growth mindset. However, over 60% of the teachers also indicated that they often use statements that reinforce a fixed mindset such as 'you are one of the top students in the class' and 'see you are good at this, you got an A on the last test'. It could be surmised that teachers are unknowingly using feedback that reinforces a fixed mindset. This finding is significant, given that teachers use feedback to guide student learning frequently throughout a school day. Feedback can focus on natural talent or ability, known as *person praise*, or focus on the process and effort, known as *process praise* (Cimpian et al., 2007). Several studies have investigated the effects of praise on student

mindset and have established that praising students for focused effort that leads to an outcome, trying new strategies, seeking help from other students and trying something harder effectively develop a growth mindset (Gunderson et al., 2013; Mueller & Dweck, 1998). Positive feedback for intelligence is commonly viewed as being beneficial to motivation; however, Mueller and Dweck (1998) discovered that praise for intelligence has a negative effect on student motivation and reinforces fixed mindsets. Other studies have identified that the type of praise given to 1–3-year-olds predicts their motivational orientation five years later (Brummelman et al., 2014; Gunderson et al., 2013; Zentall & Morris, 2012). A focus by teachers on providing feedback for effort that leads to growth fosters a growth mindset (Burhans & Dweck, 1995). Haimovitz and Dweck (2017) contend that adults' theories of how to motivate students when responding to successes or failures affect the adult's response. Thus, when adults view failure as a motivator for learning, performance and growth they are more likely to respond with a focus on the process of learning (Haimovitz & Dweck, 2017). Indeed, teacher feedback to students sends students a message about what the teacher values, which powerfully affects their mindset. A working knowledge of the impact of feedback on student mindset is essential for teachers to develop growth mindsets in students and could be included in professional development resources for early childhood teachers.

9.4.3 Teachers Occasionally Integrate Growth Mindset

Teachers in the present study were found to occasionally integrate the teaching of a growth mindset into their teaching expectations and practice. To successfully foster a growth mindset in students, creating a growth mindset environment that permeates all interactions and learning experiences is needed. Four in six teachers in this study indicated that they occasionally integrated the teaching of a growth mindset into their teaching expectations and practice, but not often. Similarly, in a survey distributed to

K–12 teachers, only one in five teachers indicated that they had deeply integrated the teaching of mindset (Yettick et al., 2016). These results show a stark contrast between teacher perceptions of mindset and what teachers actually do in practice. Results from the present study revealed that teachers believe a growth mindset affects a student's learning and they have a responsibility to teach students how to develop a growth mindset; however, teachers only occasionally included practices that reinforce a growth mindset. This finding robustly endorses the development of a set of design principles to assist early childhood teachers to foster a growth mindset in students.

9.5 Effectiveness of Using Design Principles to Guide Effective Practice of Teaching Mindset

The Phase One and Phase Two findings identified that early childhood teachers require support to foster a growth mindset in students. During Phase Two a skeleton set of design principles were developed by the researcher after analysis of survey data and the literature review. Draft principles were developed, implemented and refined in collaboration with teachers during two cycles of implementation in Phase Three. The discussion in this section pertains to research question four: 'How effective are the design principles for guiding the effective teaching of mindset?' A final survey gathered summative information about the effectiveness of the design principles at the completion of the two cycles of implementation and led to a final refined set of principles. Several themes were identified when analysing the effectiveness of the design principles and discussion of these follows.

9.5.1 Teacher Knowledge of Fostering Growth Mindset Improved Over Time When Implementing the Principles

Phase One and Phase Two findings identified the need for a tool to assist teachers to teach mindset theory and foster a growth mindset in students. Initial survey

data collected at the beginning of Phase Two revealed that four of the six focus group teachers felt they had adequate knowledge to teach students how to develop a growth mindset and two teachers did not. Additionally, four of the focus group teachers used the term 'mindset' in their work with students and two did not. Overall, these findings demonstrated that, initially, most of the teachers had some familiarity with the teaching of mindset but further support was needed.

After 10 weeks of implementing the principles, all six teachers reported that they knew more about the teaching of mindset. Nearly all the teachers also indicated that the principles were highly effective in assisting them to create a classroom environment to assist students to develop a growth mindset for learning. Similarly, a study by Seaton (2018) found that teachers who have more knowledge of mindset theory gain confidence to effectively create a growth mindset culture. Further results from Seaton's (2018) study showed that teacher behaviours regarding mindset are related to their knowledge and beliefs about mindset. Likewise, Park et al. (2016) found that process-focused teaching supports the development of student growth mindsets, as opposed to person or ability practices.

Shumow and Schmidt (2013) similarly report that teacher practices influence a student's mindset. More specifically, when students observe teacher behaviours that are supportive of a growth mindset, students are more likely to adopt stronger growth mindset beliefs. Shumow and Schmidt (2013) suggest that 'training programs' in teacher practices are most likely to have a greater influence on the teaching of mindset. Martin (2015) found that teachers can implement sustained change in their practice; however, this requires a level of cognitive dissonance to disrupt thinking about a new theory or concept. Disruptive thinking will either affirm a current belief or cause a shift to a new belief; however, this shift cannot be sustained if the intervention is not

embedded at a systemic, long-term level (Martin, 2015). The creation of design principles such as in the present study may provide a sustained, long-term approach for teachers to foster a growth mindset in students.

9.5.2 Teachers Know Their Own Mindset and Model Effective Learning Using a Growth Mindset

Design Principle One in this study states, 'Teachers develop knowledge of their own mindset and model effective learning using a growth mindset'. This principle was indicated by the focus group teachers as one of the most effective principles to assist them to teach mindset theory to foster a growth mindset in students. Haimovitz and Dweck (2017) identify the influence of teachers' beliefs on how students perceive their own abilities and the learning environment they create. Highlighting this point is a recent report by Wacker and Olson (2019) that identifies the critical role played by teacher attitudes, beliefs and practices regarding mindsets in strengthening student learning. A study by Farrington and Porter (as cited in Stroman, 2019) also found that students rated classroom learning environments higher where the teacher reported having a more positive mindset. More specifically this association was noted for students from diverse backgrounds. In addition, Wacker and Olson (2019) found that teachers' practices are shaped not only by their beliefs but also by the education system in which they work and the social norms and policies that govern these systems. Darling-Hammond (cited in Wacker & Olson, 2019) supports this notion and argues that while teachers develop knowledge of new theories, teachers are also provided with instructional strategies that reinforce altered beliefs. The teachers in the present study identified that teachers understand their own mindset to effectively model using a growth mindset. Other benefits of implementing the principles included improved social-emotional skills.

9.5.3 Implementing the Design Principles Improved Students' Social-Emotional Skills

The implementation of the design principles to foster a growth mindset positively affected other areas of development such as students' social-emotional skills. Specifically, the teachers reported an improvement in relationships between students. A study by Coates (2016) that investigated the impact of a mindset intervention with students aged 3–10 years old supports this finding. Coates (2016) also found significant improvements to students' social-emotional competencies as reported by teachers. More specifically, improvements were noted regarding relationships with peers as was found in the present study. These findings are consistent with other studies that found developing a growth mindset improved students' social-emotional skills (Aronson et al., 2002; Blackwell et al., 2007). Social-emotional skills may improve because students apply a growth mindset approach to social situations, which results in better self-regulation skills (Mrazek et al., 2018). Thus, when incorporating the design principles from the present study to develop students' growth mindset, students' social-emotional skills may also improve. The implementation of the principle that guided teachers to include teaching about the brain was also effective.

9.5.4 Teaching Neuroscience in the Early Years Positively Influenced Learning

Teachers in this study reported that teaching simple neuroscience, contextualised for young learners to explain how the brain functions when learning, positively influenced students' mindsets and metacognition for learning. Initially the teachers had not thought about doing so and did not know how to incorporate teaching about the brain in early education. Teaching students about neuroscience was discussed during focus group two, in which the researcher and teachers collaboratively shared ideas. During Iteration Two, the teachers addressed this design principle more often in their

classrooms and reflected more regularly on teaching students about the brain. In the final summative survey, the design principle 'Teachers teach students how the brain works when you learn' was chosen by the teachers as the most effective principle. The teachers reported that after students learned about what happens in the brain when they learn a new concept or skill they spoke more explicitly about the brain when facing a learning challenge. The teachers also mentioned that students spoke about their new understanding of the brain with their families at home.

Supporting this finding are studies that have found teaching students the idea that the brain is like a muscle and grows with effort leads to an increase in achievement (Aronson et al., 2002; Blackwell et al., 2007; Good et al., 2003). While it could be hypothesised that young students may not understand the workings of the brain, this result has shown that explicit explanation of how the brain functions when learning is effective in early education. In the present study, the teachers used the metaphor that your brain is like a muscle and grows with effort including how neurons work when learning something new and how effort strengthens neural pathways. The teachers used images, books, videos and/or models of the brain to achieve this. Other research highlights the link between the development of a growth mindset and metacognition (Huelser & Metcalfe, 2012).

Mindset can be seen as one of the pillars of metacognition as students use metacognitive strategies such as a growth mindset after making errors (Huelser & Metcalfe, 2012). Encouraging students to develop a growth mindset will simultaneously enhance their metacognitive skills (Mitsea et al., 2021). In the present study, teaching simple neuroscience assisted students to develop both metacognitive strategies and a growth mindset for learning. On reflection, this finding supports evidence that the brain

be included when teaching young students about body parts such as eyes, ears and nose, as is addressed in the health curriculum in the early years.

9.5.5 Socialisation of Student Mindsets

Teachers in this study raised concerns regarding the effect that parent practices may have on student mindsets for learning and could obscure teaching at school that aims to develop a growth mindset in students. The socialisation of students' mindsets occurs through experiences, education and culture at home and school, from which students establish beliefs and attitudes about themselves (Dweck, 2016a). Morin et al., (2015) describe how parents economic and human capital can constrain a child's development and parents behaviours towards their children. In particular, parental education can influence parenting (Morin et al., 2015). A study by Neitzel and Stright (2012) with 73 mothers and their kindergarten children investigated links between a mothers maternal education and the feedback mothers gave to children. This study demonstrated that higher levels of maternal education are associated with mothers encouraging their child's effort and providing more metacognitive information which shapes a mothers response to a child's success or failure. Mothers with lower maternal education use fixed failure feedback and were less skilled at scaffolding children's learning. Therefore, strong partnerships between home and school, in which both reinforce and foster a growth mindset for learning, may provide continuity and support for the development of growth mindsets. Anne described concern that the home environment and language parents use may outweigh the effect of the design principles on students mindsets. Anne had a valid point, supported by a study by Gunderson et al. (2013) investigating the relationship between parent praise and student mindset. It was reported that parent praise given at home when a child is 14–38 months of age can predict their mindset at 7–8 years of age. Children whose parents praised them regularly

for effort during naturalistic interactions were more likely to develop a growth mindset. Haimovitz and Dweck (2017) propose that the socialisation of students' mindsets is influenced by both home and school; however, initial findings that adults' mindsets directly influenced children's mindsets has been called to review.

New findings suggest that adults' mindsets may not be the primary variable shaping their behaviour towards children (Haimovitz & Dweck, 2016). Rather, adults' beliefs about how to motivate children or their responses to children's setbacks may be more important. Haimovitz and Dweck (2016) found that parents' mindsets about intelligence did not correlate with their children's mindsets. More specifically, parents who viewed failure as debilitating tended to focus on students' performance and ability rather than on their effort for learning and in turn their children tended to believe that intelligence is fixed. This finding highlights the necessity for parents to be more aware of their beliefs about success and failure to develop a growth mindset for learning. Thus, strengthening the partnership between home and school to provide continuity in the development of a growth mindset in students can be beneficial to student learning (Haimovitz & Dweck, 2016, 2017). Schools and, more specifically, teachers have a role to play in informing parents about mindset theory and the practices that encourage the development of a growth mindset to assist students to become lifelong learners. Design Principle Nine, 'Teachers share mindset practices with parents/carers and the community', was added in Phase Four during the reflection process as a result of this finding. Teachers also felt that using the principles assisted them to be more reflective in their practice.

9.5.6 Teachers Praxis of Mindset Theory Improved Reflective Practice

Teacher praxis in relation to mindset theory improved with the use of the design principles. Teachers reported greater knowledge of mindset theory and found the

principles highly effective in teaching mindset theory to foster a growth mindset in students. Praxis is when teachers reflect on new knowledge and theory to change their practice (Stamopoulos & Barblett, 2018). Teachers in the present study felt that the principles assisted them to be more reflective of their responses to student successes and failures to develop a growth mindset. The principles constructed by the teachers aligned with new knowledge from professional learning to assist teachers to connect mindset theory with practice, also known as praxis. Haimovitz and Dweck (2017) "contend that adults words and deeds tune children in to the process of learning or lead them to focus on their abilities and performance" (p. 1855). These words and actions give rise to fixed or growth mindsets. The Australian Professional Standards for Teachers (AITSL, 2014) require teachers to engage in reflective practice to improve their teaching knowledge, skills and beliefs. Liu (2015) agrees that teachers need to engage in critical reflection to see themselves as researchers who take the initiative to research their own practice. To support student learning, Liu (2015) proposes that teachers undertake critical reflection to "analyse, question and critique established assumptions of oneself, schools and the society about teaching and learning, and the social and political implications of schooling" (p. 144). The design principles developed in the present study were shown to strongly support teachers to improve praxis in their efforts to teach mindset theory to foster a growth mindset in students. The practicality and effectiveness of the principles were also investigated.

9.5.7 Practicality and Effectiveness of Principles

Teachers in Phase Three of this study found all of the principles to be practical to implement. The teachers identified the most effective principles to be Principle Six (i.e. Teachers teach students about how the brain works when you learn), Principle One (i.e. Teachers develop knowledge of their own mindset and model effective learning

using a growth mindset) and Principle Three (i.e. Teachers assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching). One teacher found the reflective framework using the 5Rs outlined in Principle Three to be an effective practice to support students. The 5Rs supported students to recognise the problem, remind them of their growth mindset talk, resolve the struggle by trying a new strategy, review how effective the strategy in achieving your goal and retry with a new strategy if needed. A report from the Grattan Institute (Goss et al., 2017) recommends that to create classrooms that improve learning, teachers need to generate "the right learning climate" (p. 3) to engage students. Darling-Hammond et al. (2020) agree and argue that a deeply integrated approach that addresses all aspects of the educational environment is required to support the child's cognitive and social-emotional growth. In the present study, the principles were designed to encompass teacher professional knowledge, practice and engagement. Table 9.1 demonstrates the alignment of each principle with the three areas of the Australian Professional Standards for Teachers (AITSL, 2014). The design principles assist teachers to further develop all three areas of professional knowledge, practice and engagement when implemented. All of the design principles align with the professional practice teacher standards. Design principles One to Eight align with the professional knowledge teacher standards and design principles One and Nine align with the professional engagement teacher standards.

Table 9.1

Design Principles Alignment to Australian Professional Standards for Teachers (APST)

Design principles	APST Professional knowledge	APST Professional practice	APST Professional engagement
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.	√	√	√
2. Teachers hold high expectations of students and believe all students can learn and grow.	√	√	
3. Teachers assist students to set goals and reflect on their learning.	√	√	
4. Teachers provide students with strategies for struggle as they work towards achieving a goal.	√	√	
5. Teachers use a common language to teach students about fixed and growth mindset.	√	√	
6. Teachers provide feedback for effort rather than talent or ability.	√	√	
7. Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.	√	√	
8. Teachers teach students how the brain works when you learn.	√	√	
9. Teachers share mindset practices with parents/carers and the community.		√	√

Additionally, the design principles from the present study support the EYLF

principles, practices and outcomes (DEEWR, 2009) and the development of the

personal and social general capability of the Australian Curriculum (Australian

Curriculum, Assessment and Reporting Authority, [ACARA], 2014) as shown in Table

9.2. In particular, the development of personal and social capabilities where students

develop their abilities to manage themselves, relate to others, develop resilience and a

sense of self-worth, resolve conflict, engage in teamwork and feel positive about themselves and the world around them. The development of personal and social capabilities in the Australian Curriculum (ACARA, 2014) is a foundation for learning and for citizenship. Table 9.2 indicates that the nine design principles support all of the principles, practices and outcomes of the EYLF (DEEWR, 2009) particularly those focused on developing children's ongoing learning and reflective practice, high expectations and equity, intentional teaching and developing secure relationships with children. Additionally, the principles link with most sub-elements of the personal and social general capability of the Australian Curriculum (ACARA, 2014). In particular, the design principles develop students' self-awareness, self-management and social awareness skills. The general capabilities are designed to be integrated through all curriculum learning areas, as are the design principles. The principles developed in this study to teach students about mindset theory to foster a growth mindset have been purposefully designed to be integrated into all learning areas and experiences for students to maximise the development of a growth mindset for learning.

Table 9.2

Design Principles (DP) Alignment with Early Years Learning Framework (EYLF) and Australian Curriculum (AC)

KEY: Design Principles (DP)								
1. Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.	2. Teachers hold high expectations of students and believe all students can learn and grow.	3.Teachers assist students to set goals and reflect on their learning	4.Teachers provide students with strategies for struggle as they work towards achieving a goal.	5.Teachers use a common language to teach students about fixed and growth mindset.	6.Teachers provide feedback for effort rather than talent or ability.	7.Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.	8.Teachers teach students how the brain works when you learn.	9.Teachers share mindset practices with parents/carers and the community

Alignment of design principles with Early Years Learning Framework		
EYLF Practices	**EYLF Principles**	**EYLF Outcomes**
Holistic Approaches DP: 1,2,4,7,8	Secure, respectful and reciprocal relationships DP: 2,4,,7,8,9	Children have a strong sense of identity DP: 2,3,4,6,7,8,9
Responsiveness to children DP: 2,3,4,5,6,7	Partnerships DP: 2,3,5,6,7,9	Children are connected with and contribute to their world DP: 3,4,7,9
Learning through play DP: 2,3,7	High expectations and equity DP: 1,2,3,4,5,6,7,8	Children have a strong sense of wellbeing DP: 1,2,3,4,6,7,8,9
Intentional teaching DP: 1,2,3,4,5,6,7,8	Respect for diversity DP: 2,6,7,9	Children are confident and involved learners DP: 2,3,4,5,6,7,8,9
Learning environments DP: 1,2,3,7	Ongoing learning and reflective practice DP: 1,3,4,5,6,7,8	Children are effective communicators DP: 3,4,5,6,7,9
Cultural competence DP: 2,9		
Continuity of learning & transitions DP: 2,7,9		
Assessment for learning DP: 2,3,5,6,7		

Alignment of design principles with the Australian Curriculum: Personal and social capability	
Self-awareness	**Self-management**
Recognise emotions DP: 4,5,6,7,	Express emotions appropriately DP: 3,4,5,6,7,9
Recognise personal qualities and achievements DP: 2,3,4,5,6,7, 9	Develop self-discipline goals DP: 3,4,6,7,9
Understand themselves as learners DP: 2,3,4,5,6,7,8,9	Work independently DP: 3,4,6,7 ,9
Develop reflective practice DP: 3,4,5,6,7,8,	Become confident, capable, resilient & capable DP: 2,3,4,5,6,7,8,9
Social awareness	**Social management**
Appreciate diverse perspectives DP: 9	Communicate effectively DP: 4,5,6,7,9
Contribute to civil society DP: 9	Work collaboratively DP: 4, 5,7,9
Understand relationships DP: 9	Make decisions DP: 2,3,4,6,7,8,9
	Negotiate and resolve conflict DP: 4,5,7
	Develop leadership skills DP: 2,3,4, 5,7

216

9.6 Retrospective Analysis of the Design Principles for Teaching Mindset Theory to Foster a Growth Mindset in the Early Years

A discussion of the final refined set of design principles is presented in this chapter to reflect on the validity and inclusion of each principle in relation to the literature.

Principle One: Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.

Teachers in Phase Three of this study read and viewed information about mindset theory to further develop knowledge of their own mindsets. The teachers described how knowing your own mindset is an important precursor to be able to model effective learning using a growth mindset. A teacher's own mindset belief influences the practices they use to support students to consider their own mindset for learning. Characteristics such as a teacher's educational background, experiences and beliefs can add to or detract from the classroom environment they create, which contributes to student achievement and motivation (Schmidt et al., 2015). Teacher beliefs are likely to influence the practices they use and therefore influence students' mindset beliefs through the quality of interactions with students. Dweck and colleagues have found that the messages students receive from teachers affect their mindset, goal orientation and consequently academic achievement (Cimpian et al., 2007; Kamins & Dweck, 1999; Mueller & Dweck, 1998). It is therefore vital that teachers know their own mindset, as the assumptions they hold about themselves and students are influenced by their mindset. Seaton (2018) argues that these mindsets "play a significant role in determining their expectations, teaching practices, and how students perceive their own mindset" (p. 43).

The National Study of Learning Mindsets (Yeager et al., 2019) is the largest randomised controlled trial of a growth mindset program in the US in K–12 settings. The study examined responses from 300 teachers from 73 schools. Data leveraged from the study showed that teachers who believed intellectual ability can improve with effort were more likely to favour using supportive instructional messages (i.e. those that contribute to better student outcomes). Teachers who believed ability is fixed and cannot improve used restrictive instructional messages (i.e. those that undermine student outcomes). Principle One in the present study draws attention to the importance of teachers knowing their own mindset and provides an impetus for teachers to engage in professional development about mindset theory to reflect on their own beliefs and assumptions. When teachers know their own mindset and model effective learning using a growth mindset this helps them see how important having high expectations of students is. Principle Two reflects a focus for teachers to hold high expectations and is discussed further.

Principle Two: Teachers hold high expectations of students and believe all students can learn and grow.

High expectations for student learning is a core principle of the EYLF (DEEWR, 2009) and one that the early childhood focus group teachers in the present study suggested led their pedagogy. Teachers who hold high expectations and help students see themselves as successful learners assist students to succeed. To hold these high expectations, teachers believe that all students can learn, grow and improve with effort. The National Study of Learning Mindsets (Yeager et al., 2019) found that teachers use different instructional messages according to the beliefs they hold in each student's abilities. In the present study, teachers used supportive instructional messages more often to improve student outcomes for students perceived to be academically stronger

than students with perceived weaker academic abilities. Canning et al. (2019) report similar findings in a longitudinal university-wide study with 150 STEM professors and 15,000 students to investigate the professors' beliefs about the fixedness of ability for stigmatised students. The results showed that racial achievement gaps in courses taught by a more fixed mindset faculty were twice as large as those with a growth mindset faculty. In addition, stigmatised students were less motivated and had more negative experiences.

The third principle of the EYLF (DEEWR, 2009) states, "early childhood educators who are committed to equity believe in all children's capacities to succeed, regardless of diverse circumstances and abilities" (p. 12). Further, educators are directed to "continually strive to find equitable and effective ways to ensure all children have opportunities to achieve learning outcomes" (DEEWR, 2009, p. 12). In the present study in Phase Three, the teachers suggested that they employed the practice of holding high expectations of students in several ways such as verbalising their beliefs that students can achieve their goals, setting individual differentiated goals that students can achieve and providing personalised motivational messages in the form of songs, dances, puppets and high fives. In an early childhood context where students are forming the foundational views of themselves as learners, Principle Two is important to ensure all students form a positive view of themselves as learners. Setting and reflecting on goals is the basis of Principle Three.

Principle Three: Teachers assist students to set goals and reflect on their learning.

The teachers in the present study realised that setting goals with students assisted them to reflect on their learning. Teachers play a vital role in assisting students to develop metacognitive skills that help them reflect, revise and retry when learning.

Darling-Hammond et al. (2020) argue that students develop metacognitive skills where they set goals, respond positively to feedback and manage their progress towards these goals to develop a sense of agency for learning. Learning outcome four of the EYLF (DEEWR, 2009) directs teachers to ensure that children develop into confident, involved learners who have agency over their learning. Assisting children in early years settings to develop goals, implement strategies and revise them for effectiveness develops dispositions such as persistence, confidence, enthusiasm and reflexivity (DEEWR, 2009). Goal setting enables reflective practice that draws on a growth mindset to overcome setbacks and challenges in learning. While working towards goals it is important to provide students with strategies to use when faced with a learning struggle as outlined in Principle Four.

Principle Four: Teachers provide students with strategies for struggle as they work towards achieving a goal.

Teachers in this study developed innovative strategies to assist students with learning struggles. For example, strategies such as teaching students a goal chant, forming a success train to celebrate the achievement of a goal, modelling your own teacher goals and ways to work on it, and role-playing what strategies for struggle look like were shared. Teachers demonstrating and modelling these strategies provide students with a variety of approaches to use when challenged to achieve their learning goals. The ultimate aim is for students to develop the ability to think independently and strategically about the best strategies to overcome learning setbacks. However, in an early childhood context it may be difficult, as students are still developing their social-emotional skills including emotional regulation and metacognition. The BERA-TACTYC Early Childhood Research Review 2003–2017 (Payler et al., 2017) suggests that "deeper inquiry into ways that adults can become involved in young children's

activity is warranted, especially relating to the development and presentation of young children's metacognition and self-regulation" (p. 73). The report argues that there is growing evidence from the neurosciences regarding early brain development and its impact on learning, and early childhood educators need to pay attention, particularly in relation to executive function, self-regulation and metacognition. Darling-Hammond et al. (2020) argue that teachers can develop metacognitive thinking by providing scaffolds for learning through modelling of thinking, explicit strategy instruction and frameworks for self-monitoring of thinking and actions. At an early childhood level, scaffolding may include allowing time for practice to develop confidence and competence so students can see improvements in their abilities to develop a growth mindset. Additionally, strategies such as modelling, describing, questioning, demonstrating, role-playing and discussion may be useful. During the second focus group, the 5Rs conceptualised by the researcher to assist teachers to support students metacognition when faced with a learning struggle were introduced. They are:

- recognise the problem

- remind yourself of your growth mindset self-talk

- resolve the struggle by trying a new strategy

- review how effective the strategy is at achieving your goal

- retry with a new strategy if needed.

Feedback from the participants in focus group three indicated that these were highly useful to teachers. To ease the struggle that new ideas can bring, developing a shared language and explaining new terminology was shown to be helpful to teachers.

Principle Five: Teachers use a common language to teach students about fixed and growth mindset.

One participant in focus group three mentioned that there was a need for a "common language that goes through [year levels] to teach fixed and growth mindset". This principle was developed with the particular words 'common language' in regards to the teaching of mindset to ensure continuity in a large school environment. Thomas and McDonagh (2013) state, "shared language refers to people developing understanding amongst themselves based on language (e.g. spoken, text, visuals) to help them communicate more effectively" (p. 46). A shared language can be developed by explaining the meaning of a term or may require a more extensive process of interaction. Thomas and McDonagh (2013) argue that language is generative, active and continually evolving. In education contexts, developing a shared language for the teaching of mindsets may enhance communication about mindset between students, teachers, administrators and parents or carers. Oades et al. (2021) argue that to promote wellbeing in the education system, wellbeing literacy is promoted. Wellbeing literacy refers to "the capability of comprehending and composing wellbeing language, sensitive to contexts, used intentionally to maintain or improve the wellbeing of oneself or others; in short mindful language use about and for wellbeing" (Oades et al., 2021, p. 327). The authors consider wellbeing literacy to be a fundamental tool to facilitate positive education interventions such as the teaching of mindset theory (Oades et al., 2021). A standard list of common vocabulary related to mindset with meanings could be created for use in discussion with children, families and colleagues to support this principle. In the development of a shared language, explicit language for feedback focused on effort is addressed in Principle Six.

Principle Six: Teachers provide feedback for effort rather than talent or ability.

In this study, teachers reflected on how Principle Six caused them to rethink the way they praised and offered feedback to students. The way teachers interact with

students can support or undermine resilience and assist or hinder students to adopt a growth mindset. Research with children from preschool to adolescence has shown that the way praise or feedback is provided affects students by reinforcing either a fixed or growth mindset. In particular, students who receive process praise that focuses on feedback for effort and strategies used to overcome a learning struggle are more likely to endorse a growth mindset (Brummelman et al., 2014; Cimpian et al., 2007; Haimovitz & Corpus, 2011; Kamins & Dweck, 1999; Mueller & Dweck, 1998; Zentall & Morris, 2012). Process praise assisted students to become learning oriented and develop resilience to learning setbacks. It was deemed important to make Principle Six explicit to teachers to ensure that they understand the powerful effect different types of praise or feedback can have on a student's mindset for learning. Process praise or praise for effort can encourage students to be more persistent when they make mistakes in learning.

Principle Seven: Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.

Teachers in this study described a number of ways they encouraged persistence and effort and normalised mistakes in a safe and supportive learning environment. For example, developing a good respectful relationship with each student, talking about instances of making mistakes themselves, modelling growth mindset strategies and self-talk, using story texts to draw attention to making mistakes and not being perfect and using phrases such as 'hakuna matata' to normalise mistakes in a novel way. In a safe and supportive learning environment making mistakes is viewed as part of the learning process and affects students' responses to challenges or setbacks in learning. Further neuroscientific research (Diamond, 2010, 2013) affirms this and has identified that more

learning occurs when students feel safe, secure and accepted and can take the risk of trying new things without fear of being wrong.

A student's identity as a learner is also influenced by their sense of 'belonging' at school, which is created through their relationships with others. Diamond (2010) describes that 'feeling excluded or as if one does not belong has been shown in controlled experiments to impair reasoning and decision-making, decrease persistence of difficult problems and impair selective attention in the face of distraction' (Baumeister et al., 2002). The EYLF (DEEWR, 2009) directs early childhood teachers to see 'belonging' as central to children's development and integral to human existence. In safe and supportive environments for learning children hold a sense of 'belonging'. Students who feel safe and supported are more likely to engage fully in learning and have more positive attitudes towards teachers and learning (Dweck et al., 2014). Haimovitz and Dweck (2017) highlight the fact that performance and high stakes testing are a priority in schools today rather than a focus on the learning process. The assessment culture in schools may be damaging the mindsets of students where performance is prioritised over process (Boaler, 2015; Lemos & Veríssimo, 2014). Creating learning environments in which students feel they belong, teachers normalise making mistakes, trying new strategies and working towards achievement of goals can help students develop a growth mindset for learning. Including the teaching of simple neuroscience also supported teachers to teach mindset theory to foster students' growth mindset.

Principle Eight: Teachers teach students how the brain works when you learn.

In this study, the teachers reported that students were more growth mindset oriented towards learning after teaching them simple neuroscience about learning. The teachers described when the students were facing a learning challenge they spoke more

explicitly about the brain and how it was strengthening. Researchers (Aronson et al., 2002; Blackwell et al., 2007; Good et al., 2003) have found that it is possible to promote a growth mindset by teaching students about neuroscientific evidence such as showing the brain is malleable and gets stronger through effort, trying new strategies and seeking help when necessary. Pascal et al.'s (2017) review of the Early Years Foundation Stage recommends that more emphasis is needed on the language of learning as young children are developing their knowledge base, capacity for metacognition and self-regulation. The review suggests that the development of self-regulation and positive learning habits is central to the Early Years Foundation Stage. Dweck and colleagues found that incorporating the teaching of neuroscience including showing that the brain is malleable and gets stronger with effort, utilising different strategies and seeking help is an influential strategy to develop a growth mindset (Blackwell et al., 2007). Students in Grade 7 were divided into two groups for a workshop on the brain and study skills. The control group were taught about stages of memory and the other half were taught about how the brain grows when you learn and how to apply this to school work. The results showed that three times as many students in the growth mindset group showed an increase in effort and motivation compared with the control group (Blackwell et al., 2007). As a result of this finding, programs were developed such as Brainology© to provide online training to primary and high school students. A study to assess the effectiveness of the Brainology© program found that when at-risk high school students participated in the online growth mindset training they showed significant increases in grades and satisfactory course completion (Paunesku et al., 2015). Finally, Principle Nine focused on sharing practices with parents or carers and the community to develop a growth mindset in students.

Principle Nine: Teachers share mindset practices with parents/carers and the community.

A growth mindset is best encouraged with support from family and communities as well as schools and teachers. An African proverb states, 'it takes a village to raise a child' (ACECQA, 2018b) and reinforces the idea that it takes a community to nurture and educate a child. The amount, frequency and nature of the activities in the home learning environment that children experience during the pre-school years consistently predicts children's later academic outcomes (Foster et al., 2016). Interestingly, in the present study the students took growth mindset messages home to share with parents. Haimovitz and Dweck (2017) describe that socialisation of students' mindsets is influenced by both parents and teachers. Importantly, more recent research has found that mindset may not be transmitted between adults and children. Studies have shown that adult responses to children's setbacks and beliefs about what motivates children are important (Ferrar et al., 2019; Haimovitz & Dweck, 2017). Many parents may not be aware that their responses to student setbacks in learning shape their mindset and academic abilities. During the final focus group the participants raised the idea of holding a parent information session. Sharing mindset theory with parents can be done via newsletters, parent information sessions, podcasts and sharing of online resources used to teach mindset via school communication platforms. This may ensure that parents receive accurate information on mindset theory and help align parent and school practices to further reinforce the teaching of mindset. The nine principles developed in the present study add to the paucity of research on growth mindset in early childhood education to assist early childhood teachers in particular.

9.7 Summary

Chapter 9 discussed the findings from the research study in relation to answering the research questions and comparing the results to the literature. Overall, the findings for research question one (i.e. What knowledge and attitudes do early childhood teachers have about mindset?) showed that early childhood teachers knew about mindset theory and believed it to be important as a factor for successful learning; however, they did not know how to incorporate it. The need to bridge the research to practice gap is highlighted in this study in regards to the teaching of mindset theory to foster a growth mindset in students in the early years. The results to research question two (i.e. What attributes do early childhood teachers believe students need to be effective learners?) indicated that the teachers believed students need to develop social-emotional skills, be engaged and motivated and develop supportive relationships to feel safe at school. These and other factors indicated by teachers reflected many of the principles and practices of the EYLF (DEEWR, 2009) such as developing positive relationships with students and families and using developmentally appropriate pedagogical practices. Many of these practices are also shown to foster a growth mindset; however, teachers were not aware of the reciprocal benefits to both. Therefore, explicit links between early years pedagogical and curriculum documents and mindset theory would assist teachers. The teachers did not indicate that a growth mindset was as important as other factors for successful learning, which indicates that teachers lack awareness of the benefits of developing a growth mindset for learning. The teachers also strongly agreed that students need to believe their teacher knows them, treats them equally and fairly, and feel they belong and can be successful learners at school, which are also reflected in the EYLF (DEEWR, 2009). Further findings revealed how early childhood teachers support the development of a growth mindset.

Findings for research question three (i.e. How do early childhood teachers support the development of a growth mindset in students?) indicated that the early childhood teachers used practices and feedback that reinforce fixed and growth mindsets. Teachers in this study were found to occasionally integrate the teaching of a growth mindset into their teaching expectations and practice. Findings in relation to research question three illuminated the misconceptions that teachers had of mindset theory and led to the development of the design principles to further support teachers to teach mindset theory to foster a growth mindset in students. Regarding research question four (How effective are the design principles for guiding practice in the teaching of mindset theory?), the teachers felt that the principles were highly effective in providing assistance to teach mindset theory to foster a growth mindset in students in the early years context. Early childhood teacher praxis of mindset theory improved with benefits including improved teacher knowledge of mindset theory, student learning and student social and emotional skills. In Phase Four a final design principle was added during the reflection phase to address the need to share mindset theory and practices with parents to strengthen the link between home and school, as raised by the teachers. The next chapter, Chapter 10: Conclusion, will provide a summary of the research study, outline the limitations and include recommendations for the future.

Chapter 10: Conclusion

10.1 Introduction

This study aimed to investigate the perceptions that early childhood teachers have of mindset theory and collaboratively develop a set of principles to assist them to teach mindset theory to foster a growth mindset in students. Chapter 10 includes an overview of the thesis and reviews key findings from the study. An explanation of the limitations of the study follow, followed by recommendations and implications for future research. Finally, the chapter concludes with final remarks.

10.2 Overview of the Thesis

This thesis comprises 10 chapters, including this final chapter. Chapter 1 introduced the background, rationale and significance of the study. Chapter 2 included a review of the literature pertaining to the development of effective 21st century learners, the development of social-emotional skills and the importance of developing metacognitive skills. Chapter 2 included a review of motivational theory, mindset theory including a critique, and lastly the importance of developing a growth mindset in the early years. Chapter 3 discussed the conceptual framework of the study. Chapter 4 outlined the theoretical framework, study aims and research questions. The methodology of the study including methods used to collect and analyse the data, which were explained in Chapter 4. Chapter 5 presented the findings from Phase One, the survey. Chapter 6 outlined Phase Two findings and Chapter 7 reported Phase Three findings in relation to the development of the principles. Chapter 8 followed and presented the Phase Four findings including a final set of principles developed. Chapter 9 provided a discussion of the findings in relation to the four research questions and relevant literature. Chapter 10 provides a summary of the key findings from the

research, highlights the limitations of the study and presents recommendations for future research.

10.3 Key Findings of the Study

Data were collected across four phases in this study using DBR. The key findings from the study are reviewed.

10.3.1 Early Childhood Teachers' Knowledge of Mindset Theory Improved With Design Principles Implementation

The implementation of the design principles positively improved teacher knowledge of mindset theory. Initially, this study found in Phase One that four in five early childhood teachers occasionally integrated the teaching of mindset; however, none of them did so often. Additionally, the early childhood teachers had some knowledge of mindset theory but it was not a term being used consistently in the classroom. The early childhood teachers believed that a growth mindset is important for successful learning, it is part of their role to develop a growth mindset in students but they did not have adequate knowledge to incorporate the teaching of mindset in their classrooms. This finding reveals a stark contrast between teacher beliefs of mindset and what teachers actually do in practice to teach students about mindset.

Early childhood teachers had some knowledge of the behaviours associated with fixed and growth mindsets but with evident knowledge gaps. The knowledge gaps suggest that the implementation of mindset theory provides challenges to early childhood teachers and currently there is little guidance available to assist them, particularly in the Australian context. The teachers indicated that it is important students hold the beliefs that their teacher knows them and treats them equally and fairly, and that they belong and can be a successful learner at school. A significant finding was that fewer teachers believed that students need to feel that failure is part of learning, they

can learn challenging material and their academic abilities can increase with effort. Yet studies have shown that these are core beliefs in the development of a growth mindset (Blackwell et al., 2007; Dweck, 1999; Dweck & Leggett, 1988; Hong et al., 1999; Nussbaum & Dweck, 2008). However, after developing, implementing and refining the design principles, all six focus group teachers reported that they knew more about mindset theory. Further guidance to support each principle may include strategies and tips for implementation. The tips could also be shared with parents and carers.

10.3.2 Early Childhood Teachers' Praxis of Mindset Theory Improved

The teachers found the principles to be highly effective in assisting to create a classroom environment where students are more growth mindset oriented towards learning. Initial findings from this study showed that early childhood teachers are unknowingly sending mixed messages to students by using practices that reinforce both a fixed and growth mindset. The teachers were found to consistently use practices known to reinforce a growth mindset; however, they also unknowingly use practices that reinforce a fixed mindset. The teachers often used practices such as praising for effort, encouraging students to try new strategies when they were struggling and encouraging students who were doing well to keep trying, which all reinforce a growth mindset. However, teachers also used feedback and strategies that encourage a fixed mindset such as praising students for their intelligence, praising students for earning good grades, and telling students that it is alright to struggle and not everyone is good at a given subject. If teachers are to create a growth mindset culture to develop students' growth mindsets then a nuanced understanding of the practices that reinforce a growth mindset is needed. A focus by teachers on strategies and effort students apply can create a cultural norm for learning where students see their abilities as something to be developed.

10.3.3 Early Childhood Teachers Require Clarification of the Links Between Mindset Theory and Early Childhood Curriculum and Pedagogy

The overall findings about teacher beliefs of the factors students need to be an effective learner revealed that the early childhood teachers placed importance on many factors influencing learning, particularly those pedagogical beliefs and practices reflected in the EYLF (DEEWR, 2009). The teachers stated that students need to feel safe at school, develop their social-emotional skills and be engaged and motivated, develop positive relationships with peers, parents and teachers, receive appropriate strategies for learning and develop a sense of agency. However, developing a growth mindset was not a factor recognised as being as important as other factors. The teachers were not aware of the links between mindset theory and the EYLF principles and practices they use that influence their behaviour and expectations. It is suggested the link between the early childhood pedagogical principles and practices teachers use are guided by the EYLF (DEEWR, 2009) and those that contribute to the development of a growth mindset are made more explicit to early childhood teachers. Additionally, the inclusion of mindset theory in the EYLF (DEEWR, 2009) would focus early childhood teachers to include the teaching of mindset.

10.3.4 Early Childhood Teachers Found the Design Principles Highly Effective to Teach Mindset Theory to Foster a Growth Mindset in Students

All six of the early childhood teachers in Phase Two and Phase Three who developed, implemented and refined the principles reported that they knew more about the teaching of mindset at the end of the two iterations. Additionally, they reported that the principles were highly effective in assisting them to develop a growth mindset culture in their classrooms to assist students to develop a growth mindset for learning. The teachers reflected that it is important for teachers to know their own mindset to

understand mindset theory. The most effective principles the teachers reported were

Principle Six (i.e. Teachers teach students about how the brain works when you learn),

Principle One (i.e. Teachers develop knowledge of their own mindset and model

effective learning using a growth mindset) and Principle Three (i.e. Teachers assist

students to reflect on their learning by setting goals and providing students with

strategies for struggle through explicit teaching). The teachers reported that the

principles were well scaffolded to allow for implementation in a manageable way and

all the principles had a clear purpose and could be implemented effectively. Overall, the

teachers suggested that the principles assisted them to be more reflective of the beliefs

they hold about mindsets for learning and the practices they use to develop a growth

mindset.

10.3.5 Early Childhood Teachers Found Teaching Students Neuroscience

Positively Influenced Learning

The early childhood teachers in Phase Two and Phase Three had initially not

thought about incorporating the teaching of neuroscience in the early years. To begin

with they did not know how to include teaching about the brain at an appropriate level

for young students. After support was provided, the teachers reported changes in student

language and dialogue when students were confronted with a learning struggle. The

teachers reported that students spoke more explicitly about the brain when facing a

learning challenge after learning about what happens in the brain when they learn a new

concept or skill. Students also shared this new knowledge and language with parents.

The teachers revealed that teaching students about the brain and how it works when you

learn was surprising for them as they found the students were engaged, reflective and

highly interested. Additionally, the teachers in this study found that the students placed

more value on the mindfulness sessions after learning about the brain. This finding

suggests that the inclusion of teaching simple neuroscience about learning and mindset in health or social-emotional curriculum may lead to positive learning outcomes for students. Further research to analyse the effectiveness of incorporating the teaching of neuroscience to students in an early years context and the strategies to support teaching about the brain is warranted.

10.4 Limitations of the Study

As with all research studies, there were limitations to this study. The first limitation was in relation to the setting and sample size for Phase Two and Phase Three. Phase Two and Phase Three took place with six early childhood educators in one independent girls' school setting in Perth, Western Australia. The school was chosen based on the school pedagogy towards teaching and learning, which encouraged resilience. The purposive selection method positively affected study outcomes as the participants were motivated to participate and invest their time in the study. Although the participants of Phase Two and Phase Three were committed for the 10 weeks of data collection, the second iteration video diary sample was not large. This was due to unexpected matters from the participants such as illness, which reduced the number of video diaries in the second iteration. Future research is also needed in a more diverse range of settings to mitigate the limitation of only using one school to develop and trial the principles.

Another limitation is the nature of DBR. As DBR is carried out in the complex situations of actual learning environments such as classrooms there are many uncontrollable variables that may affect the success of the design (McKenney & Reeves, 2019). Time is also another limitation as the nature of doctoral research requires the completion of work in a shorter timeframe than DBR projects would

normally allow. This required the shortening of design cycles where ideally longer cycles would be used.

It is also acknowledged in DBR that researcher bias may be present as the researcher holds the joint role of researcher as designer and researcher. DBR researchers are not just observing interactions but are also influencing them. Ary et al. (2010) state that "achieving objectivity in DBR in regard to the neutrality or the extent to which the research is free of bias in the procedures and interpretation of results is difficult" (p. 504). The nature of DBR is that the researcher immerses themselves in the research context to work closely with the participants to develop the design principles. Because of this, researcher bias may be present as the researcher leads the participants in the development of the principles. The use of triangulation of data in this study by using multiple sources increased the objectivity of the findings.

10.5 Recommendations

The findings from this study highlighted four recommendations, which are presented and discussed in the next section.

10.5.1 Recommendation One: Embed the Design Principles in Initial Teacher Education, Early Childhood Educator Training and Professional Learning Programs to Teach Mindset Theory

This study found that early childhood teachers knew about mindset and believed it to be an important factor students need for successful learning; however, they did not have adequate knowledge or feel confident to implement mindset theory in classrooms. Currently there is little support available contextualised for early childhood teachers to incorporate mindset theory. The findings in Phase One highlighted the problem that teachers displayed misconceptions about fixed and growth mindsets. The problem was addressed through the development of nine design principles to guide teachers to teach

mindset theory. The principles were found by the early childhood teachers to be highly effective at assisting them to foster a growth mindset in students in the early years. The principles were designed to change the everyday interactions teachers have with students to create mindsets that develop resilience for learning. The teaching of mindsets can be meaningfully applied in the early years as young students form beliefs of themselves as learners (Baker et al., 2017). Additionally, there are inherent links between early childhood theory and mindset theory as both recognise child wellbeing as complementary to education with a focus on belonging, being and becoming (DEEWR, 2009). The resulting design principles from the present study provide specific guidance to teachers in the early years to teach mindset theory to foster a growth mindset to enhance student learning and achievement.

For these reasons, it is recommended that the design principles are included in early childhood initial teacher education, educator training and professional learning programs to be implemented widely across early childhood classrooms. Raising awareness of mindset theory and the design principles for practicing teachers could occur through online or face to face professional learning programs. Pre-service teacher training courses could also include both knowledge of mindset theory and the principles through core units of study such as learning theory and professional experience units. Consent has been given to use the data from this study for teaching and learning purposes.

10.5.2 Recommendation Two: Include Growth Mindset Theory in Early Childhood Curriculum and Policy Documents

In this study, the teachers found that using the design principles improved students' social and emotional skills. The teachers reported that students used more supportive language when conversing with each other, leading to an improvement in

relationships between students. An increasing focus by policymakers on the importance of the development of students' social and emotional skills to prepare them for the 21st century provides an impetus for curriculum documents to more explicitly focus on the inclusion of mindset theory. The OECD (2015) argues that "children need a balanced set of cognitive, social and emotional skills to adapt to today's demanding, changing and unpredictable world" (p. 1). The PISA report 'Growth Mindset from the PISA 2018 results' (OECD, 2019) outlines the need for teachers to develop a growth mindset in students in which they learn that effort and learning strategies lead to success. Further, another recent report by PISA (OECD, 2020), titled 'Sky's the limit: Growth mindset, students, and schools in PISA', describes that new items on mindset will be included in the 2025 PISA assessment, which indicates an increased focus on the importance of the development of students' growth mindsets for learning. Additionally, a recent Australian Government directive suggests that teachers assist all students to "develop a growth mindset and a passion for learning and be inspired to aim high and pursue bold goals" (p. 5). Importantly, the report identifies that strong foundations for successful learning are laid in the early years and early childhood education is tasked with assisting students to develop agency over their learning to create motivated and successful learners for the present and the future. For these reasons, it is suggested that the links between early childhood frameworks such as the EYLF (DEEWR, 2009) and mindset theory are made more explicit to ensure that early childhood teachers understand the links between mindset theory and early childhood pedagogical and curriculum documents. Similarly, the addition of mindset theory to the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2014) within personal and social general capabilities is suggested to support the integration of the development of growth mindsets for learning in all aspects of the curriculum. Farrell

(2016, p. 2) argues that "early childhood research has become part of an internationally recognised discourse, pushing for the strongest possible start for children's life chances and life outcomes." The inclusion of growth mindset theory in early childhood curriculum and policy documents may also assist early childhood teachers to see the benefits of the inclusion of mindset theory. Benefits such as helping students develop agency in their learning in the early stages of schooling set them up for the trials and successes in learning in later years of school.

10.5.3 Recommendation Three: Include the Teaching of Neuroscience in Health and/or Social and Emotional Curriculums

Teachers in this study found that teaching neuroscience to students in the early years was 'eye opening' and led to positive changes in students' language and attitudes when faced with a learning struggle. It is recommended that teaching students how the brain operates when they learn and the malleability of the brain helps them believe they have agency over their learning. Research has shown that teaching middle school students about how the brain grows with learning increases effort and motivation for learning (Blackwell et al., 2007). Concepts such as looking at the structure of the brain with diagrams and models, teaching about neurons and how neural pathways are formed when you learn something new, and how practice strengthens those connections warrant inclusion. Additionally, teaching students the analogy that your brain is like a muscle and grows stronger with practice is also a core understanding of those with a growth mindset and warrants explicit teaching. Using models, books, diagrams, videos and hands-on activities are all useful strategies for younger students. While it could be hypothesised that young students may not understand the workings of the brain, the present study has shown that explicit teaching of simple neuroscience at an early childhood level is effective according to teachers.

On reflection, this result supports evidence that teaching young students about the brain is akin to teaching them about other body parts such as the eyes, ears and nose, which is addressed in the health curriculum in the early years. It is suggested that teaching about the brain in relation to mindset and learning is included as a part of the health and/or social-emotional curriculum.

10.5.4 Recommendation Four: Develop a Resource to Provide Professional Development for Early Childhood Teachers

The principles developed in this study will provide guidance to early childhood educators to teach mindset theory to foster a growth mindset in students. The study results suggest a necessity for professional development or a resource to support early childhood teachers. The Australian Professional Standards for Teachers (AITSL, 2014) standard six directs teachers to engage in professional learning to improve their practice. The development of a professional development resource will assist teachers to meet standard six. Professional development could include ongoing workshops or online training to introduce and disseminate the information. A blog web page could assist teachers to participate in a community of practice to share experiences and ideas. The participants in this study also suggested that the development of strategies for each principle would assist early childhood educators to implement the principles. This is an avenue for further research with early childhood teachers.

10.6 Implications for Future Research

Future research could be focused on several projects to further the development of young students' growth mindset. This research focused on the development of a set of principles to assist early childhood educators to foster a growth mindset in students. Further research to develop particular practices to support each principle would be beneficial to teachers. Practices could be developed in collaboration with schools

already implementing mindset theory in the early years to ensure relevant practices are captured. Additionally, further research could investigate the application of the principles to a wider context such as primary school students in Years 2–6.

In this study, concern was raised that parents fostering a growth mindset at home is important to consistently reinforce a growth mindset message. Further research could involve consultation with families to develop a resource to assist parents to develop a growth mindset in students. To support various home learning environments, the resource could be provided in different languages for those families whose first language is not English.

Finally, the scope of this study did not allow for students' views on their own mindsets. Further research could focus on several questions including: How do students feel about challenges? Do they feel their mindset affects their learning? Additionally, the paucity of research on the development of mindsets in the early years leads to further questions such as: What are the factors that affect ability beliefs during this developmental phase? Are the conceptions that students have of themselves at this age a predictor for future mindsets? And when do academic mindsets emerge? This study reported that teachers were surprised about the impact of teaching young students neuroscience to further develop their understanding of the learning process. However, the impact of teaching young students about neuroscientific processes when learning was not measured from a child's viewpoint. The investigation of these questions would add further knowledge to assist early childhood educators to understand the development of mindsets in students in the formative years.

10.7 Concluding Remarks

Every student can emerge from schooling with a passion for learning developed through a growth mindset, which helps them aim high and pursue bold goals. Australian

teachers have been tasked with creating 21st century, lifelong learners who can persevere and problem solve to live and work in a globalised economy. The foundations for excellence in learning are laid early in life. Therefore, the early years are an important time to create positive motivation for learning and to strengthen self-belief that they have the ability to change and grow through perseverance. The teaching of mindset theory to foster a growth mindset in an early childhood environment encourages students to see the power of effort and resilience for learning. Supporting students to understand mindsets and develop a growth mindset during the early years positions them for success throughout their education and life. The design principles developed in this study provide the necessary guidance for early childhood teachers to assist them to teach mindset theory and foster a growth mindset in students in the early years context.

References

Allport, G. W. (1961). *Pattern and growth in personality*. Holt, Rinehart and Winston.

Almlund, M., Duckworth, A. L., Heckman, J., & Kautz, T. (2011). Personality psychology and economics. In E. Hanushek, S. Machin & L. Woessmann (Eds.), *Handbook of the economics of education* (Vol. 4, pp. 1–181). Elsevier. https://doi.org/10.1016/B978-0-444-53444-6.00001-8

Álvarez Álvarez, M. D. C. (2015). Can teachers bridge the theory-practice gap? An ethnographic study of a teacher. *US-China Education Review B*, *5*(4), 233–244. https://doi.org/10.17265/2161-6248/2015.04.002

Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. *Journal of Educational Psychology*, *76*(3), 478–487. https://doi.org/10.1037/0022-0663.76.3.478

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*(3), 261–271. https://doi.org/10.1037/0022-0663.84.3.261

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, *80*(3), 260–267. https://doi.org/10.1037/0022-0663.80.3.260

Anderson, T., & Shattuck, J. (2012). Design-based research: A decade of progress in education research? *Educational Researcher*, *41*(1), 16–25. https://doi.org/10.3102/0013189X11428813

Armstrong, D. M. (1961). *Perception and the physical world*. Routledge and Kegan Paul.

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing stereotype threat and boosting academic achievement of African-American students: The role of conceptions of

intelligence. *Journal of Experimental Social Psychology*, *38*(2), 113–125.

https://doi.org/10.1006/jesp.2001.1491

Ary, D., Jacobs, L. C., Sorensen, C., & Razavieh, A. (2010). *Introduction to research in education* (8th ed.). Cengage Learning.

Australian Children's Education and Care Quality Authority. (2018a). National quality standard. http://acecqa.gov.au/national-quality-framework/the-national-quality-standard

Australian Children's Education and Care Quality Authority. (2018b). 'It takes a village to raise a child': The role of community—Part 1. https://wehearyou.acecqa.gov.au/2018/07/02/it-takes-a-village-to-raise-a-child-the-role-of-community-part-1/

Australian Curriculum, Assessment and Reporting Authority. (2014). General capabilities. https://www.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/

Australian Institute for Teaching and School Leadership. (2014). *Australian Professional Standards for Teachers*. https://www.aitsl.edu.au/teach/standards

Baker, L., Green, S., & Falecki, D. (2017). Positive early childhood education: Expanding the reach of positive psychology into early childhood. *European Journal of Applied Positive Psychology*, *1*(8), 1–12. https://www.thepositivityinstitute.com.au/wp-content/uploads/2017/04/BakerGreenFalecki-EJAPP-Positive-early-childhood-education.pdf

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action: Social cognitive theory*. Prentice Hall.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational behavior and human decision processes*, *50*(2), 248–287. https://doi.org/10.1016/0749-5978(91)90022-L

Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian Journal of Social Psychology*, *2*(1), 21–41. https://doi.org/10.1111/1467-839X.00024

Bandura, M., & Dweck, C. S. (1985). *The relationship of conceptions of intelligence and achievement goals to achievement-related cognition, affect and behavior*. [Unpublished manuscript], Department of Psychology, Harvard University.

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *Journal of the Learning Sciences*, *13*(1), 1–14. https://doi.org/10.1207/s15327809jls1301_1

Barblett, L., Knaus, M., & Barratt-Pugh, C. (2016). The pushes and pulls of pedagogy in the early years: Competing knowledges and the erosion of play-based learning. *Australasian Journal of Early Childhood*, *41*(4), 36–43. https://doi.org/10.1177/183693911604100405

Barrett, K. C. (2000). The development of the self in relationships. In R. Mills & S. Duck (Eds.), *The developmental psychology of personal relationships* (pp. 91–107). Wiley.

Barrett, K. C., & Morgan, G. A. (1995). Continuities and discontinuities in mastery motivation during infancy and toddlerhood: A conceptualization and review. In R. H. MacTurk & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations and applications* (pp. 57–94). Ablex.

Baumeister, R. F., Twenge, J. M., & Nuss, C. K. (2002). Effects of social exclusion on cognitive processes: Anticipated aloneness reduces intelligent thought. *Journal*

of Personality and Social Psychology, *83*(4), 817–827.

https://doi.org/10.1037//0022-3514.83.4.817

Bell, M. M., & Wolfe, C. D. (2004). Emotion and cognition: An intricately bound

developmental process. *Child Development*, *75*(2), 366–370.

https://doi.org/10.1111/j.1467-8624.2004.00679.x

Bellen, L. (2016). *Play-lost in transition? Teacher beliefs about pedagogic continuity*

across the transition to formal schooling. [Doctoral dissertation, University of

Notre Dame Australia]. ProQuest Dissertations and Theses Global.

Besant, H. (2016). The journey of brainstorming. *Journal of Transformational*

Innovation, *2*(1), 1–7.

https://www.regent.edu/acad/global/publications/jti/vol2iss1/Besant_JTISU16A.

pdf

Birt, L., Walter, F., Scott, S., Cavers, D., & Campbell, C. (2016). Member checking: A

tool to enhance trustworthiness or merely a nod to validation? *Qualitative*

Health Research, *26*(13), 1802–1811.

https://doi.org/10.1177/1049732316654870

Blackwell, L. S., Trzesniewski, K., & Dweck, V. (2007). Implicit theories of

intelligence predict achievement across an adolescent transition: A longitudinal

study and an intervention. *Child Development*, *78*(1), 246–263.

https://doi.org/10.1111/j.1467-8624.2007.00995.x

Blair, C. (2002). School readiness: Integrating cognition and emotion in a

neurobiological conceptualization of children's functioning at school entry.

American Psychologist, *57*(2), 111–127. https://doi.org/10.1037/0003-

066X.57.2.111

Blanchet-Cohen, N., & Richardson/Kinewesquao, C. (2017). Foreword: Fostering

cultural safety across contexts. *AlterNative: An International Journal of*

Indigenous Peoples, *13*(3), 138–141.

https://doi.org/10.1177/1177180117714139

Boaler, J. (2013). Ability and mathematics: The mindset revolution that is reshaping

education. *Forum*, *55*(1), 143–152. https://www.youcubed.org/wp-

content/uploads/14_Boaler_FORUM_55_1_web.pdf

Boaler, J. (2015). *Memorizers are the lowest achievers and other common core math*

surprises. The Hechinger Report. http://hechingerreport.org/memorizers-are-the-

lowest-achievers-andother-common-core-math-surprises/

Bolstad, R., Gilbert, J., McDowall, S., Bull, A., Boyd, S., & Hipkins, R. (2012).

Supporting future-oriented learning and teaching: A New Zealand perspective.

Ministry of Education.

https://www.educationcounts.govt.nz/publications/schooling/109306

Bowlby, J. (1978). Attachment theory and its therapeutic implications. *Adolescent*

Psychiatry, *6*, 5–33. https://psycnet.apa.org/psycinfo/1982-00026-001

Boylan, F., Barblett, L., & Knaus, M. (2018). Early childhood teachers' perspectives of

growth mindset: Developing agency in children. *Australasian Journal of Early*

Childhood, *43*(3), 16–24. https://doi.org/10.23965/AJEC.43.3.02

Boyle, M. E. (2013). *Prekindergarten and kindergarten teachers' perceptions of*

childhood demographic determinants and academic achievement [Doctoral

dissertation, University of Southern Mississippi]. ProQuest Dissertations and

Theses Global.

https://aquila.usm.edu/cgi/viewcontent.cgi?article=1111&context=dissertations

Bradley, B., & Reinking, D. (2011). A formative experiment to enhance teacher-child language interactions in a preschool classroom. *Journal of Early Childhood Literacy*, *11*(3), 362–401. https://doi.org/10.1177/1468798411410802

Brinck, I., & Liljenfors, R. (2013). The developmental origin of metacognition. *Infant and Child Development*, *22*(1), 85–101. https://doi.org/10.1002/icd.1749

Brown, A. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences*, *2*(2), 141–178. https://doi.org/10.1207/s15327809jls0202_2

Brummelman, E., Thomaes, S., Overbeek, G., de Castro, B. O., van den Hout, M. A., & Bushman, B. J. (2014). On feeding those hungry for praise: Person praise backfires in children with low self-esteem. *Journal of Experimental Psychology: General*, *143*, 9–14. https://doi.org/10.1037/a0031917

Burhans, K. K., & Dweck, C. S. (1995). Helplessness in early childhood: The role of contingent worth. *Child Development*, *66*(6), 1719–1738. https://doi.org/10.2307/1131906

Burnette, J. L., O'Boyle, E. H., VanEpps, E. M., Pollack, J. M., & Finkel, E. J. (2013). Mind-sets matter: A meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin*, *139*(3), 655–701. https://doi.org/10.1037/a0029531

Butler, R. (1998). Age trends in the use of social and temporal comparison for self-evaluation: Examination of a novel developmental hypothesis. *Child Development*, *69*(4), 1054–1073. https://doi.org/10.1111/j.1467-8624.1998.tb06160.x

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework

for Educators (Digcompedu). *European Journal of Education*, *54*(3), 356–369. https://doi.org/10.1111/ejed.12345

Cain, K. M., & Dweck, C. S. (1995). The relation between motivational patterns and achievement cognitions through the elementary school years. *Merrill-Palmer Quarterly*, *41*, 25–52. https://www.jstor.org/stable/23087453

Canning, E. A., Muenks, K., Green, D. J., & Murphy, M. C. (2019). STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes. *Science Advances*, *5*(2). https://doi.org/10.1126/sciadv.aau4734

Carlton, M. P., & Winsler, A. (1998). Fostering intrinsic motivation in early childhood classrooms. *Early Childhood Education Journal*, *25*(3), 159–166. https://doi.org/10.1023/A:1025601110383

Center on the Developing Child. (2016). *From best practices to break-through impacts: A science-based approach to building a more promising future for young children and families*. Harvard University. https://developingchild.harvard.edu/resources/from-best-practices-to-breakthrough-impacts/

Chalkiadaki, A. (2018). A systematic literature review of 21st century skills and competencies in primary education. *International Journal of Instruction*, *11*(3), 1–16. https://files.eric.ed.gov/fulltext/EJ1183407.pdf

Cimpian, A., Arce, H. M. C., Markman, E. M., & Dweck, C. S. (2007). Subtle linguistic cues affect children's motivation. *Psychological Science*, *18*(4), 314–316. https://doi.org/10.1111/j.1467-9280.2007.01896.x

Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, *113*(31), 8664–8668. https://doi.org/10.1073/pnas.1608207113

Claxton, G., & Carr, M. (2004). A framework for teaching learning: The dynamics of disposition. *Early Years*, *24*(1), 87–97. https://doi.org/10.1080/09575140320001790898

Coates, K. (2016). *An evaluation of growing early mindsets* (Publication No. 10142204) [Doctoral Dissertation, University of Oregon]. ProQuest Dissertations and Theses Global. https://www.proquest.com/docview/1807933801?pq-origsite=gscholar&fromopenview=true

Collaborative for Academic, Social, and Emotional Learning. (2013). *The 2013 CASEL guide: Effective social and emotional learning programs*. http://casel.org/wp-content/uploads/2016/01/2013-casel-guide-1.pdf

Collins, A. (1992). Toward a design science of education. In E. Scanlon & T. O'Shea (Eds.), *New directions in educational technology* (pp. 15–22). Springer-Verlag.

Commonwealth of Australia. (2018). *Australian early developmental census*. AGP. https://www.aedc.gov.au/

Compagnoni, M., Karlen, Y., & Merki, K. M. (2019). Play it safe or play to learn: Mindsets and behavioral self-regulation in kindergarten. *Metacognition and Learning*, *14*(3), 291–314. https://doi.org/10.1007/s11409-019-09190-y

Conley, D. T. (2014). *Learning strategies as metacognitive factors: A critical review*. Educational Policy Improvement Center. https://www.performanceassessmentresourcebank.org/system/files/Raikes_Learning_Strategies-3.pdf

Conti, G., & Heckman, J. J. (2013). The developmental approach to child and adult health. *Pediatrics*, *131*(2), 133–141. https://doi.org/10.1542/peds.2013-0252d

Cordoves, J. L. (2013). *A concurrent mixed method study of preservice teachers' attitudes toward the inclusion of students with autism in general education classrooms* (Publication No. 3599511) [Doctoral Dissertation, Walden University]. ProQuest Dissertations and Theses. https://www.proquest.com/docview/1462885125?pq-origsite=gscholar&fromopenview=true

Cornell, C., Kiernan, N., Kaufman, D., Dobee, P., Frydenberg, E., & Deans J. (2017). Developing social emotional competence in the early years. In E. Frydenberg, A. Martin & R. Collie (Eds.), *Social and emotional learning in Australia and the Asia-Pacific* (pp. 391–411). Springer. https://doi.org/10.1007/978-981-10-3394-0_21

Creswell, J. W., & Creswell, J. D. (2018). *Research design*. SAGE Publications.

Crick, R. E., Broadfoot, P. M., & Claxton, G. L. (2004). Developing an effective lifelong learning inventory: The ELLI Project. *Assessment in Education*, *11*(3), 247–272. https://doi.org/10.1080/0969594042000304582

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dawes, J. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *International Journal of Market Research*, *50*(1), 61–104. https://doi.org/10.1177/147078530805000106

Deak, J. (2010). *Your fantastic elastic brain*. Little Pickle Stories.

De Bono, E. (1985). *De Bono's thinking course*. Ariel Books.

Deci, E., & Ryan, R. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. University of Rochester Press.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, *26*(3–4), 325–346. https://doi.org/10.1080/00461520.1991.9653137

Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, *2*(3), 270–283. https://doi.org/10.1177/1558689808316807

Department of Education, Employment and Workplace Relations. (2009). *Belonging, being and becoming: The Early Years Learning Framework for Australia*. https://k10outline.scsa.wa.edu.au/__data/assets/pdf_file/0003/4629/EYLF_compl ete_doc.pdf

Department of Education and Training. (2018). *Through growth to achievement: Report of the review to achieve educational excellence in Australian schools*. https://docs.education.gov.au/documents/through-growth-achievement-report-review-achieve-educational-excellence-australian-0

The Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, *32*(1), 5–8. https://doi.org/10.3102/0013189X032001005

Dewey, J. (1929). The quest for certainty: A study of the relation of knowledge and

action. *The Journal of Philosophy*, *27*(1), 14–25.

https://doi.org/10.2307/2014669

Diamond, A. (2010). The evidence base for improving school outcomes by addressing

the whole child and by addressing skills and attitudes, not just content. *Early

Education and Development*, *21*(5), 780–793.

https://doi.org/10.1080/10409289.2010.514522

Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, *64*, 135–168.

https://doi.org/10.1146/annurev-psych-113011-143750

Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous

changes in performance, strategy and achievement cognitions following failure.

Journal of Personality and Social Psychology, *36*(5), 451–462.

https://doi.org/10.1037/0022-3514.36.5.451

Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: The

processing of success. *Journal of Personality and Social Psychology*, *39*(5),

940–952. https://doi.org/10.1037/0022-3514.39.5.940

Dix, K. L., Slee, P. T., Lawson, M. J., & Keeves, J. P. (2012). Implementation quality

of whole-school mental health promotion and students' academic performance.

Child and Adolescent Mental Health, *17*(1), 45–51.

https://doi.org/10.1111/j.1475-3588.2011.00608.x

Dörnyei, Z., & Ushioda, E. (2014). *Teaching and researching motivation*. Routledge.

https://doi.org/10.4324/9781315833750

Doyle, S. (2007). Member checking with older women: A framework for negotiating

meaning. *Health Care for Women International*, *8*(10), 888–908.

https://doi.org/10.1080/07399330701615325

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Duckworth, A., & Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *Journal of Personality Assessment*, *91*(2), 166–174. https://doi.org/10.1080/00223890802634290

Duncan, G. J., & Magnuson, K. (2011). The nature and impact of early achievement skills, attention skills, and behavior problems. In G. J. Duncan & R. J. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances* (pp. 47–70). Russell Sage Foundation.

Dupeyrat, C., & Mariné, C. (2005). Implicit theories of intelligence, goal orientation, cognitive engagement, and achievement: A test of Dweck's model with returning to school adults. *Contemporary Educational Psychology*, *30*(1), 43–59. https://doi.org/10.1016/j.cedpsych.2004.01.007

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*, 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology*, *31*(4), 674–685. https://doi.org/10.1037/h0077149

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, *41*(10), 1040-1048. https://doi.org/10.1037/0003-066X.41.10.1040

Dweck, C. S. (1991). Self-theories and goals: Their role in motivation, personality, and

    development. In R. Dienstbier (Ed.), *Nebraska symposium on motivation* (pp.

    199–235). University of Nebraska Press.

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality and*

    development. The Psychology Press.

Dweck, C. S. (2002). Messages that motivate: How praise moulds students' beliefs,

    motivation, and performance (in surprising ways). In J. Aronson (Ed.)

    Improving academic achievement (pp. 37–60). Academic Press.

    https://doi.org/10.1016/B978-012064455-1/50006-3

Dweck, C. S. (2007). The perils and promises of praise. *Educational Leadership*, *65*(2),

    34–39. http://www.ascd.org/Default.aspx

Dweck, C. S. (2009). Who will the 21st-century learners be? *Knowledge Quest*, *38*(2),

    8–9. http://www.ala.org/ala/aasl/aaslpubsandjournals/kqweb/kqweb.cfm

Dweck, C. S. (2010). Even geniuses work hard. *Educational Leadership*, *68*(1), 16–20.

    Retrieved from http://www.ascd.org/publications/educational-

    leadership/sept10/vol68/num01/Even-Geniuses-Work-Hard.aspx

Dweck, C. S. (2015). Growth. *British Journal of Educational Psychology*, *85*, 242–245.

    https://doi.org/10.1111/bjep.12072

Dweck, C. S. (2016a). *Mindset: The new psychology of success* (updated edition).

    Random House.

Dweck, C. S. (2016b). *Growth mindset doesn't promise pupils the world.* TES.

    https://www.tes.com/news/school-news/breaking-views/growth-mindset-doesnt-

    promise-pupils-world

Dweck, C. S. (2017). The journey to children's mindsets and beyond. *Child*

    Development Perspectives, *11*(2), 139–144. https://doi.org/10.1111/cdep.12225

Dweck, C. S. (2018, June 26). *Carol Dweck responds to recent criticisms of growth mindset research*. Mindset Scholar Network. https://mindsetscholarsnetwork.org/carol-dweck-responds-recent-criticisms-growth-mindset-research/

Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*, *6*(4), 267–285. https://doi.org/10.1207/s15327965pli0604_1

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273. https://doi.org/10.1037/0033-295X.95.2.256

Dweck, C. S., & Reppucci, N. D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology*, *25*(1), 109–116. https://doi.org/10.1037/h0034248

Dweck, C. S., & Sorich, L. A. (1999). Mastery-oriented thinking. In C. R. Snyder (Ed.), *Coping: The psychology of what works* (pp. 232–251). Oxford University Press.

Dweck, C. S., Walton, G. M., & Cohen, G. L. (2014). *Academic tenacity: Mindsets and skills that promote long-term learning*. Bill & Melinda Gates Foundation. https://ed.stanford.edu/sites/default/files/manual/dweck-walton-cohen-2014.pdf

Dweck, C. S., & Yeager, D. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science*, *14*(3), 481–496. https://doi.org/10.1177/1745691618804166

Education Council. (2018). *Australian student wellbeing framework*. https://studentwellbeinghub.edu.au/

Education Council. (2019). *Alice Springs (Mparntwe) Education Declarati*on. Council

    of Australian Governments. http://www.educationcouncil.edu.au/Alice-Springs-

    Mparntwe-Education-Declaration.aspx

Edwards, J., & Martin, B. (2016). *Schools that deliver*. Corwin

Edwards, S. (2007). From developmental-constructivism to socio-cultural theory and

    practice: An expansive analysis of teachers' professional learning in early

    childhood education. *Journal of Early Childhood Research*, *5*(1), 83–106.

    https://doi.org/10.1177/1476718X07072155

Elliott, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance

    achievement motivation. *Journal of Personality and Social Psychology*, *72*(1),

    218–232. https://doi.org/10.1037/0022-3514.72.1.218

Elliott, A. J., Dweck, C. S., & Yeager, D. S. (Eds.) (2017). *Handbook of competence*

    and motivation: Theory and application. Guilford Publications.

Elliott, E. S., & Dweck, C. S. (1983). Achievement motivation. In P. Mussen & E. M.

    Hetherington (Eds.), *Handbook of child psychology* (pp. 643–691). Wiley.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and

    achievement. *Journal of Personality and Social Psychology*, *54*(1), 5–12.

    https://doi.org/10.1037/0022-3514.54.1.5

Ericson, A., & Pool, R. (2016). *Growth mindset is only half the solution, you need a*

    deliberate practice mindset, too. https://www.tes.com/news/school-

    news/breaking-views/exclusive-growth-mindset-only-half-solution-you-need-a-

    deliberate

Erikson, E. H. (1998). *The life cycle completed* (extended version). W.W. Norton &

    Company.

Fadel, C. (2015). *Redesigning the curriculum for 21st century education.* Center for

 Curriculum Redesign. http://curriculumredesign.org/wp-content/uploads/CCR-

 FoundationalPaper-Updated-Jan2016.pdf

Farrell, A., Kagan, S. & Tisdall, E. (2016). Early childhood research: An expanding

 field. In A. Farrell, S. L. Kagan, E. K. Tisdall (Eds), *The SAGE handbook of*

 early childhood research (pp. 1-12). SAGE Publications Ltd, https://www-doi-

 org.ezproxy.ecu.edu.au/10.4135/9781473920859

Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., & Johnson,

 D. W., & Beechum, N. O. (2012). *Teaching adolescents to become learners:*

 The role of noncognitive factors in shaping school performance: A critical

 literature review. Consortium on Chicago School Research.

 https://eric.ed.gov/?id=ED542543

Ferrar, S. J., Stack, D. M., Dickson, D. J., Serbin, L. A., Ledingham, J., &

 Schwartzman, A. E. (2019). Maternal socialization responses to preschoolers'

 success and struggle: Links to contextual factors and academic and cognitive

 outcomes. *Journal of Research in Childhood Education*, *33*(3), 363–381.

 https://doi.org/10.1080/02568543.2019.1607787

Fogel, A. (1995). Relational narratives of the prelinguistic self. In P. Rochat (Ed.),

 Advances in Psychology (pp. 117–139). Elsevier Science & Technology.

 https://doi.org/10.1016/S0166-4115(05)80009-3

Ford, M. E., & Thompson, R. A. (1985). Perceptions of personal agency and infant

 attachment: Toward a life-span perspective on competence development.

 International Journal of Behavioral Development, *8*(4), 377–406.

 https://doi.org/10.1177/016502548500800402

Foster, T. D., Froyen, L. C., Skibbe, L. E., Bowles, R. P., & Decker, K. B. (2016). Fathers' and mothers' home learning environments and children's early academic outcomes. *Reading and Writing*, *29*(9), 1845–1863. https://doi.org/10.1007/s11145-016-9655-7

García, E. (2014). The need to address non-cognitive skills in the education policy agenda. In M. S. Khine & S. Areepattamanni (Eds.), *Non-cognitive skills and factors in educational attainment* (pp. 31–64). Springer.

Gardner, H. (2008). The five minds for the future. *Schools: Studies in Education, 5(1-2), 17–24.*. https://doi.org/10.1086/591814

Gelman, S. G., Heyman, G. D., & Legare, C. H. (2007). Developmental changes in the coherence of essentialist beliefs about psychological characteristics. *Child Development*, *78*(3), 757–774. https://doi.org/10.1111/j.1467-8624.2007.01031.x

Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology*, *24*, 645–662. https://doi.org/10.1016/j.appdev.2003.09.002

Goodman, A., Joshi, H., Nasim, B., & Tyler, C. (2015). *Social and emotional skills in childhood and their long-term effects on adult life*. Institute of Education.

Goss, P., Sonnemann, J., & Griffiths, K. (2017). *Engaging students: Creating classrooms that improve learning.* Grattan Institute. https://grattan.edu.au/wp-content/uploads/2017/02/Engaging-students-creating-classrooms-that-improve-learning.pdf

Gössling, B., & Daniel, D. (2018). Video analysis in design-based research: Findings of

    a project on self-organised learning at a vocational school. *Educational Design*

    Research, *2*(2), 1-27. https://doi.org/10.15460/eder.2.2.1270

Gottfried, G. M., Gelman, S. A., & Schultz, J. (1999). Children's understanding of the

    brain: From early essentialism to biological theory. *Cognitive Development*,

    14(1), 147–174. https://doi.org/10.1016/S0885-2014(99)80022-7

Graham, S. (1995). Implicit theories as conceptualized by an attribution researcher.

    Psychological Inquiry, *6*(4), 294–297.

    https://doi.org/10.1207/s15327965pli0604_4

Graham, S., & Weiner, B. (1996). Theories and principles of motivation. In D. C.

    Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 63–

    84). Taylor and Francis.

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact.

    Journal of Personality and Social Psychology, *85*(3), 541–553.

    https://doi.org/10.1037/0022-3514.85.3.541

Greenbaum, T. L. (1998). *The handbook for focus group research*. SAGE Publications.

    https://doi.org/10.4135/9781412986151

Greene, B. A., & Miller, R. B. (1996). Influences on achievement: Goals, perceived

    ability, and cognitive engagement. *Contemporary Educational Psychology*,

    21(2), 181–192. https://doi.org/10.1006/ceps.1996.0015

Guba, E. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries.

    Educational Communication and Technology, *29*(2), 75–91.

    https://doi.org/10.1007/BF02766777

Gunderson, E. A., Gripshover, S. J., Romero, C., Dweck, C. S., Goldin-Meadow, S., &

    Levine, S. C. (2013). Parent praise to 1- to 3-year-olds predicts children's

motivational frameworks five years later. *Child Development*, *84*(5), 1526–

1541. https://doi.org/10.1111/cdev.12064

Gutman, L. M., & Schoon, I. (2013). *The impact of non-cognitive skills on outcomes for

young people*: *Literature review*. University of London, Institute of Education.

https://discovery.ucl.ac.uk/id/eprint/10125763/1/Gutman_Schoon_%202013%2

0Non-cognitive_skills_literature_review_.pdf

Haimovitz, K., & Corpus, J. H. (2011). Effects of person versus process praise on

student motivation: Stability and change in emerging adulthood. *Educational

Psychology*, *31*, 595–609. https://doi.org/10.1080/01443410.2011.585950

Haimovitz, K., & Dweck, C. S. (2016). What predicts children's fixed and growth

intelligence mind-sets? Not their parents' views of intelligence but their parents'

views of failure. *Psychological Science*, *27*(6), 859–869.

https://doi.org/10.1177/0956797616639727

Haimovitz, K., & Dweck, C. S. (2017). The origins of children's growth and fixed

mindsets: New research and a new proposal. *Child Development*, *88*(6), 1849–

1859. https://doi.org/10.1111/cdev.12955

Harackiewicz, J. M., & Elliott, A. J. (1995). Life is a roller coaster when you view the

world through entity glasses. *Psychological Inquiry*, *6*(4), 298–301.

https://doi.org/10.1207/s15327965pli0604_5

Haslam, N., Bastian, B., Bain, P., & Kashima, Y. (2006). Psychological essentialism,

implicit theories, and intergroup relations. *Group Process and Intergroup

Relations*, *9*(1), 63–76. https://doi.org/10.1177/1368430206059861

Haslam, N., Bastian, B., & Bissett, M. (2004). Essentialist beliefs about personality and

their implications. *Personality and Social Psychology Bulletin*, *30*(12), 1661–

1673. https://doi.org/10.1177/0146167204271182

Hatch, J. A. (2010). Rethinking the relationship between learning and development: Teaching for learning in early childhood classrooms. *The Education Forum*, *3*(74), 258–268. https://doi.org/10.1080/00131725.2010.483911

Hebert, C. A. (1985). *Mediators of persistence in pre-schoolers: Implications for development* [Doctoral dissertation, Harvard University].

Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, *24*(3), 411–482. https://doi.org/10.1086/504455

Henderson, V. L., & Dweck, C. S. (1990). Achievement and motivation in adolescence: A new model and data. In S. Feldman & G. Elliot (Eds.), *At the threshold: The developing adolescent* (pp. 34–55). Harvard University Press.

Herrington, J., McKenney, S., Reeves, T., & Oliver, R. (2007). Design-based research and doctoral students: Guidelines for preparing a dissertation proposal. In *EdMedia+Innovate Learning* (pp. 4089–4097). Association for the Advancement of Computing in Education (AACE).

Heyman, G. D., & Dweck, C. S. (1992). Achievement goals and intrinsic motivation: Their relation and their role in adaptive motivation. *Motivation and Emotion*, *16*(3), 231–247. https://doi.org/10.1007/BF00991653

Heyman, G. D., Dweck, C. S., & Cain, K. M. (1992). Young children's vulnerability to self-blame and helplessness: Relationship to beliefs about goodness. *Child Development*, *63*(2), 401–415. https://doi.org/10.1111/j.1467-8624.1992.tb01636.x

Hill, R., Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention and behavior: An introduction to theory and research. *Contemporary Sociology*, *6*(2), 244–245. https://doi.org/10.2307/2065853

Hong, Y., Dweck, C. S., Chiu, C., Lin, M. S., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, *77*(3), 588–599. https://doi.org/10.1037/0022-3514.77.3.588

Houen, S., Danby, S., Farrell, A., & Thorpe, K. (2016). Creating spaces for children's agency: 'I wonder...' formulations in teacher-child interactions. *International Journal of Early Childhood, 48*(3), 259–276. https://doi.org/10.1007/s13158-016-0170-4

Howard, P. G. (2018). Twenty-first century learning as a radical re-thinking of education in the service of life. *Education Sciences*, *8*(4), 189-190. https://doi.org/10.3390/educsci8040189

Huberman, A. M., Miles, M. B., & Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook*. SAGE Publications.

Huelser, B. J., & Metcalfe, J. (2012). Making related errors facilitates learning, but learners do not know it. *Memory & Cognition*, *40*(4), 514–527. https://doi.org/10.3758/s13421-011-0167-z

Imagineers. (2010). *Walt Disney imagineering: A behind the dreams look at making more magic real*. Disney Book Publishing.

Jacovidis, J. N., Anderson, R. C., Beach, P. T., & Chadwick, M. K. L. (2020). *Growth mindset thinking and beliefs in teaching and learning*. Inflexion. https://www.ibo.org/globalassets/publications/ib-research/policy/growth-mindset-policy-paper.pdf

James, W. (1907). Pragmatism's conception of truth. *The Journal of Philosophy, Psychology and Scientific Methods*, *4*(6), 141–155. https://www.pdcnet.org/jppsm/content/jppsm_1907_0004_0006_0141_0155

Jones, D. E., Greenberg, M., & Crowley, M. (2015). *American Journal of Public Health*, *105*(11), 2283–2290. https://doi.org/10.2105/AJPH.2015.302630

Juuti, K., Lavonen, J., & Meisalo, V. (2016). Pragmatic design-based research: Designing as a shared activity of teachers and researchers. In P. Dimitris & K. Petros (Eds.), *Iterative design of teaching-learning sequences* (pp. 35–46). Springer. https://link.springer.com/chapter/10.1007/978-94-007-7808-5_3

Kamins, M. L., & Dweck, C. S. (1999). Person versus process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology*, *35*(3), 835–847. https://doi.org/10.1037/0012-1649.35.3.835

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth. *Journal of Digital Learning in Teacher Education*, *29*(4), 127–140. https://doi.org/10.1080/21532974.2013.10784716

Kilpatrick, J. T. (2012). *Elementary school teachers' perspectives on learning styles, sense of efficacy and self-theories of intelligence* (Publication No. 1509632) [Doctoral dissertation, Western Carolina University]. ProQuest Dissertations and theses Global. https://www.proquest.com/docview/1014026877?pq-origsite=gscholar&fromopenview=true

Lamb, S., Maire, Q., & Doecke, E. (2017). *Key skills for the 21st century: An evidence based review*. Centre for International Research on Education Systems. https://research.acer.edu.au/cgi/viewcontent.cgi?article=1358&context=research_conference

Lemos, M. S., & Veríssimo, L. (2014). The relationships between intrinsic motivation, extrinsic motivation, and achievement, along elementary school. *Procedia-Social and Behavioral Sciences*, *112*, 930–938. https://doi.org/10.1016/j.sbspro.2014.01.125

Leshem, S., & Trafford, V. (2007). Overlooking the conceptual framework. *Innovations in Education and Teaching International*, *44*(1), 93–105. https://doi.org/10.1080/14703290601081407

Liamputtong, P. (2013). *Qualitative research methods* (4th ed.). Oxford University Press.

Liamputtong, P. (2019). *Qualitative research methods* (5th ed.). Oxford University Press.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

Lincoln, Y. S., & Guba, E. G. (2013). *The constructivist credo*. Routledge. https://doi.org/10.4324/9781315418810

Linneberg, M. S., & Korsgaard, S. (2019). Coding qualitative data: A synthesis guiding the novice. *Qualitative Research Journal*, *19*(3), 259–270. https://doi.org/10.1108/QRJ-12-2018-0012

Liu, K. (2015). Critical reflection as a framework for transformative learning in teacher education. *Educational Review*, *67*(2), 135–157. https://doi.org/10.1080/00131911.2013.839546

Lucariello, J. M., Nastasi, B. K., Anderman, E. M., Dwyer, C., Ormiston, H., & Skiba, R. (2016). Science supports education: The behavioral research base for psychology's top 20 principles for enhancing teaching and learning. *Mind, Brain, and Education*, *10*(1), 55–67. https://doi.org/10.1111/mbe.12099

Lucas, B. (2019). *Why we need to stop talking about twenty-first century skills*. Centre for Strategic Education (CSE). http://www.expansiveeducation.net/resources/Documents/Lucas%20(2019)%20Why%20we%20must%20stop%20talking%20about%2021st%20century%20skills.%20Melbourne%20Centre%20for%20Strategic%20Education.pdf

Lucas, B., Claxton, C., & Spencer, E. (2013). *Expansive education: Teaching learners for the real world.* Australian Council for Educational Research.

Lyons, K. E., & Ghetti, S. (2010). Metacognitive development in early childhood: New questions about old assumptions. In A. Efklides & M. Misailidi (Eds.), *Trends and prospects in metacognition research* (pp. 259–278). Springer.

Magelinskaitė, Š., Kepalaitė, A., & Legkauskas, V. (2014). Relationship between social competence, learning motivation, and school anxiety in primary school. *Procedia – Social and Behavioral Sciences*, *116*, 2936–2940. https://doi.org/10.1016/j.sbspro.2014.01.683

Magid, R. W., & Schulz, L. E. (2015). *Quit while you're ahead: Preschoolers' persistence and willingness to accept challenges are affected by social comparisons*. Department of Brain and Cognitive Sciences. https://cbmm.mit.edu/sites/default/files/publications/15_Cogsci_Magid%26Schulz.pdf

Mantei, J. (18th June 2008). *Using a design based research approach to explore ways that primary school teachers conceptualise authentic learning: A work in progress* [Paper presentation]. Emerging Technologies Conference, University of Wollongong, Australia. https://ro.uow.edu.au/etc08/15/

Martin, A. (2015). Implicit theories about intelligence and growth (personal best) goals: Exploring reciprocal relationships. *British Journal of Educational Psychology*, *85*(2), 207–223. https://doi.org/10.1111/bjep.12038

Martin, A., Ryan, R & Brooks-Gunn, J. (2013). Longitudinal associations among interest, persistence, supportive parenting, and achievement in early childhood. *Early Childhood Research Quarterl*y, *28*(4), 658–667. https://doi.org/10.1016/j.ecresq.2013.05.003

Marulis, L. M., Palincsar, A. S., Berhenke, A. L., & Whitebread, D. (2016). Assessing metacognitive knowledge in 3–5 year olds: The development of a metacognitive knowledge interview (McKI). *Metacognition and Learning*, *11*(3), 339–368. https://doi.org/10.1007/s11409-016-9157-7

Masten, A. (2001). Ordinary magic: Resilience processes in development. *The American Psychologist*, *56*(3), 227–238. https://doi.org/10.1037/0003-066X.56.3.227

Masters, G. N. (2014). Towards a growth mindset in assessment. *Practically Primary*, *19*(2), 4–7.

https://research.acer.edu.au/cgi/viewcontent.cgi?article=1017&context=ar_misc

McClelland, D. C. (1953). *The achievement motive.* Appleton-Century-Crofts.

McDonald, S. M. (2012). Perception: A concept analysis. *International Journal of Nursing Knowledge*, *23*(1), 2–9. https://doi.org/10.1111/j.2047-3095.2011.01198.x

McKenney, S., & Reeves, T. C. (2019). *Conducting educational design research* (2nd ed.). Routledge.

Miller, A. (1985). A developmental study of the cognitive basis of performance impairment after failure. *Journal of Personality and Social Psychology*, *49*(2), 529–538. https://doi.org/10.1037//0022-3514.49.2.529

Mindset Works. (2021). *Mindset works Inc*. https://www.mindsetworks.com/

Merriam-Webster. (n.d.). Merriam-Webster dictionary. https://www.merriam-webster.com/

Mitsea, E., Drigas, A., & Mantas, P. (2021). Soft skills and metacognition as inclusion amplifiers in the 21st century. *International Journal of Online & Biomedical Engineering*, *17*(4), 121-132. https://doi.org/10.3991/ijoe.v17i04.20567

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., & Sears, M. R. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, *108*(7), 2693–2698. https://doi.org/10.1073/pnas.1010076108

Morrin, M., Glickman, J., & Brooks-Gunn, J. (2015). Parenting and the home environment. In A. Farrell, S. Kagan, & E. Tisdall. (Eds.). (2015). *The sage handbook of early childhood research*. SAGE Publications. https://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=4453984.

Morton, S., Petersen, E., Buckley, J., & Murray, S. (2020). *Early self-control development: Prevalence, persistence and change in a NZ cohort.* Ministry of Social Development (New Zealand). https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/research/early-self-control-development/early-self-control-development.pdf

Mrazek, A. J., Ihm, E. D., Molden, D. C., Mrazek, M. D., Zedelius, C. M., & Schooler, J. W. (2018). Expanding minds: Growth mindsets of self-regulation and the influences on effort and perseverance. *Journal of Experimental Social Psychology*, *79*, 164–180. https://doi.org/10.1016/j.jesp.2018.07.003

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, *75*(1), 33–52. https://doi.org/10.1037/0022-3514.75.1.33

National Scientific Council on the Developing Child. (2004). *Children's emotional development is built into the architecture of their brains: Working paper No. 2*. Centre on the Developing Child, Harvard University.

https://46y5eh11fhgw3ve3ytpwxt9r-wpengine.netdna-ssl.com/wp-content/uploads/2004/04/Childrens-Emotional-Development-Is-Built-into-the-Architecture-of-Their-Brains.pdf

Nestor, A. (2017). *Investigating mindset theories: The implications for classroom instruction and professional development* (Publication No. 10666720) [Doctoral dissertation, University of Pittsburgh). ProQuest Dissertations and Theses Global. http://d-scholarship.pitt.edu/32709/

Neitzel, C., & Stright, A. D. (2004). Parenting behaviours during child problem solving: the roles of child temperament, mother education and personality, and the problem-solving context. *International Journal of Behavioral Development, 28*(2), 166–179. https://doi-org.ezproxy.ecu.edu.au/10.1080/01650250344000370

Nolan, A., & Raban, B. (2015). *Theories into practice: Understanding and rethinking our work with young children and the EYLF.* Teaching Solutions.

Nussbaum, A. D., & Dweck, C. S. (2008). Defensiveness versus remediation: Self-theories and modes of self-esteem maintenance. *Personality and Social Psychology Bulletin*, *34*(5), 599–612. https://doi.org/10.1177/0146167207312960

Oades, L. G., Baker, L. M., Francis, J. J., & Taylor, J. A. (2021). Wellbeing literacy and positive education. In M. L. Kern & M. L. Wehmeyer (Eds.), *The Palgrave Handbook of Positive Education* (pp. 325–344). Palgrave McMillan. https://link.springer.com/content/pdf/10.1007%2F978-3-030-64537-3.pdf

OECD. (2015). *Skills for social progress: The power of social and emotional skills*. OECD Skills Studies. OECD Publishing. http://dx.doi.org/10.1787/9789264226159-en

OECD. (2019). *PISA 2018 results (volume III): What school life means for students' lives*. OECD Publishing. https://doi.org/10.1787/acd78851-en

OECD. (2020). *PISA 2018 sky's the limit: Growth mindset, students and schools in PISA*. OECD Publishing. https://www.oecd.org/pisa/growth-mindset.pdf

Ohtani, K., & Hisasaka, T. (2018). Beyond intelligence: A meta-analytic review of the relationship among metacognition, intelligence, and academic performance. *Metacognition Learning*, *13*, 179–212. https://doi.org/10.1007/s11409-018-9183-8

Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*, *8*(3), 1–21. https://doi.org/10.1177/160940690900800301

Ørngreen, R. (2015). Reflections on design-based research. In J. Abdelnour Nocera, B. Barricelli, A. Lopes, P. Campos & T. Clemmensen (Eds.), *Human work interaction design: Work analysis and interaction design methods for pervasive and smart workplaces*. IFIP Advances in Information and Communication Technology (Vol. 468). Springer, Cham. https://doi.org/10.1007/978-3-319-27048-7_2

Orrill, C. H., Hannafin, M. J., & Glazer, E. M. (2003). Disciplined inquiry and the study of emerging technology. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (2nd ed., pp. 335–353). Lawrence Erlbaum Associates.

Osher, D., Kidron, Y., Brackett, M., Dymnicki, A., Jones, S., & Weissberg, R. P. (2016). Advancing the science and practice of social and emotional learning:

Looking back and moving forward. *Review of Research in Education*, *40*(1),

644–681. https://doi.org/10.3102/0091732X16673595

Osher, D., Cantor, P., Berg, J., Steyer, L., & Rose, T. (2018). Drivers of human

development: How relationships and context shape learning and development.

Applied Developmental Science, *24*(1), 6–36.

https://doi.org/10.1080/10888691.2017.1398650

Oxford Learners Dictionaries. (n.d.). *Oxford Learners dictionaries.com*.

https://www.oxfordlearnersdictionaries.com/definition/english/praxis?q=praxis

Park, D., Gunderson, E. A., Tsukayama, E., Levine, S. C., & Beilock, S. L. (2016).

Young children's motivational frameworks and math achievement: Relation to

teacher-reported instructional practices, but not teacher theory of intelligence.

Journal of Educational Psychology, *108*(3), 300–300.

http://dx.doi.org.ezproxy.ecu.edu.au/10.1037/edu0000064

Parsons, J. E., & Ruble, D. N. (1977). The development of achievement-related

expectancies. *Child Development*, *48*(3), 1075–1079.

https://doi.org/10.1111/j.1467-8624.1977.tb01271.x

Partnership for 21st Century Skills. (2007). *Framework for 21st century learning*.

http://static.battelleforkids.org/documents/p21/P21_Framework_DefinitionsBFK
.pdf

Pascal, C., Bertram, T., & Cole-Albäck, A. (2017). *The hundred review: What research

tells us about effective pedagogic practice and children's outcomes in the

reception year*. Early Excellence. http://earlyexcellence.com/wp-

content/uploads/2018/01/EX_CREC_TheHundredReview.pdf

Pascal C., Bertram, T., & Rouse, L. (2019). *Getting it right in the early years foundation stage: A review of the evidence.* Centre for Research in Early Childhood.

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science*, *26*(6), 784–793. https://doi.org/10.1177/0956797615571017

Payler, J., Wood, E., Georgeson, J., Davis, G., Jarvis, P., Rose, J., Gilbert, L., Hood, P., Mitchell, H., & Chesworth, L. (2017). *BERA-TACTYC early childhood research review 2003–2017*. BERA. https://www.bera.ac.uk/project/bera-tactyc-early-childhood-research-review-2003-2017

Peirce, C. S. (1905). What pragmatism is. *The Monist*, *15*(2), 161–181. https://doi.org/10.5840/monist190515230

Pink, D. H. (2005). *A whole new mind: Moving from the information age to the conceptual age*. Riverhead Books.

Pintrich, P., & Schunk, D. (2002). *Motivation in education: Theory research and applications*. Merrill Prentice Hall.

Procee, H. (2006). Reflection in education: A Kantian epistemology. *Educational Theory*, *56*(3), 237–253. https://doi.org/10.1111/j.1741-5446.2006.00225.x

QSR International. (2018). NVivo qualitative data analysis software (ver. 12) [Computer software]. https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home

Rademacher, A., & Koglin, U. (2019). The concept of self-regulation and preschoolers' social-emotional development: A systematic review. *Early Child Development and Care*, *189*(14), 2299–2317. https://doi.org/10.1080/03004430.2018.1450251

Reams, P., & Twale, D. (2008). The promise of mixed methods: Discovering conflicting realities in the data. *International Journal of Research & Method in Education*, *31*(2), 133–142. https://doi.org/10.1080/17437270802124509

Reeve, J. (2006). Extrinsic rewards and inner motivation. In C. M. Evertson & C. S. Weinstein (Eds.), *Handbook of classroom management: Research, practice, and contemporary issues* (pp. 645–664). Lawrence Erlbaum Associates.

Reeves, T. C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (Vol. 1, pp. 52–66). Routledge.

Reyman, I. M. M. J., Hammer, D. K., Kroes, P. A., van Aken, J. E., Dorst, C. H., Bax, M. F. T., & Basten, T. (2006). A domain-independent descriptive design model and its application to structured reflection on design processes. *Research in Engineering Design*, *16*(4), 147–173. https://doi.org/10.1007/s00163-006-0011-9

Rholes, W. S., Blackwell, J., Jordan, C., & Walters, C. (1980). A developmental study of learned helplessness. *Developmental Psychology*, *16*(6), 616–624. https://doi.org/10.1037/0012-1649.16.6.616

Robins, R. W., & Pals, J. L. (2010). Implicit self-theories in the academic domain: Implications for goal orientation, attributions, affect, and self-esteem change. *Self and Identity*, *1*(4), 313–336. https://doi.org/10.1080/15298860290106805

Rolfe, G., Freshwater, D., & Jasper, M. (2001). *Critical reflection in nursing and the helping professions: A user's guide*. Palgrave Macmillan.

Romero, C., Master, A., Paunesku, D., Dweck, C. S., & Gross, J. J. (2014). Academic and emotional functioning in middle school: The role of implicit theories. *Emotion*, *14*(2), 227–234. https://doi.org/10.1037/a0035490

Schmidt, J. A., Shumow, L., & Kackar-Cam, H. (2015). Exploring teacher effects for

mindset intervention outcomes in seventh-grade science classes. *Middle Grades

Research Journal*, *10*(2), 17–32.

http://web.b.ebscohost.com.ezproxy.ecu.edu.au/ehost/detail/detail?vid=1&sid=f

0b94818-c484-4662-bbc3-5f21321df698%40pdc-v-

sessmgr03&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=1104

59552&db=eue

School Curriculum and Standards Authority. (2016). Curriculum and Assessment

Outline. https://www.scsa.wa.edu.au/

Schoon, I., Nasim, B., Sehmi, R., & Cook, R. (2015). *The impact of early life skills on

later outcomes: Report for the OECD.* UCL Institute for Education.

https://discovery.ucl.ac.uk/id/eprint/10051902/1/Schoon_2015%20The%20Impa

ct%20of%20Early%20Life%20Skills%20on%20Later%20Outcomes_%20Sept

%20fin2015.pdf

Schunk, D. H. (1989). Self-efficacy and achievement behaviors. *Educational

Psychology Review*, *1*(3), 173–208. https://doi.org/10.1007/BF01320134

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory,

research and applications* (3rd ed.). Pearson.

Schunk, D. H., & Zimmerman, B. J. (2012). *Motivation and self-regulated learning:

Theory, research and applications.* Taylor & Francis.

Seaton, F. (2018). Empowering teachers to implement a growth mindset. *Educational

Psychology in Practice*, *34*(1), 41–57.

https://doi.org/10.1080/02667363.2017.1382333

Shumow, L., & Schmidt, J. A. (2013). *Enhancing adolescents' motivation for science*.

Corwin Press.

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, *29*(4), 549–571. https://doi.org/10.1177/0956797617739704

Skinner, B. F. (1992). 'Superstition' in the pigeon. *Journal of Experimental Psychology: General*, *121*(3), 273–274. https://doi.org/10.1037/0096-3445.121.3.273

Sklad, M., Diekstra, R., Ritter, M. D., Ben, J., & Gravesteijn, C. (2012). Effectiveness of school-based universal social, emotional, and behavioral programs: Do they enhance students' development in the area of skill, behavior, and adjustment? *Psychology in the Schools*, *49*(9), 892–909. https://doi.org/10.1002/pits.21641

Smiley, P. A., & Dweck, C. S. (1994). Individual differences in achievement goals among young children. *Child Development*, *65*(6), 1723–1743. https://doi.org/10.1111/1467-8624.ep9501252902

Smiley, P. A., Tan, S. J., Goldstein, A., & Sweda, J. (2016). Mother emotion, child temperament, and young children's helpless responses to failure. *Social Development*, *25*(2), 285–303. https://doi.org/10.1111/sode.12153

Stamopoulos, E., & Barblett, L. (2018). *Early childhood leadership in action: Evidence-based approaches for effective practice*. Allen & Unwin.

Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 34, pp. 379–440). Academic Press.

Stephens, N. M., Hamedani, M. G., & Destin, M. (2014). Closing the social-class achievement gap: A difference-education intervention improves first-generation

students' academic performance and all students' college transition. *Psychological Science*, *25*(4), 943–953. https://doi.org/10.1177/0956797613518349

Stipek, D. J. (1984). Young children's performance expectations: Logical analysis or wishful thinking? In J. G. Nicholls (Ed.), *Advances in motivation and achievement* (Vol. 3, pp. 33–56). JAI Press.

Stipek, D., Recchia, S., McClintic, S., & Lewis, M. (1992). Self-evaluation in young children. *Monographs of the Society for Research in Child Development*, *57*(1), 1–100. https://www.jstor.org/stable/1166190?seq=1#metadata_info_tab_contents

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* SAGE Publications.

Stroman, C. (2019). *Mindsets and the learning environment: Learning mindsets, teacher practice, and school organizations: Becoming effective learners survey and 5 essentials*. http://studentexperiencenetwork.org/wp-content/uploads/2019/06/Farrington-Porter.pdf

Sue, V. M., & Ritter, L. A. (2012). *Conducting online surveys* (2nd ed.). SAGE Publications.

Tashakkori, A. (2010). *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). SAGE Publications.

Tempelaar, D. T., Rienties, B., Giesbers, B., & Gijselaers, W. H. (2015). The pivotal role of effort beliefs in mediating implicit theories of intelligence and achievement goals and academic motivations. *Social Psychology of Education: An International Journal*, *18*(1), 101–120. https://doi.org/10.1007/s11218-014-9281-7

Thomas, J., & McDonagh, D. (2013). Shared language: Towards more effective communication. *Australasian Medical Journal*, *6*(1), 46–54. https://doi.org/10.4066/AMJ.2013.1596

Thomson, S., De Bortoli, L., Underwood, C., & Schmid, M. (2019). *PISA 2018: Reporting Australia's results*. Australian Council for Educational Research. https://research.acer.edu.au/ozpisa/35/

Tough, P. (2012). *How children succeed: Grit, curiosity, and the hidden power of character*. Houghton Mifflin Harcourt.

Van den Akker, J. (1999). Principles and methods of development research. In J. van den Akker, R. M. Branch, K. Gustafson, N. Nieveen & T. Plomp (Eds.), *Design approaches and tools in education and training* (pp. 1–14). Kluwer Academic.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wacker, C., & Olson, L. (2019). *Teacher mindsets.* FutureEdGU. https://www.future-ed.org/wp-content/uploads/2019/06/Final-report_Teacher-Mindsets.pdf

Walker, L. O., & Avant, K. C. (2005). *Strategies for theory construction in nursing* (4th ed.). Pearson/Prentice Hall.

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, *92*(1), 82–96. https://doi.org/10.1037/0022-3514.92.1.82

Wang, F., & Haffanin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, *53*(4), 5–23. https://doi.org/10.1007/BF02504682

Waters, E., & Sroufe, L. A. (1983). Social competence as a developmental construct. *Developmental Review*, *3*(1), 79–97. https://doi.org/10.1016/0273-2297(83)90010-2

Weaver-Hart, A. (1988). Framing an innocent concept and getting away with it. *UCEA Review*, *24*(2), 11–12. http://www.ucea.org/resource/ucea-review/

Weiner, B. (1992). *Human motivation: Metaphors, theories, and research.* SAGE Publications.

Weiner, B., & Kukla, A. (1970). An attributional analysis of achievement motivation. *Journal of Personality and Social Psychology*, *15*(1), 1–20. https://doi.org/10.1037/h0029211

Whitebread, D., Coltman, P., Pasternak, D. P., Sangster, C., Grau, V., Bingham, S., Almeqdad, Q., & Demetriou, D. (2009). The development of two observational tools for assessing metacognition and self-regulated learning in young children. *Metacognition and learning*, *4*(1), 63–85. https://doi.org/10.1007/s11409-008-9033-1

Wilson, T. D., & Linville, P. W. (1985). Improving the performance of college freshmen with attributional techniques. *Journal of Personality and Social Psychology*, *49*(1), 287–293. https://doi.org/10.1037/0022-3514.49.1.287

Yan, V. X., Thai, K. P., & Bjork, R. A. (2014). Habits and beliefs that guide self-regulated learning: Do they vary with mindset? *Journal of Applied Research in Memory and Cognition*, *3*, 140–152. https://doi.org/10.1016/j.jarmac.2014.04.003

Yeager, D., Paunesku, D., Walton, G., & Dweck, C. (2013). *How can we instil productive mindsets at scale? A review of the evidence and an initial R&D agenda*. A White Paper.

https://mindsetscholarsnetwork.org/research_library/how-can-we-instill-productive-mindsets-at-scale-a-review-of-the-evidence-and-an-initial-rd-agenda-a-white-paper-prepared-for-the-white-house-meeting-on-excellence-in-education-the-importa/

Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojsa, C. P., & Paunesku, D. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, *573*(7774), 364–369. https://doi.org/10.1038/s41586-019-1466-y

Yeager, D. S., Romero, C., Paunesku, D., Hulleman, C. S., Schneider, B., Hinojosa, C., Lee, Y., O'Brien, J., Flint, K., Roberts, A., Trott, J., Greene, D., Walton, G. M., & Dweck, C. S. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology*, *108*(3), 374-391. https://doi.org/10.1037/edu0000098

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research*, *81*(2), 267–301. www.jstor.org/stable/23014370

Yeager, D. Y., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, *47*(4), 302–314. https://doi.org/10.1080/00461520.2012.722805

Yettick, H., Lloyd, S., Harwin, A., Riemer, A., & Swanson, C. B. (2016). *Mindset in the classroom: A national study of K–12 teachers*. Editorial Projects in Education.

Zentall, S. R., & Morris, B. J. (2012). A critical eye: Praise directed toward traits increases children's eye fixations on errors and decreases motivation.

Psychonomic Bulletin & Review, *19*(6), 1073–1077.

https://doi.org/10.3758/s13423-012-0294-y

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An

overview. *Educational Psychologist*, *25*(1), 3–17.

https://doi.org/10.1207/s15326985ep2501_2

List of Appendices

Appendix A: Phase One Survey Information Letter

Appendix B: Phase One Survey Invite Via Facebook Post

Appendix C: Consent to Use Survey Instrument

Appendix D: Phase One Survey Questions

Appendix E: Phase Two and Three: Information Letter for the Principal

Appendix F: Phase Two and Three: Consent Form for the Principal (School)

Appendix G: Phase Two and Three: Information Letter for Teachers

Appendix H: Phase Two and Three: Consent Form for Teachers

Appendix I: Phase Two and Three: Information Letter for Parents/Child

Appendix J: Phase Two and Three: Consent Form for Parents/Child

Appendix K: Phase Two and Three: The School's Purpose

Appendix L: Phase Two: Professional Development Session Information

Appendix M: Phase Two: Teacher Mindset Quiz (Taken From Dweck, 20016)

Appendix N: Told Us, Made Us Wonder Reflective Tool

Appendix O: Phase Three: Focus Group Protocols

Appendix P: Phase Three: Discussion Points for Focus Group 1

Appendix Q: Phase Three: Discussion Points for Focus Group 2

Appendix R: Phase Three: Discussion Points for Focus Group 3

Appendix S: Iteration One Hierarchy Chart

Appendix T: Iteration Two Hierarchy Chart

Appendix U: Phase Three: Reflection Template Used in Video Reflections

Appendix V: Phase Three: PMI (Plus, Minus, Interesting) Completed in Focus Group 2

Appendix W: Phase Three: Growth Mindset Practices Currently Used by Teachers

Appendix X: Phase Three: Final Questionnaire

Appendix A: Phase One Survey Information Letter

INFORMATION LETTER: TEACHERS

Title of Project: MINDSET MATTERS: EARLY CHILDHOOD EDUCATORS PERCEPTIONS OF MINDSET

Date:

Dear Early Childhood Teacher,

I am contacting you to invite you to participate in a short survey about mindset in the early years. There is not a lot of research about the way mindset is understood in the early years. This survey hopes to gather information about this. After you have completed this survey I am hoping you will forward this message on to other nominated early childhood teachers of your acquaintance so I can gather many views. By early childhood teacher I mean any teacher currently teaching in Kindergarten, Pre-primary, Year one or Year two and the possible splits within these year levels.

Once you have read the information below, by clicking on the link you will be taken to the survey. Your completion of the survey implies consent to participate in the research. The survey is short and should take 15 -20 minutes. Your participation is entirely voluntary and you do not have to take part. The survey will require you to give your name. This data will be coded so that you are not identifiable. However, should you wish to no longer participate, the data can be reidentified to allow its removal. Submission of the survey will be finalised once you have clicked on the submit button at the end of the questionnaire. Participants may also be contacted to participate in a follow up focus group and will be provided with a summarised report of the results of the study.

The data will be secured at Edith Cowan University and only accessed by the researcher named below. Data may also be used for a future research PhD project which is an extension of this study within the next 5 years. Explicit consent will be obtained from you before the data is used for future research and the nature of the research explained. The Human Research Ethics Committee at Edith Cowan University has approved the project.

If you would like to discuss any aspect of this study, please contact me using the details provided below. If you wish to speak with an independent person about the conduct of the project, please contact the ECU Research Ethics Officer, on (08) 6304 2170.

Thank you very much for your assistance.

Kind regards

Fiona Boylan   *Lennie Barblett*   *Marianne Knaus*

Fiona Boylan   (Supervisor)   (Supervisor)

                                   Dr Lennie Barblett   Dr Marianne Knaus

Appendix B: Phase One Survey Invite Via Facebook Post

Attention Early Childhood Teacher, I would like to invite you to participate in a short 10 minute survey about mindset in the early years as part of my Masters of Education study at Edith Cowan University. There is not a lot of research about the way mindset is understood in the early years and this survey hopes to gather information to improve the way we address this. By early childhood teacher I refer to any teacher currently teaching in Kindergarten, Pre-primary, Year one or Year two and the possible splits within these year levels. By clicking on the link below you will be taken to the information page and then the survey.

Appendix C: Consent to Use Mindset Survey Instrument

RE: Request to use Mindset survey

SL Sterling Lloyd <SLloyd@epe.org>
    To ● Fiona BOYLAN; ○ RCInfo

↩ Reply ↪ Reply All → Forward •••

Sat 20/01/2018 5:18 AM

ⓘ Follow up. Start by Friday, 29 May 2020. Due by Friday, 29 May 2020.

Action items   + Get more add-ins

Hi Fiona,

Thank you for your inquiry regarding use of the survey instrument. It will be fine for you to use it in your research. Please cite the Education Week Research Center where appropriate based on customary research standards.

Feel free to contact me should you have additional questions or need more information. Good luck with your research. It sounds interesting.

Sterling

Sterling C. Lloyd
Assistant Director
Education Week Research Center
301-280-3100
slloyd@epe.org

From: Fiona BOYLAN [mailto:fboylan@our.edu.au]
Sent: Sunday, January 14, 2018 10:46 PM
To: RCInfo <RCInfo@epe.org>
Subject: Request to use Mindset survey

Hello, My name is Fiona Boylan. I am a Masters student at Edith Cowan University in Western Australia. I am writing to request permission to use elements of your survey "Mindsets in the classroom - A national study of K-12 teachers" as a part of my Masters project. I am currently investigating early childhood educators perceptions of mindset and would like to use some of your questions as part of my survey. This would be acknowledged in my work. If you have any information you could also send me in regards to this study that would greatly appreciated.

Kind Regards

Fiona Boylan
Sessional Tutor

Appendix D: Phase One Survey Questions

DEMOGRAPHIC QUESTIONS

1. What grade level do you currently teach? K, P, 1, 2, K/P,P/1, 1/2

2. What type of school do you currently teach in? government, private or Catholic school?

3. How long have you been teaching for? 0-5 years, 5-10 years, 10-15 years, 15-20 years, 20-25 years, 25+ years

4. What is your highest qualification? PhD, Masters, Bachelor of Education, Graduate Certificate, Other

5. What area is your qualification in? Early Childhood, Primary, K-7

QUESTIONNAIRE

1. Have you ever heard of the fixed/growth mindset theory? Yes/No/Unsure

2. Is mindset a term you use in your work with children? Yes/No/Unsure

3. Which of these statements define mindset?

	Agree	Disagree	Unsure
Mindsets are the beliefs you have about your most basic qualities such as your intelligence, talents and personality.			
A mindset is a belief that orients the way we handle situations.			
A mindset is a mental inclination or disposition, or a frame of mind.			
A mindset is comprised of non-cognitive factors.			

4. How do you rate the importance of a child's mindset as having an impact on their learning?

   Strongly agree, Agree, Neutral, Disagree, Strongly Disagree

5. How important are the following factors to children's success in learning?

	Agree	Neutral	Disagree
Student engagement and motivation			
Teaching quality			
School climate			
School safety			
Social and emotional learning			
Parental support and engagement			
Use of growth mindset with students			
School discipline policies			
Family background			

Are there any other factors? Please list here.

6. To what extent do you agree that the following beliefs children have about themselves are important to success in learning?

	Agree	Disagree	Unsure
They can learn from failure and are willing to try new things in school			
They can find help at school when they have difficulties			
Their work in school has value for them			
They can be successful in school			
They belong in the school community			
Teachers know students personally			
Their academic abilities will increase through effort			
They have the ability to learn challenging material			
Teachers treat all students equally and fairly			
They have some autonomy and choice in their learning tasks			
Doing well in school will lead to further success			

7. To what extent do you agree that the following factors are associated with a child's mindset for learning?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Excitement about learning					
Persistence in learning					
High levels of effort towards learning					
Frequent participation in class activities					
Consistent completion of work					
Good grades					
High standardised test scores					
Willingness to make mistakes and learn from them					
An understanding of how your brain works when you learn					

Responsible decision making				
Social belonging in school				

Are there any other factors? Please list here

8. To what extent do you believe the following are associated with developing a growth mindset or a positive attitude towards learning?

	Agree	Disagree	Unsure
Self-control			
Resilience			
Organisation			
Grit			
Metacognition			
Social Competencies			
Self-Regulation			
Goal Orientation			
Self-Motivation			
Self-Efficacy or confidence			

9. How often have you engaged in the following practices in your classroom?

	Often	Occasionally	Never
Praising students for their effort			
Encouraging students who are already doing well to keep trying to improve			
Encouraging students to try new strategies when they are struggling			
Praising students for their learning strategies			
Suggesting that students seek help from other students on schoolwork			
Telling students that it is alright to struggle and not everyone is good at a given subject			
Praising students for their intelligence			
Praising students for earning good scores or grades			
Encouraging students by telling them a new topic will be easy to learn			

10. How often do you use these statements when encouraging children to learn?

	Often	Occasionally	Never
I really like the way you tried all kinds of strategies on that problem until you finally got it			
You really studied for your test and your improvement shows it			
I love how you kept your concentration to keep working on that problem			
Great job! You must have worked really hard on this.			
See, you are good at this subject. You got an A on your last test			
Look at how smart you are.			
You are one of the top students in the class.			
This is easy, you will get this in no time.			

11. To what extent do you agree with the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
All students can and should have a growth mindset					
Fostering a growth mindset in students is part of my job duties and responsibilities					
I am good at fostering a growth mindset in my students					

12. To what extent have you integrated a positive attitude or growth mindset towards learning into your teaching expectations and practice?

Often/Occasionally/ Never

If you use mindset teaching in your class are you willing to be a part of a focus group?

Yes/No

If yes, please state your name and an email address below on which you can be contacted

Name:_____

Email:_____

Appendix E: Phase Two and Three: Information Letter for the Principal

INFORMATION LETTER: PRINCIPAL

Title of Project: MINDSET MATTERS: EARLY CHILDHOOD EDUCATORS PERCEPTIONS OF MINDSET

Date:

Dear Principal,

I am a researcher from Edith Cowan University (ECU) completing my Doctorate of Philosophy (PhD). I am writing to you to invite you to participate in a research project that is exploring early years educators' (Kindergarten to year two) perceptions of mindset and the development of design principles and strategies to guide the effective teaching of mindset. Much has been written about mindset theory in the upper primary and adolescent years, however, very few studies have sought to understand it in the early years context.

How will the research benefit educators and young children?

Results from this study will contribute to literature in relation to the perceptions early childhood educators have of the theory of mindset and will develop a set of design principles for use by educators and schools to assist children to develop a growth mindset to promote high-quality learning outcomes for students. There are no risks associated with this research project.

What does participating in the case study involve?

This study will take a Design-Based research approach, where the partnership between the researcher and the educator is paramount to its success. I am asking to conduct research with the Kindergarten to year 2 educators at your school. The research will involve:

- The educator's completion of a pre and post mindset questionnaire that will take approximately 15 mins to complete to establish the educators mindset.
- The educator's attendance at an introductory meeting that will run for 60-90 mins to explain the research project.
- The educators attendance at four focus group meetings; one at the beginning and end of term two and one at the beginning and end of term three to develop, implement, evaluate and refine design principles and practices for the effective

teaching of a growth mindset in students, to share resources and plan how you will use self-tracking video technology cameras in their classes to record effective practices. These meetings will be audio recorded and will run for 60-90 minutes.

- The use of self-tracking video technology to gather video evidence of effective practices implemented to develop a growth mindset in students. This will entail the use of a device that fits onto an iPad or an iPod touch to make some short video clips of your own teaching. Videoing will be used as the educators see fit during a normal class.

- Presentation of a video-clip of the educators teaching at the focus group meetings if they wish to share effective practices in the teaching of mindset.

- The implementation of a short mindset questionnaire for students at the beginning and again at the end of the research project. The questionnaire will take approximately 10 minutes to complete.

- The educator's engagement in weekly video diary reflections using Kolb's (1994) reflection format. It is envisaged these reflections will take approximately 10 minutes to complete.

- Planning documents or other similar items may be requested for review during and after Phase 3, as additional evidence of changes made from the implementation.

Does my school have to take part?

No, your school does not have to take part. Participating in this research project is entirely voluntary. This decision should always be made completely freely. Once a decision is made to participate, you can change your mind at any time. All decisions made, will be respected by the researcher without question.

What if participants change their initial decision?

Participation in this research project is entirely voluntary. Should participants wish to withdraw their participation at any stage they are free to do so without disadvantage or prejudice.

If the project has already been published at the time they decide to withdraw, their contributions that were used in reporting the project cannot be removed from the publication. However, all participants will be non-identifiable in any written reports.

What will happen to the information given?

The data will be analysed and used to write a thesis and may also be published in a journal/book and given at conference presentations. Neither the participants nor the school will be identified in any way. Videos are only for the purposes of data collection

and will not be viewed by anyone outside the school or research team. The researcher may decide to use the videos, or parts of, for teaching purposes. However, explicit consent will be obtained from participants for the use of video for teaching purposes, should this occur. Should any incidents occur that might cause embarrassment to the *teacher,* children or the school, these video recordings will be erased.

All data collected will be anonymous. The names of the participants will not be recorded. All information will be strictly confidential. Information that identifies anyone will be removed from the data collected.

Data will be stored securely in a lockable cabinet in an office at ECU and will only be accessed by the research team working on the project. The data will be stored until the youngest participant turns 25 years of age, in accordance with the Western Australian University Sector Disposal Authority, after which it will be destroyed. This will be achieved by shredding hard copy data and permanently erasing electronic data.

Is this research approved?

This study has been approved by the Human Research Ethics Committee at ECU [#22179]

Who do I contact if I wish to discuss this project further?

If you have any questions about this research project you may contact the researcher directly. If you have any concerns about this project or would like to talk to an independent person, you may contact the Research Ethics Office at ECU by phone 08 6304 2170, or Email: research.ethics@ecu.edu.au

How do I access results?

A summarised report of the research results will be sent to you, the school principal. Alternatively, participants can formally request a summary of results from the researcher.

How do I become involved?

If you have had all questions about the project answered to your satisfaction, and are willing for your school to participate, please complete the Consent Form on the following page.

This information letter is for you to keep. Thank you for your help.

Yours sincerely,

Fiona Boylan	*Lennie Barblett*	*Marianne Knaus*
Fiona Boylan	(Supervisor)	(Supervisor)
	Dr Lennie Barblett	Dr Marianne Knaus

Appendix F: Phase Two and Three: Consent Form for the

Principal (School)

Title of Project: MINDSET MATTERS: EARLY CHILDHOOD EDUCATORS PERCEPTIONS OF MINDSET

- I have been provided with a copy of the Information Letter
- I have read and understand the information provided
- I have been given the opportunity to ask questions and have had any questions answer to my satisfaction
- I am aware that if I have any further questions I can contact the research team
- I understand that my school's participation in the project is entirely voluntary

Principal's Name: …………………………………………………………………………………………………….

Principal's Signature: …………………………………………………………………………………………………

Date: ………/………/………

Appendix G: Phase Two and Three: Information Letter for Teachers

INFORMATION LETTER: EARLY CHILDOOD EDUCATORS

Title of Project: MINDSET MATTERS: EARLY CHILDHOOD EDUCATORS PERCEPTIONS OF MINDSET

Date:

Dear Early Childhood Educator,

I am a researcher from Edith Cowan University (ECU) completing my Doctorate of Philosophy (PhD). I am writing to you to invite you to participate in a research project that is exploring early years educators' (Kindergarten to year two) perceptions of mindset and the development of design principles and strategies to guide the effective teaching of mindset. Much has been written about mindset theory in the upper primary and adolescent years, however, very few studies have sought to understand it in the early years context.

How will the research benefit educators and young children?

Results from this study will contribute to literature in relation to the perceptions early childhood educators have of the theory of mindset and will develop a set of design principles for use by educators to assist children to develop a growth mindset to promote high-quality learning outcomes for students. There are no risks associated with this research project.

What does participating in the case study involve?

This study will take a Design-Based research approach, where the partnership between the researcher and the educator is paramount to its success. The research will involve:

- Completion of a pre and post mindset questionnaire that will take approximately 15 mins to complete to establish the educators mindset.
- Attendance at an introductory meeting that will run for 60-90 mins to explain the research project.
- Attendance at four focus group meetings; one at the beginning and end of term two and one at the beginning and end of term three to develop, implement, evaluate and refine design principles and practices for the effective teaching of a growth mindset in students, to share resources and plan how you will use self-tracking video technology

cameras in their classes to record effective practices. These meetings will be audio recorded and will run for 60-90 minutes.

- The use of self-tracking video technology to gather video evidence of effective practices implemented to develop a growth mindset in students. This will entail the use of a device that fits onto an iPad or an iPod touch to make some short video clips of your own teaching. Videoing will be used as the educators see fit during a normal class.

- Presentation of a video-clip of your own teaching at the focus group meetings if you wish to share effective practices in the teaching of mindset.

- Implementation of a short mindset questionnaire for students at the beginning and again at the end of the research project. The questionnaire will take approximately 10 minutes to complete.

- Engagement in weekly video diary reflections using Kolb's (1994) reflection format. It is envisaged these reflections will take approximately 10 minutes to complete.

- Planning documents or other similar items may be requested for review during and after Phase 3, as additional evidence of changes made from the implementation.

Do I have to take part?

No, you do not have to take part. Participating in this research project is entirely voluntary. This decision should always be made completely freely. Once a decision is made to participate, you can change your mind at any time. All decisions made, will be respected by the researcher without question.

You may opt to be excluded from any audio recording in the focus group meetings or video recording in the classroom.

What if I wanted to change my initial decision?

Participation in this research project is entirely voluntary. Should you wish to withdraw your participation at any stage, or to withdraw any information involving yourself, you are free to do so without disadvantage or prejudice.

If the project has already been published at the time you decide to withdraw, your contributions that were used in reporting the project cannot be removed from the publication. However, all participants will be non-identifiable in any written reports.

What will happen to the information I give?

The data will be analysed and used to write a thesis and may also be published in a journal/book and given at conference presentations. Neither the participants nor the school will be identified in any way. Videos are only for the purposes of data collection and will not be viewed by anyone outside the school or research team. The researcher

may decide to use the videos, or parts of, for teaching purposes. However, explicit consent will be obtained from participants for the use of video for teaching purposes, should this occur. Should any incidents occur that might cause embarrassment to the *teacher,* children or the school, these video recordings will be erased.

All data collected will be anonymous. The names of the participants will not be recorded. All information will be strictly confidential. Information that identifies anyone will be removed from the data collected.

Data will be stored securely in a lockable cabinet in an office at ECU and will only be accessed by the research team working on the project. The data will be stored until the youngest participant turns 25 years of age, in accordance with the Western Australian University Sector Disposal Authority, after which it will be destroyed. This will be achieved by shredding hard copy data and permanently erasing electronic data.

Is this research approved?

This study has been approved by the Human Research Ethics Committee at ECU [#22179]

Who do I contact if I wish to discuss this project further?

If you have any questions about this research project you may contact the researcher directly. If you have any concerns about this project or would like to talk to an independent person, you may contact the Research Ethics Office at ECU by phone 08 6304 2170, or Email: research.ethics@ecu.edu.au

How do I access results?

A summarised report of the research results will be sent to the school principal. Alternatively, participants can formally request a summary of results from the researcher.

How do I become involved?

If you have had all questions about the project answered to your satisfaction, and are willing to participate, please complete the Consent Form on the following page.

This information letter is for you to keep. Thank you for your help.

Yours sincerely,

Fiona Boylan	*Lennie Barblett*	*Marianne Knaus*
Fiona Boylan	(Supervisor)	(Supervisor)
	Dr Lennie Barblett	Dr Marianne Knaus

Appendix H: Phase Two and Three: Consent Form for

Teachers

TITLE OF PROJECT: Mindset matters: Early childhood educators perceptions of mindset
Phase 3: Cycle of implementation of strategies

- I have been provided with a copy of the Information Letter
- I have read and understand the information provided
- I have been given the opportunity to ask questions and have had any questions answered to my satisfaction
- I am aware that if I have any further questions I can contact the research team
- I understand that participation in this research is voluntary and that I can withdraw from the project at any time without any consequences, with no further data collected. I understand that data already collected will remain part of the research project.
- I understand part of the project involves using a digital audio recorder to record the focus group sessions and the use of self-tracking video technology to gather video evidence of effective practices in the classroom. I understand that the data obtained will be
    - transferred onto an external hard drive as soon as possible
    - stored in a locked filing cabinet at Edith Cowan University for seven years
    - destroyed after seven years by deletion of digital files.
- I understand that I am responsible for ensuring that only students whose parents have consented to them being videoed are included in video footage I record and that I am responsible for the secure storage of the video footage. I will only share video clips with the researcher and other teachers also participating in this research.
- I understand that the information provided will be kept confidential and that the identity of participants will not be disclosed without consent
- I understand that this research may be published in a thesis and journal, provided that the participants or the school are not identified in any way.
- I understand that a summarised report of the research results will be sent to the school Principal.

……………………………………………………………………….
Name of the school

……………………………………………………………………….
Name of the teacher

……………………………………………………………………….
Signature Date

296

Appendix I: Phase Two and Three: Information Letter for Parents/Child

INFORMATION LETTER: PARENT(S)/GUARDIAN(S)
Title of Project: MINDSET MATTERS: EARLY CHILDHOOD EDUCATORS PERCEPTIONS OF MINDSET

Date:

Dear Parent(s)/Guardian(s),

I am a researcher from Edith Cowan University (ECU) completing my Doctorate of Philosophy (PhD). I am writing to you to invite your child to participate in a research project that is exploring early years educators' (Kindergarten to year two) perceptions of mindset and the development of design principles and strategies to guide the effective teaching of mindset. Much has been written about mindset theory in the upper primary and adolescent years, however, very few studies have sought to understand it in the early years context. This will take place in your child/wards classroom at the school, during the normal school day.

What does the research involve?

I would like to work with your child in this research project, as I highly value children's contributions and believe that children are valued research partners who contribute meaningful data. During this research, the class teacher will use video technology to gather video evidence of the practices used to teach children to have a growth mindset. This will entail the teacher using an iPad to make some short video clips of his/her own teaching. This will occur as the teacher sees fit during term two and three in the school year. Students will be advised when the filming will take place. The focus of the video will be the teacher, however because this will be capturing normal teaching activities some of the students images may be included in the video footage. Children will be also be invited to complete a mindset questionnaire at the beginning and end of the research project. The mindset questionnaire will involve your child answering several questions using a 5 point Likert scale rating about the way they view their talents, abilities and intelligence. This questionnaire will take about 10 mins to complete and will provide information about the effectiveness of strategies that teachers employ to teach children to develop a growth mindset.

What are the benefits and risks of this research project?

This research project will benefit children as it will assist educators' to develop understandings of mindset in an early childhood context and how this can be used to support children's learning. There are no risks associate with this research project.

Does my child have to take part?

No. Participating in this research project is entirely voluntary. This decision should always be made completely freely. Participation is voluntary and your decision will be respected. You are free to withdraw your child's participation at any time, without affecting the relationship with the researcher or Edith Cowan University. All decisions made will be respected by the researcher without question.

What if I and/or my child want to change our initial decision?

Participation in this research project is entirely voluntary. Should you wish to withdraw your child's participation at any stage, or to withdraw any information involving your child, you are free to do so without disadvantage or prejudice to you or your child.

If the project has already been published at the time you decide to withdraw, your child's contribution that was used in reporting the project cannot be removed from the publication. However, all participants will be non-identifiable in any written reports.

What will happen to the information my child gives?

The data will be analysed and used to write a thesis and may also be published in a journal/book and given at conference presentations. Neither the participants nor the school will be identified in any way. Videos are only for the purposes of data collection and will not be viewed by anyone outside the school or research team. The researcher may decide to use the videos, or parts of, for publication and/or teaching purposes. However, explicit consent will be obtained from you for the use of video for publication and/or teaching purposes, should this occur. Should any incidents occur that might cause embarrassment to the teachers, children or the school, these video recordings will be erased.

All data collected will be anonymous. The names of the participants will not be recorded. All information will be strictly confidential. Information that identifies anyone will be removed from the data collected. Data will be stored securely in a lockable cabinet in an office at ECU and will only be accessed by the research team working on the project. The data will be stored until the youngest participant turns 25 years of age, in accordance with the Western Australian University Sector Disposal

Authority, after which it will be destroyed. This will be achieved by shredding hard copy data and permanently erasing electronic data.

Is this research approved?

This study has been approved by the Human Research Ethics Committee at ECU [#22179].

Who do I contact if I wish to discuss this project further?

If you have any questions about this research project you may contact the researcher directly. If you have any concerns about this project or would like to talk to an independent person, you may contact the Research Ethics Office at ECU by phone 08 6304 2170, or Email: research.ethics@ecu.edu.au

How do I access results?

A summarised report of the research results will be sent to the school Principal. Alternatively, participants can formally request a summary of results from the researcher.

How does my child become involved?

If you have had all questions about the project answered to your satisfaction, and are willing for your child to participate, please complete the Consent Form on the following page. Please discuss this project with your child, should you agree for them to participate, so that they are aware that you have agreed to their participation.

This information letter is for you to keep. Thank you for your help.

Fiona Boylan	*Lennie Barblett* (Supervisor)	*Marianne Knaus*
Fiona Boylan	Dr Lennie Barblett	(Supervisor)
		Dr Marianne Knaus

Appendix J: Phase Two and Three: Consent Form for Parents/Child

Consent form: Parents/Child

TITLE of project: Mindset matters: Early childhood educators perceptions of mindset

Phase 3: Cycle of implementation of principles

- I have been provided with a copy of the Information Letter
- I have read and understand the information provided
- I have been given the opportunity to ask questions and have had any questions answered to my satisfaction
- I am aware that if I have any further questions I can contact the research team
- I understand that participation in the project is entirely voluntarily.
- I am willing for my child to become involved in the project, as described.
- I have discussed with my child what it means to participate in this project. He/she has explicitly indicated a willingness to take part, as indicated by the parent/carers completion of the consent form.
- I understand that both my child and I are free to withdraw that participation at any time without affecting the family's relationship with my child's teacher or my child's school.
- I understand that both my child and I are free to withdraw that participation at any time but that data already collected will remain part of the project.
- I give permission for the contribution that my child makes to this research to be published in a thesis and journal, provided that my child or the school is not identified in any way.
- I understand that a summarised report of the research results will be sent to the school Principal
- I understand that the class teacher will be filming short video clips of his/her teaching but that in some instances images of students in the class may be included in the video.
- I understand that short video clips selected by the teacher may be used by the class teacher in focus group meetings to set goals and reflect on their teaching. Care will be

taken to ensure that these video clips portray the teacher, the students and the school in a positive manner.

- I understand that my child will complete a short questionnaire about their mindset to establish the effectiveness of teaching strategies employed.

Name of Child (printed):			
Name of Parent/Carer (printed):			
My child/ward can participate in the research	**YES**		**NO**
My child/ward can be included in the videos recorded for the purpose of this research	**YES**		**NO**
Signature of Parent:			
Date:			

Appendix K: Phase Two and Three: The School's Purpose (Taken from the School Website)

The schools educational philosophy extends beyond academic achievement to span the 'Whole Person Paradigm' of mind, heart, body and spirit. The school focuses on empowering students to seize opportunities and challenge convention in pursuit of their dreams and to achieve their personal best

We promote a positive and inclusive school culture, in which every student is encouraged to actively model our core shared values. Thrive is the name we use to describe our expansive range of programs, experiences and connections—our thrive infrastructure underpins the wellbeing and personal growth of our girls and is integral to the learning experience we offer.

Beginning in junior school and continuing through Year 12, our thrive curriculum and programs are carefully designed and based on best practice in positive psychology, to stimulate development and enhancement in social and emotional skills. Opportunities for students to engage in healthy risk-taking, goal-setting and the development of self-confidence and self-esteem is facilitated by thrive in action.

Appendix L: Phase Two: Professional Development Session

Information

Professional Development Session	
TIME	**ACTIVITY**
1.00 – 1.15pm	Meet and greet the participants
1.15 – 2.45pm	PD session aims: • Define mindset theory • Identify the characteristics of a fixed and growth mindset • Develop an understanding of its importance for learning • Examine ways you can encourage students to develop a growth mindset in your classroom according to research
	Activities completed during the session:
	• Mindset survey • Complete a Told Us Made Us Wonder • Complete a mindset quiz for teachers to determine their mindset • Complete a Graffiti task – what evidence of mindsets do you see in your class?
2.45-3.00	• Explain the study and ask for participant consent.

Appendix M: Phase Two: Teacher Mindset Quiz (Taken from Dweck, 20016)

	Strongly Agree	Agree	Disagree	Strongly Disagree	Score
1. Your intelligence is something very basic about you that you can't change very much.	0	1	2	3	
2. No matter how much intelligence you have, you can always change it quite a bit.	3	2	1	0	
3. You can always substantially change how intelligent you are.	3	2	1	0	
4. You are a certain kind of person, and there is not much that can be done to really change that.	0	1	2	3	
5. You can always change basic things about the kind of person you are.	3	2	1	0	
6. Music talent can be learned by anyone	3	2	1	0	
7. Only a few people will be truly good at sports – you have to be 'born with it'.	0	1	2	3	
8. Math is much easier to learn if you are male or maybe come from a culture who values math.	0	1	2	3	
9. The harder you work at something, the better you will be at it.	3	2	1	0	
10. No matter what kind of person you are, you can always change substantially.	3	2	1	0	
11. Trying new things is stressful for me and I avoid it.	0	1	2	3	
12. Some people are good and kind, and some are not – it's not often that people change.	0	1	2	3	
13. I appreciate when people, parents, coaches, teachers give me feedback about my performance.	3	2	1	0	

14. I often get angry when I get feedback about my performance.	0	1	2	3	
15. All human beings without a brain injury or birth defect are capable of the same amount of learning.	3	2	1	0	
16. You can learn new things, but you can't really change how intelligent you are.	0	1	2	3	
17. You can do things differently, but the important parts of who you are can't really be changed.	0	1	2	3	
18. Human beings are basically good, but sometimes make terrible decisions.	3	2	1	0	
19. An important reason why I do my school work is that I like to learn new things.	3	2	1	0	
20. Truly smart people do not need to try hard.	0	1	2	3	

Marking Key:

Strong Growth Mindset	60-45 points
Growth Mindset with some Fixed ideas	44-34 points
Fixed Mindset with some Growth ideas	33-21 points
Strong Fixed Mindset	20-0 points

Appendix N: Told Us, Made Us Wonder Reflective Tool

Told us...Made us wonder

Told us	Made us wonder

Appendix O: Phase Three: Focus Group Protocols

1. One person speaks at a time.

2. No side conversations with your neighbour.

3. Confidentiality is requested so that all participants feel comfortable to speak freely.

4. Can you say your name before you speak for the recorder.

Appendix P: Phase Three:

Discussion Points for Focus Group 1

1. Welcome to the focus group and thanks for coming. Introduce the topic. Ground rules – one person speaks at a time. No side conversations with your neighbour. Can you say your name before you speak for the recorder.

DISCUSSION STARTER:

2. What attributes do you believe children need to be effective learners? MAKE A LIST ON LARGE PAPER

DISCUSSION PROMPTS:

3. Provided teachers with a summary of the examples of fixed/growth mindset responses they listed from PD session.

4. Tell me about what do you currently do in your classroom that you think assist children to develop a growth mindset? (It is important to acknowledge that teachers are already doing many things to develop this without knowing it).

BRAINSTORM ONTO LARGE PAPER

5. What does the growth mindset teacher/classroom sound and look like? Call out and write on large post it note paper.

GROUPING OF PRINCIPLES

6. Now let's see if we can group those things together that are similar.

7. Now let's create some principles to follow (or rules of thumb). Looking at the post it notes and the way we have grouped them can you see any rules/principles.

Appendix Q: Phase Three: Discussion Points

for Focus Group 2

1. Welcome to the focus group and thanks for coming. Introduce the topic. Ground rules – one person speaks at a time. No side conversations with your neighbour. Can you say your name before you speak for the recorder.

   DISCUSSION STARTER:

2. Today we are going to revise the design principles we have been reflecting on. Thank teachers for uploading reflections to Box.

   DISCUSSION PROMPTS:

3. Give each participant a summary of principles we developed at FG 1.

4. Explain that we are going to complete a PMI (plus, minus, interesting) for all of the principles.

   HAND OUT PMI SHEETS AND ASK PARTICPANTS TO FILL IN.

   DISCUSSION OF PMI

5. Ok now let's discuss the feedback on the PMI's.

   OTHER FEEDBACK FROM THE DATA

6. These principles not reflected on much – Teachers teach students about how the brain works when you learn

7. Highest coding – Teachers create a warm, safe and supportive learning environment where mistakes are embraced.

8. **OTHER CODES – inquiry learning and agency – where do they fit?**

9. **Any other feedback to add here?**

Appendix R: Phase Three: Discussion Points

for Focus Group 3

1. Welcome to the focus group and thanks for coming. Remind participants of the ground rules – one person speaks at a time. No side conversations with your neighbour. Can you say your name before you speak for the recorder.

   DISCUSSION STARTER:

2. Now that we are at the end of the two cycles of developing, trialling and refining the design principles I would like to gather your feedback on the design principles. Thank teachers for uploading reflections to Box.

   DISCUSSION PROMPTS:

3. Give each participant a summary of principles we developed at FG 2.

4. Ask the question, is there anything you think needs changing?

5. Explain that I would like to gather the participants feedback on particular strategies they used for each principles. Participants are to note them down on the sheet handed to them.

   HAND OUT STRATEGIES SHEETS AND ASK PARTICPANTS TO FILL IN.

   COMPLETION OF FINAL EVALUATION SURVEY

6. Explain the questionnaire to the participants which will gather their views on the effectiveness and practicality of the principles. Explain the Likert scale and boxes for other comments.

7. **Any other feedback to add here?**

Appendix S: Iteration One Hierarchy Chart

Hiearchy diagram: Iteration One coding of video reflections

Teachers create a warm, safe and supportive learning environment where persistence, effort and mistakes are embraced., 47

Teachers provide students with strategies for struggle through explicit teaching and normalising mistakes., 26

Teachers use language to promote a growth mindset including praising effort., 20

Teachers hold high expectations of students and believe all students can learn and grow., 13

Teachers assist students to reflect on their learning by setting learning goals., 24

Teachers develop knowledge of their own mindset and model effective learning using a growth mindset., 18

Growth Mindset misint... 3

Teac... teach stud... about how the...

Inquiry learn... 2

Agency, 1

Appendix T: Iteration Two Hierarchy Chart

Hiearchy diagram: Iteration Two coding of video reflections

Educators assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching., 14

Educators use language to promote a growth mindset including praising effort., 9

Educators encourage persistence, effort and normalise mistakes in a safe and supportive learning environment. , 5

Educators develop knowledge of their own mindset and model effective learning using a growth mindset., 4

Educators teach students about how the brain works when you learn., 4

Educators hold high expectations of students and believe all students can learn and grow., 2

# Appendix U: Phase Three: Reflection Template Used In Video

Reflections

Reflection template		
Reflection stages	**Explanation of each stage**	**Your reflection**
What?	What happened? What did you learn? What did you do? What did you expect? What was different? What was your reaction?	
So what?	Why does it matter? What are the consequences and meanings of your experiences? How do your experiences link to your academic, professional and/or personal development? What difference did you make? How do you know?	
Now what?	What are you going to do as a result of your experiences? What will you do differently? How will you apply what you have learned?	

Adapted from Rolfe, Freshwater and Jasper (2001)

Appendix V: Phase Three: PMI (Plus, Minus, Interesting)

Completed in Focus Group 2

PMI — Plus, Minus and Interesting

Please consider all of the principles and record the positives(P), the negatives (M) and anything of interest(I)

P	M	I

Global Education Website
www.globaleducation.edu.au

Appendix W: Phase Three: Growth Mindset Practices

Currently Used by Teachers

The following practices were identified by the teachers used to develop a growth mindset:

- Using positive self-talk
- The You Can Do It program – persistence, confidence, getting along, resilience and organisation
- Giving feedback
- Goal setting with strategies to assist children to achieve their goals
- Asking children to provide examples of who or what inspires them – as an inquiry eg person, colour, animal
- Starting from known and working towards the unknown – linking to prior knowledge
- An inquiry project in year one – How can we ensure everyone thrives?
- Looking at video clips and stories that reinforce a growth mindset, interviewing the junior school captain, sayings that help us thrive. This is tied in with the school motto – heart, mind, body and spirit.
- Open-ended questioning
- Giving agency to children over their learning
- Using language and modelling a growth mindset
- Talking about thoughts and feelings openly
- Scaffolding learning for each child to meet their individual needs – differentiation, grouping for ability so that each child experiences some success
- Encouraging students to work towards their own goals and not compare to others
- Using the school psychologist to talk about anxiety and nervousness with children and parents – explicit teaching of the way that feels, letting children and parents know it's OK to feel like that that when we do something new.
- Komochi's – A commercial program to talk about feelings in year 1
- Using explicit teaching and incidental moments to reinforce a growth mindset
- Implementing Lee Watanabe-Crockett's model of inquiry including fluencies and essential fluencies

Appendix X: Phase Three: Final Questionnaire

Qu. No.	Questions	Answer scale		
1.	Do you feel you know more about growth mindset now than before you used the principles? Additional comments	Yes	No	Unsure
2.	How effective were the principles in assisting you to create a classroom environment where children are more growth mindset oriented towards learning? Additional Comments	Highly effective	Somewhat effective	Not effective
3.	Were there any unexpected outcomes from implementing the principles in your classroom? Please comment.			
4.	How practical did you find the principles to use in the classroom? Additional comments:	Very practical	Somewhat practical	Not practical at all
5.	Did you find one or more principles particularly effective at promoting a growth mindset in the classroom? If so which one/s? Please select by circling. Additional Comments:	Principles: 1. *Teachers develop knowledge of their own mindset and model effective learning using a growth mindset.* 2. *Teachers hold high expectations of students and believe all students can learn and grow.* 3. *Teachers assist students to reflect on their learning by setting goals and providing students with strategies for struggle through explicit teaching.* 4. *Teachers use language to promote a growth mindset including praising effort.* 5. *Teachers encourage persistence, effort and normalise mistakes in a safe and supportive learning environment.* 6. *Teachers teach students about how the brain works when you learn.*		
6.	Will you continue to use the principles in the future?	Yes	No	Unsure
	Do you have any other comments you would like to make about the design principles? Please comment below.			