

**CONNECTING SOCIAL AND MATHEMATICAL THINKING:
USING FINANCIAL DILEMMAS TO EXPLORE CHILDREN'S FINANCIAL
PROBLEM-SOLVING AND DECISION-MAKING**

Carly Sawatzki, B.A/B.Bus(Mgt), Dip.Ed(Sec), M.Ed – Leadership, Policy and Change



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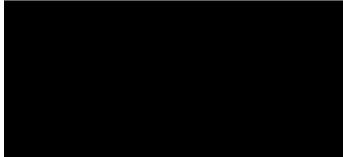
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AUTHOR NOTE

DECLARATION

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

Signed:



Carly Sawatzki

Date: 05/09/2014

ETHICS APPROVAL

The research for this thesis received the approval of the Monash University Standing Committee for Ethical Research on Humans.

Stage 1, Chapters 4 and 5 - Project Number: CF12/2207 – 2012001183.

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LIST OF PUBLICATIONS

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Sawatzki, C. & Richardson, P. (2012). Part-time teaching in Victorian government schools: The policy frameworks and the dilemmas facing school leaders, *Proceedings of the 2011 Australian Association of Research in Education [AARE] 2011 Conference*, 27 November - 1 December 2011, AARE, Hobart Australia, pp. 1-22.

Book chapters

Sawatzki, C. (2014). Teaching economics and business. In R. Gilbert & B. Hoepper (Eds.), *Teaching Humanities and Social Sciences: History, Geography, Economics and Citizenship in the Australian Curriculum*, 5th edition (pp.278-296). Melbourne, Australia: Cengage Learning.

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ABSTRACT

This thesis tells the story of a research project incorporating parent, teacher, and student voices. The topic in focus is financial literacy teaching and learning. Since many financial tasks involve some mathematics, those who are numerate are likely to be more financially literate. In Australia, the close relationship between financial literacy and mathematics is represented in the *Australian Curriculum* with “Money and financial mathematics” to be taught as part of the school mathematics curriculum, and practical applications of numeracy to feature in other disciplines where financial literacy topics are identified.

Despite this clear positioning in the curriculum, financial literacy teaching and learning is complex for a range of reasons, not least of which being that, like other literacies, it is socially constructed and situated. Consumer, economic, and financial socialisation research together with behavioural economics research build a compelling case that human financial behaviour may depend as much on intrinsic psychological attributes and social understandings learned at home as knowledge and skills acquired at school. Drawing on both constructivist and sociocultural perspectives, the current research project sought to explore the understandings about money 10-12 year olds bring to school from home, and develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and learning. An elaboration of Ajzen’s (1991) theory of planned behaviour was the theoretical framework underpinning this work. The theory of planned behaviour argues that attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) have a direct effect on intentions and an indirect effect on behaviour through intentions. However, values also seem to be important to the formation and development of attitudinal and behavioural tendencies, and so were included for consideration as part of the elaborated model.

An extensive range of data was collected and analysed over a 12-month period. Initially, interviews were conducted with the Acting Principal, two Year 5/6 teachers, eight parents, and their Year 6 students in a Victorian government school. This research produced stories of within-family financial literacy teaching and learning, including eight case studies that highlight the similarities and differences in understandings about money 10-12 year olds bring to school from home. These insights guided and informed the development and design of an educational intervention.

The educational intervention consisted of five financial dilemmas and associated pedagogies. The financial dilemmas were essentially open-ended mathematical problems involving financial

contexts drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in and/or able to imagine. Each financial dilemma formed the basis of a single mathematics lesson. The financial dilemmas required students to draw on both social and mathematical understandings simultaneously and in synergy, involved multiple solutions, and invited students to share and explain their reasoning. An important goal of the educational intervention was to strengthen students’ disposition to connect social and mathematical thinking as part of their financial problem-solving, the assumption being that doing so will likely contribute to informed financial decision-making.

Subsequently, more than 35 Year 5 and 6 teachers and more than 850 of their students used the educational intervention. The sample included participants from a range of Government, Catholic, metropolitan, and regional primary schools in Victoria, Australia.

The findings confirm the potential of and merit in the financial dilemmas and associated pedagogies to enhance financial literacy teaching and learning by: engaging a wide range of students in everyday applications of mathematics; building students’ capacity to connect social and mathematical thinking; and orienting students to seek out and consider multiple alternative options. In these ways, the educational intervention prepares students to be active and critical problem-solvers who make informed financial decisions in the future. However, the findings also highlight the challenges and complexities associated with creating and/or selecting “real life” contexts that are meaningful to students given their family backgrounds, characteristics, and interests. There is no such thing as a “one size fits all” mathematical problem, so the extent to which teachers know and understand their students can be pivotal.

Two recommendations to improve financial literacy teaching and learning in schools are made. The first is that financial literacy educational programs should align with and extend upon what children are learning about money at home. The second recommendation is that teachers need quality, research-based professional learning opportunities to guide and inform their approach to financial literacy education. The thesis closes by identifying opportunities for further research.

CHAPTER 1: INTRODUCTION

This chapter explains the motivation for this research project, from growing global interest in financial literacy and financial literacy education to my own personal and professional background. The key terms and assumptions underpinning this research project are defined. Next, the research aims and questions are identified. The chapter closes with an overview of the thesis.

1.1 THE MOTIVATION FOR THIS RESEARCH PROJECT

Since the 2007 global financial crisis (GFC), there has been increased interest in financial literacy levels and financial literacy education by economists, politicians, policymakers, researchers, and educators around the world. Much of this interest has centred on the fallout from the GFC and what has been learned about human financial behaviour as a result. The need to educate people to resist the lure of scams and make informed financial decisions is well-recognised. In Australia, newspapers routinely feature articles offering generic tips and tricks from financial experts about how to take control of one's finances. There are often articles focusing on how to teach children about money – from how much is the “right” amount of pocket money to give, to what household duties might be appropriate to earn it. There are also companies that provide “financial solutions” to eliminate the stress and worry of managing finances by tailoring personal budgeting and debt management plans – at a price. Meanwhile, more and more Australians are turning to financial counselling services for information, support, and advocacy. The above trends signal a need for educational research that might guide and inform improvements to financial literacy teaching and learning at school.

Financial literacy teaching and learning is complex for a range of reasons, not least of which being that, like other literacies, it is socially constructed and situated. A number of studies have found that low financial literacy is associated with low socioeconomic status (Australia and New Zealand Banking Group (ANZ), 2003, 2005, 2008, 2011; Commonwealth Bank Foundation (CBF), 2010; Organisation for Economic Cooperation and Development (OECD), 2013). In this respect, financial literacy is no different to other learning outcomes (i.e., literacy and numeracy) where social class and educational attainment are closely related. However, to the extent that financial literacy levels can either perpetuate or contribute to breaking the cycle of disadvantage, the need for education policy and initiatives is clear. What is not so clear, even from the considerable body of academic literature into the area, is how children and early adolescents

consolidate their learning about money at home and at school and what constitutes best practice financial literacy education. Here lies the imperative for educational research.

While financial literacy education tends to focus on developing students' financial knowledge and skills, consumer, economic, and financial socialisation research together with behavioural economics research build a compelling case that financial behaviour may depend as much on intrinsic psychological attributes and values and attitudes learned at home as knowledge and skills acquired at school (Homer & Kahle, 1988; de Meza, Irlenbusch, & Reyniers, July 2008).

Chapter 2, the literature review, explains the following:

1. Parents are significant agents of consumer, economic, and financial socialisation in childhood and adolescence (see Danes, 1994; Lewis & Scott, 2003; Webley & Nyhus, 2006; Shim, Xiao, Barber, & Lyons, 2009; Shim, Barber, Card, Xiao, & Serido, 2010).
2. Parents are apparently unequally equipped to teach financial values, attitudes, and behaviours to their children (Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA), 2005; CBF, 2010; Australian Securities and Investments Commission (ASIC), 2011a,b; OECD, 2013). Demographic descriptors such as gender, educational attainment, employment status, ethnicity, and family background as well as financial knowledge, values, attitudes, and behaviour have been found to affect parents' capacity to provide their children with financial literacy education at home (Lewis & Scott, 2003; Hibbert, Beutler, & Martin, 2004; Webley & Nyhus, 2006; Mandell & Klein, 2007; Shim et al., 2010; OECD, 2013).
3. How much and how well parents educate their children about money can contribute significantly to their children's financial motivations, financial literacy learning, and financial behaviour, including into adulthood (Shim et al., 2009, 2010).
4. Financial literacy teaching and learning might be enhanced if teachers knew more about, and drew upon, the prior understandings about money students' bring to school from home.

If we accept that parents play an important role in consumer, economic, and financial socialisation, then it is helpful to explore how teachers can find out what prior understandings about money students bring to school from home. Likewise, if we accept that values and attitudes are central to financial literacy, then there is the need to explore what experiences and pedagogies teachers might use to improve financial literacy teaching and learning at school. The current research project sought to explore the ways and means by which sociocultural and psychological factors influence young people's financial literacy learning, and apply learning theories and researched pedagogies to financial literacy teaching and learning.

1.2 RESEARCHER BACKGROUND

It is relevant to explain my personal and professional perspective as a researcher in financial literacy education given that the influences on, and perspectives of, the researcher can inform the reading of the thesis.

By the time the Australian economy was declared in recession in the early 1990s, my father had already been unemployed for an extended period of time and I was abundantly aware that the family was in financial hardship. I was 12 years old. I recall that my mother was extremely prudent in how she managed the household budget. She regularly communicated the importance of living within our family's means, saving whenever possible, and avoiding debt. As a result, I am now profoundly risk-averse, a characteristic that both helps and hinders me in making financial decisions. My upbringing, life experiences, and formal financial education have shaped my financial values and attitudes. Some I have inherited, some I have learned along the way. Inevitably, they seem to be influential in my day-to-day financial problem-solving and decision-making, and how I am choosing to teach my own children about money. They are also reflected in my career choice. My professional work is as a teacher-educator in curriculum and pedagogy in the Faculty of Education at Monash University. This follows a departure from teaching Business Studies and Psychology in secondary schools after a brief career stint in the financial services industry. My experience and expertise in education and financial services also influence the roles I play as parent, teacher, teacher-educator, and researcher.

In preparing this thesis, I have come to understand the significance that the above characteristics have brought to bear on this research project. This research project was an opportunity to utilise and extend my interest and expertise in financial literacy education to develop an educational research initiative that has resulted in new knowledge about how financial literacy teaching and learning at school might be improved.

1.3 KEY TERMS AND ASSUMPTIONS

This section outlines the key terms and assumptions underpinning the current research project, including financial literacy, financial education or financial literacy education, values, and attitudes. The role of constructivist and sociocultural perspectives, the important relationship between financial literacy and mathematics, and the relevance of practical or realistic mathematics to the current research project are also discussed.

There are a number of definitions of **financial literacy**. The OECD's working definition of financial literacy for the Programme for International Student Assessment (PISA) Financial Literacy Assessment in 2012 served as a reference point for the assessment and improvement of financial literacy levels internationally. This definition refers to financial literacy as:

knowledge and understanding of financial concepts, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life.

(OECD, 2012, p.12-13)

Put simply, this definition considers that knowledge, skills and psychological attributes (i.e., motivation and confidence) influence financial decision-making. In the United Kingdom (UK), the term financial capability is preferred over the term financial literacy because it more strongly implies that financial literacy is inextricably linked to behaviour. This is an essential understanding upon which the current research project has been based: financial literacy education should take into consideration students' financial motivations and behaviour (i.e., problem-solving and decision making) related to earning, spending, saving, investing and sharing money. As this research project focuses on financial literacy education in early adolescence (10-12 years of age), an investigation of investing, which involves more complex financial decision-making than saving, is deliberately omitted from this study. Hence, from here, the focus is on earning, spending, saving and sharing money.

The OECD refers to **financial literacy education** as financial education, and defines it as:

the process by which individuals improve their understanding of financial products and concepts; and through information, instruction and/or objective advice develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being and protection.

(OECD, 2012, p.12)

This definition focuses on knowledge, skills, and behaviour, but does not acknowledge the complex processes involved in financial literacy learning over the course of a lifetime, or the role that parents and teachers play in shaping students' values, attitudes, motivation, and confidence regarding money. Essentially, financial literacy education is an example of anticipatory socialisation. This means it is concerned with the development of values, attitudes,

knowledge, and skills that are related to adult roles and that may have limited relevance for children and adolescents (Shim et al., 2010). It involves observational, experiential, and formal learning through parents, family, school, teachers and other socialising agents. The process of financial literacy learning in childhood and adolescence involves negotiating meaning from episodes at home, school, and in the community to develop a socially constructed understanding of money and how it might be earned, spent, saved, and shared (Danes & Haberman, 2007).

Values and attitudes are types of social cognition that guide individuals as they adapt to situations and contexts (Homer & Kahle, 1988). Consumer behaviour research has shown that values have distinct dimensions that are important to the formation and development of attitudinal and behavioural tendencies (Homer & Kahle, 1988). **Values** are understood to mean "...the principles and fundamental convictions which act as general guides to behaviour, the standards by which particular actions are judged as good or desirable" (Halstead & Taylor, 2000, p.169). **Attitudes**, on the other hand, are defined as latent, evaluative responses to a target object (for example, money) that manifest themselves in observable responses (for example, financial behaviour) (Ajzen, 2005). Financial values and attitudes can therefore be understood as the principles, convictions, and evaluations about money that guide financial behaviour.

For the purposes of this research project, financial literacy education (or financial literacy teaching and learning) is understood to include any educational experience that develops values, attitudes, knowledge, and skills regarding interrelated mathematical, consumer, economic, and financial understandings centred around money and how it might be earned, spent, saved, and shared. These educational experiences might be formal (i.e., direct instruction and facilitated experiential learning) or informal (i.e., observational learning, parents' modelling) and might take place at home, at school, or in the local community.

While the above definitions provide some clarity moving forward, they are also problematic. If schools and teachers are charged with improving financial literacy levels, but financial literacy is influenced by values and attitudes and evidenced by behaviour (often in the long-term), then it is difficult to evaluate the outcomes of financial literacy education programs that focus on the development of immediate knowledge and skills. Additionally, financial literacy discourses are replete with the term *responsible*, which is values-laden and essentially politicises complex and sensitive economic and social realities. To suggest that some financial decisions are more responsible than others, for example, is simplistic and possibly unfair. People experiencing financial hardship are not necessarily less responsible with their money than those with more financial resources available to them. They may be doing their best with limited financial

resources and/or in extenuating circumstances. From an educational perspective, the real issue is whether individuals are empowered with the values, attitudes, knowledge, and skills to make *informed* financial choices, whether or not those choices are identified as responsible or apparently frivolous.

For the very reason that financial literacy is socially constructed and situated, the design of the current research project was informed by different perspectives on learning: social and psychological theories of learning, including constructivist and sociocultural perspectives; and those related to practical or realistic mathematics. These are discussed in the next section.

1.3.1 THE ROLE OF CONSTRUCTIVIST AND SOCIOCULTURAL PERSPECTIVES

There is considerable theoretical debate concerning the role of constructivist and sociocultural perspectives in education in general, and in mathematics education in particular. Constructivists claim that “knowing” is an active process that is both “individual and personal, and that is based on previously constructed knowledge” (Ernest, 1994, p.2). Socioculturalists, on the other hand, typically link learning activity to participation in culturally organised practices (Cobb, 1994b). While constructivist and sociocultural perspectives are sometimes proposed as distinct and oppositional, Cobb (1994b) argued that they are complementary in the sense that the former focuses on what students learn and the processes by which they do so, and the latter informs theories of the conditions for the possibility of learning. This thesis is based on the view that constructivist and sociocultural perspectives can be harmoniously aligned to explain how teaching and learning take place. This argument is justified further in Chapters 2 and 3.

Vygotsky’s social theories were particularly relevant to this research project. According to Vygotsky, the processes of teaching and learning are more than the transmission of prescribed knowledge and skills (Wells, 1999). Vygotsky saw development as the unfolding of cognitive understandings of social beings within social contexts and theorised that social, cultural and historical forces all play a part (Wells, 1999). Individuals are therefore part of, and the product of, the collective culture to which they belong (Daniels, 2001). Drawing on Vygotsky’s sociocultural theory, Vasquez (2006, p.36) argued that:

What an individual comes to know and believe is largely based on the social and cultural processes in which he or she is raised. As learners interact with others in their social environment, they not only acquire new forms of knowledge and skills but also acquire the ideas, language, values and dispositions of the social group, making their experience a “cultural learning experience”. It is through the process of acquiring these cultural resources that learners achieve membership in the social group.

In order to be effective, financial literacy education should situate teaching and learning within the appropriate social and cultural contexts that financial problem-solving and decision-making take place. As Cole and Griffin (1983, in Daniels, 2001) suggested, education that focuses on theoretical, content-based teaching and does not connect with learners' everyday empirical learning will be inert and developmentally ineffective. This argument is further developed in relation to financial literacy teaching and learning throughout this thesis.

1.3.2 THE RELATIONSHIP BETWEEN FINANCIAL LITERACY AND MATHEMATICS

Since everyday financial activities tend to involve mathematics, mathematics has an important role to play in guiding and informing financial problem-solving and decision-making. Those who are numerate are likely to be more financially literate. For these reasons, mathematics education is a critical dimension of financial literacy education. In Australia, the close relationship between financial literacy and mathematics is represented in the *Australian Curriculum* with "Money and financial mathematics" to be taught as part of the school mathematics curriculum, and practical applications of numeracy to feature in other disciplines where financial literacy topics are identified (i.e., *Economics and Business* and *Civics and Citizenship*). However, this tends to result in students learning about money through subject-specific episodes that give snapshots of the puzzle, rather than an interdisciplinary view. This is why the current research project involved developing, trialling, studying, and refining teaching and learning activities with both social and mathematical dimensions.

1.3.3 PRACTICAL OR REALISTIC MATHEMATICS

Various researchers have argued that constructivist and sociocultural perspectives have the potential to transform mathematics education through practical or realistic applications. Ernest (2010) argued that one goal of the mathematics curriculum in the compulsory years of schooling is to produce functionally numerate citizens, and so teaching and learning that involves practical applications of mathematics in "real life" contexts is important. Zevenbergen and Zevenbergen (2009) argued the importance of preparing young people for the numeracy demands of contemporary work. They found that problem-solving played a central role in workplace activities and therefore argued the need to align school mathematics with workplace numeracies. Sullivan (2011) argued that contextualised problems that require students to apply both social and mathematical thinking have the potential to prepare students for the challenges of life beyond school, while demonstrating that mathematics is useful. Realistic Mathematics Education (RME) is an example of an approach to mathematics education that applies these arguments.

RME is a Dutch reform based on Freudenthal's view that mathematics must be connected to reality, stay close to children, and be relevant to society, in order to be of human value (Freudenthal, 1977 in van den Heuvel-Panhuizen, 2003). Freudenthal believed that mathematics is a human activity, and so mathematics education should give students guided opportunities to explore and experience mathematics by doing it (van den Heuvel-Panhuizen, 2003). van den Heuvel-Panhuizen (2003) describes the following features of RME:

- it places an emphasis on connecting mathematics to realistic contexts that students are familiar with or that they can imagine;
- contextualised problems function as a source for the learning process, so that as students are problem-solving, they are also actively developing their mathematical understandings;
- students are offered opportunities to share their problem-solving experiences and insights with each other; and
- traditional, mechanistic, procedure-focused approaches are avoided.

Drawing on the above ways of thinking about how students learn, it seems that financial literacy education at school might be enhanced if teachers know more about the understandings about money students bring to school from home. Furthermore, contextualised tasks and researched pedagogies designed to explore the diverse range of understandings about money that exist within any given class might build students' capacity to take a critical approach to financial problem-solving so that they might make informed financial decisions.

1.4 RESEARCH AIMS AND QUESTIONS

Research aims outline what a research project sets out to achieve. Research questions, on the other hand, illustrate the process of inquiry that frame a research project. This research project explores the following research aims and questions, which are presented as they align with each other:

AIMS:	QUESTIONS:
<p>a. To explore parents', teachers' and students' views about financial literacy teaching and learning.</p>	<p>1. What do parents say is important to teach to 10-12 year olds as part of financial literacy education at school? What explanations do they give?</p> <p>2. What do teachers say is important to teach to 10-12 year olds as part of financial literacy education at school?</p>

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| <ul style="list-style-type: none"> b. To explore the understandings about money 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings. c. To develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and learning. d. To formulate recommendations to improve financial literacy teaching and learning in schools. | <p>What explanations do they give?</p> <ul style="list-style-type: none"> 3. What understandings about money do 10-12 year olds bring to school from home? Have parents done anything deliberate / specific to cultivate these understandings? If so, what? 4. Can an educational intervention involving “real life” financial dilemmas and associated pedagogies enhance financial literacy teaching and learning? If so, in what ways? 5. What can be done to improve financial literacy teaching and learning in schools? |
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The decision to focus this research project on 10-12 year olds was based on the findings of a number of studies discussed in the literature review which suggested the need and potential to explore the emergence of financial literacy during childhood and adolescence (real-time, as opposed to retrospectively). For example, Moschis (1987) argued that even by the time a child enters school, the foundations of his/her values and attitudes about money are already well-established thanks to socialisation processes and Danes (1994) found that parents believed that 9-13 years of age is an appropriate time to involve children in family finances.

1.5 OVERVIEW OF THE THESIS

Chapter 2 outlines the findings of international and local research studies into financial literacy, financial literacy education, and mathematics education in two parts. Part 1 explores: financial literacy policy, curriculum, and resources; the role of parents in informal financial literacy teaching and learning at home; and the role of teachers in formal financial literacy teaching and learning at school. Initiatives and strategies by the OECD, Australian government, MCEECDYA, ASIC, and the Australian Curriculum, Assessment and Reporting Authority (ACARA) are outlined to illustrate the political backdrop to this research project. The findings of consumer, economic, and financial socialisation research emerge as being of critical importance. Part 2 explores research within mathematics education, with an emphasis on approaches to

mathematical problems and effective pedagogies. The chapter closes by noting the need for a mixed-methods, design-based research project incorporating parent, teacher, and student voices drawn from a range of educational contexts and classrooms to explore what prior understandings about money upper primary students bring to school from home, and the potential implications for teachers.

Chapter 3 gives a synopsis of the research approach. Here, the research aims and questions are identified. A rationale for drawing on constructivist and sociocultural perspectives is outlined with consideration to issues and debates noted in the mathematics education and financial literacy education research literature. The theoretical underpinnings to the research; namely a hypothesised elaboration of the theory of planned behaviour (Ajzen, 1991) are described. The selected methodology and methods are then outlined. The case for design-based research as an appropriate methodology to explore financial literacy teaching and learning is made. How the methodology was applied to the stages of research and writing of this thesis is explained through a table matching the research aims, questions, contexts, participants, and data sources involved in the current research project. This highlights the iterative, mixed-methods nature of the study. The chapter concludes by describing the steps taken to enhance the validity and reliability of the research findings.

Bannan-Ritland (2003) outlined four components and sub-components of design-based experiments which might be understood as stages of research. While it is acknowledged that the structure is unusual, Chapters 4-8 of this thesis have been written to align with these four stages. This means that each of Chapters 4-7 begins by describing the research aims, questions, context and data sources pertinent to the stage of the study being reported, before proceeding to report the associated research findings. In this way, Chapters 4-7 might be considered as “stand-alone” papers. As per Bannan-Ritland’s (2003) framework, the concluding chapter, Chapter 8, includes an evaluation of the potential broader impact of the research project.

STAGE 1: INFORMED EXPLORATION, DEVELOPMENT, AND DESIGN

Chapters 4 and 5 explain Stage 1 of the research project, which involved informed exploration, development, and design of the educational intervention. This stage of the research project took place in a small government school that services a diverse middle class school population. Interviews were conducted with the Acting Principal, two Year 5/6 teachers, eight parents, and their Year 6 students. Chapter 4 presents eight case studies of within-family financial literacy teaching and learning to highlight the similarities and differences in understandings about money 10-12 year olds bring to school from home. Chapter 5 explores how the Year 6 students

approached a series of seven “real life” financial dilemmas focusing on earning, spending, saving, and sharing money, including how they explained their financial problem-solving and decision-making. The students made insightful comments that showed mature social understandings about earning, spending, saving, and sharing money that were closely aligned with what their parents reported teaching them. The parents’ and students’ interview responses were analysed against the elaboration of the theory of planned behaviour presented in Chapter 3. The findings validated the relevance of the theoretical framework to conceptualise the origins and nature of the social understandings about money 10-12 year olds bring to school from home. This suggested that financial literacy teaching and learning might be enhanced if teachers had tasks and associated pedagogies that enabled them to work together with students to identify and critically explore the different social understandings about money that exist in any given classroom.

These findings led to the development of an educational intervention. The educational intervention consisted of five financial dilemmas and associated pedagogies. The financial dilemmas were essentially open-ended mathematical problems involving financial contexts drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in and/or able to imagine. Each financial dilemma would form the basis of a single mathematics lesson. The financial dilemmas required students to draw on both social and mathematical understandings simultaneously and in synergy, involved multiple solutions, and invited students to share and explain their reasoning. An important goal of the educational intervention was to strengthen students’ disposition to connect social and mathematical thinking as part of their financial problem-solving, the assumption being that doing so will likely contribute to informed financial decision-making.

The financial dilemmas were to be used together with researched pedagogies and practices that have been found to enhance mathematics education. These included:

- Providing a **rationale** for the lessons by defining financial literacy, explaining the difference between social and mathematical thinking, and emphasising the importance of both to informed financial problem-solving and decision-making.
- Building a strong **introduction** to the lesson through literacy and other strategies that give students confidence to begin problem-solving. Literacy strategies include: ensuring the problem is read aloud to the class; asking students to underline or highlight the information that they think is important to the problem; and asking students to identify any words they do not know or understand so that these can be defined as a class.

Other strategies that seem to help students make sense of financial dilemmas include the use of role play and concrete materials (i.e., using notes and coins).

- Emphasising problem-solving **tools and strategies** that might help students, including creating tables to organise information and/or drawing pictures.
- Providing time for **individual thinking** and problem-solving, followed by **small group collaboration** where students can share and discuss their problem solving approaches and solution/s.
- Facilitating **critical whole-class discussions**, including: ensuring that a range of options (mathematical workings and explanations) are recorded, and asking open, sometimes provocative questions to stimulate different ways of thinking.

STAGE 2: ENACTMENT, INTERVENTION

Chapter 6 explains Stage 2 of the research project, which involved the enactment of the educational intervention in four Year 5 and 6 classrooms in four different schools. Each of three financial dilemmas was used as the focus for a 60-90 minute numeracy lesson, the aim being to trial, study, and refine the tasks and the associated pedagogies. During each of these lessons, data were collected from a range of sources, including student worksheets, lesson transcripts, and observational and reflective notes made by me. Data were analysed with a view to understanding the nature of the social understandings about money students bring to school from home, and how these seem to influence financial problem-solving and decision-making. The advantages of using financial dilemmas for financial literacy teaching and learning purposes included the potential to:

- engage a wider range of students in everyday applications of mathematics;
- orient students to seek out and consider multiple alternative options so as to inform their financial problem-solving and decision-making; and
- consolidate students' social and mathematical understandings by positioning both as having important roles to play in "real life" financial problem-solving and decision-making.

The findings presented in Chapter 6 indicated that the educational intervention had merit, signalling the potential for broader implementation.

STAGE 3: EVALUATION OF IMPACT

Chapter 7 presents the findings of research involving 35 Year 5 and 6 teachers and more than 850 Year 5 and 6 students in 16 Victorian primary schools. The teachers were surveyed and their students assessed before and after trialling the educational intervention as their

mathematics lessons. This chapter focuses on teachers' reports about financial literacy teaching and learning pre- and post-intervention. Insights that might guide and inform financial literacy teaching and learning based on the teachers' reports of their experiences using the financial dilemma are also discussed. The findings of pre- and post-intervention student assessment data are discussed to evaluate the effectiveness of the five financial dilemmas and associated pedagogies as an educational intervention.

STAGE 4: EVALUATION OF BROADER IMPACT

Finally, Chapter 8 examines Stage 4 of the research project, by evaluating the potential broader impact of the educational intervention, including key insights and recommendations to improve financial literacy teaching and learning in schools. The limitations of this research project and the need for further research are also acknowledged.

CHAPTER 2. LITERATURE REVIEW

This chapter outlines findings of international and local research studies into financial literacy, financial literacy education, and mathematics education in two parts. Part 1 explores: financial literacy policy, curriculum, and resources; the role of parents in informal financial literacy teaching and learning at home; and the role of teachers in formal financial literacy teaching and learning at school. Part 2 explores research into mathematics education, with an emphasis on approaches to mathematical problems and effective pedagogies. The chapter closes by drawing together the insights of the literature review and explaining how they informed the approach to the current research project.

2.1 PART 1: RESEARCH INTO FINANCIAL LITERACY AND FINANCIAL LITERACY EDUCATION

Considerable research into financial literacy and financial literacy education has been undertaken in the UK and US compared with Australia. In the UK, where the term financial capability is preferred over the term financial literacy, the Financial Services Authority (FSA) commissioned a study to find out people's perceptions of financial capability so that ways might be identified to measure it in a questionnaire (FSA, 2005). Focus groups and interviews involving a mix of participants representing different age groups and income levels were conducted. Focus group participants were found to perceive financial capability in behavioural terms with four discrete aspects: managing money; planning ahead; making choices; and getting help. The focus group participants discussed issues about knowledge, understanding, skills, attitudes, confidence and personality in the context of their behaviour in relation to these four activities and felt that personality, confidence and attitudes were inextricably bound up with knowledge and skills, with the outcomes reflected in behaviour (FSA, 2005). In another study commissioned by the FSA, deMeza, Irlenbusch, and Reyniers (2008) drew on a range of consumer behaviour literature to convincingly argue that psychological rather than informational differences may explain much of the variation in levels of financial capability across the UK. They suggested that improving levels of financial capability would require long-term changes in values, attitudes and behaviour towards money. This insight prompts the question whether financial literacy teaching and learning might be enhanced through the use of pedagogies that promote critical understandings of values and attitudes while teaching knowledge and skills.

In the US, various policies have recognised the need to improve financial literacy and financial literacy education. Several studies have sought to evaluate the impact of these policies and the

associated financial literacy education programs. Bernheim, Garrett, and Maki (2001) investigated whether compulsory financial literacy education in high school correlated with responsible financial behaviour in adulthood. They surveyed 2000 adults aged 30-49 who graduated from high school during the period curriculum mandates were introduced in many states and found that self-reported saving rates were higher for students in states where financial literacy education had been compulsory for five years (Bernheim, Garrett, & Maki, 2001). This study highlighted that there is no “quick fix” solution to financial literacy education and there is merit in taking a long-term view when developing and evaluating policies and programs.

The *Jump\$tart Coalition for Personal Financial Literacy*, a non-profit organisation formed to help US students become financially literate by the time they graduate from high school, conducted national surveys in 1997, 2000, 2002 and 2004 to measure twelfth Year students’ financial knowledge (Varcoe, Martin, Devitto, & Go, 2005). The average financial literacy score in 1997 was low (57.3 per cent), but further deteriorated in 2000 (51.9 per cent) and 2002 (50.2 per cent). At that point in time, *Jump\$tart* concluded that the poor results were due to schools and teachers not doing enough in the area of financial literacy education. The average financial literacy score reached 52.3 per cent in 2004, still below the 1997 benchmark. Mandell and Klein (2007) analysed the 2006 *Jump\$tart* survey data in terms of the relationship between financial literacy scores and responses to three questions designed to measure student motivation to become financially literate. They found that motivation is a key characteristic of financial literacy. While it is not surprising that being motivated to learn is a prerequisite to learning, this finding has obvious implications for schools and teachers. In order to be successful, they must not only focus on communicating the importance and relevance of financial literacy education to students achieving their financial aspirations, but also situate teaching and learning in meaningful “real life” contexts.

In another study investigating financial literacy education impact, Varcoe et al. (2005) evaluated the effectiveness of the *Money Talks: Should I be Listening?* curriculum on the financial knowledge and behaviour of 13-20 year olds. The study involved 114 high school students who completed identical pre- and post- test assessments of their financial knowledge, attitudes and behaviour and demonstrated improvements in each of these areas. However, of particular interest is the finding that half of the participants in this study reported not having a bank account. Having a bank account and regularly saving to it are things teachers might think adolescents are already doing as a result of early financial literacy teaching by parents at home. This study highlights that teachers should avoid making assumptions and should find out what

prior understandings about money students bring to school from home. This is an important premise of my research project.

Similarly, Sherraden, Johnson, Guo, and Elliot (2009) studied a four-year school-based financial education and savings program called “I Can Save”. The study involved 93 children and included an experimental group of children who completed “I Can Save” and a comparison group of children who did not. “I Can Save” included a matched savings program, classroom teaching and learning, an after-school club, and financial literacy education workshops for parents. As part of the program, children regularly visited their local bank to deposit their own savings (this is distinctly different to school banking in Australia where schools collect students’ money and deposit it on their behalf). Data collected included a test of student financial knowledge, interviews with children, teacher focus groups and program data. Students who participated in “I Can Save” scored significantly higher on a financial literacy assessment than their peers who had not, regardless of socioeconomic factors such as parent education and income. The findings suggest that providing parents with financial literacy education, parent engagement in school-based programs, and the opportunity for children to meaningfully participate in local financial services are ways that financial literacy teaching and learning can be enhanced.

The above studies, designed to find out whether financial literacy education actually “works”, reveal that research in this area tends to be driven by the goal of measuring and reporting on program impact. Fox, Bartholomae, and Lee (2005) provided an overview of the range of financial literacy education programs in the US and concluded there was scarce evidence of impact. Later, Hathaway and Khatiwada (2008) completed a critical analysis of research investigating the impact of four types of financial literacy education program and the impact of these on adult financial behaviour: home ownership counselling; credit card counselling; school-based financial literacy education; and workplace financial literacy education. They found that much of the academic literature assumed a causal relationship between financial literacy education (knowledge) and financial outcomes (behaviour) when in fact there seems to be only a weak correlation between the two. This supports the view that financial literacy education needs to target more than knowledge and skills. While they found that financial literacy education programs tailored to specific audiences are more likely to be effective, they echoed Fox et al.’s (2005) view that there is no conclusive evidence that financial literacy education programs actually work. Given the previously cited studies that claim otherwise (Bernheim et al., 2001; Varcoe et al., 2005; Mandell & Klein, 2007; Sherraden et al., 2009) whether one views financial literacy education as effective or not seems to depend on what you measure and how you measure it. Clearly, further research in financial literacy education is much needed, but

what is also needed is an appropriate approach to reading and evaluating this research. There is the potential for qualitative educational research in classroom settings to make a valuable knowledge contribution about financial literacy teaching and learning.

The studies reviewed so far have the potential to guide and inform financial literacy policy and education in Australia, where government organisations and financial institutions have funded much of the research, with the focus tending to be on adult financial literacy levels and what might be done to improve them. It is worth noting that while the involvement of financial institutions in this area of research may be viewed with some suspicion, their funding and support is generally represented as part of a commitment to being socially responsible corporate citizens.

The ANZ Bank commissioned the first Survey of Adult Financial Literacy in Australia in 2002. The survey was developed by Roy Morgan Research using the UK framework for measuring financial literacy as a starting point and included 145 finance and 25 demographic questions. The research involved 3,500 randomly selected Australian adults and established a reasonable benchmark of financial literacy. Subsequent surveys in 2005, 2008 and 2011 have been used to monitor changes in financial literacy and related behaviour over time. The ANZ surveys found that there is a pronounced difference in financial literacy levels between Australia's most and least financially literate (top and bottom 20 per cent), with financial literacy being strongly associated with a person's age, being female, education and socioeconomic characteristics (ANZ, 2003, 2005, 2008, 2011). The lowest levels of financial literacy were found to be among those educated only up to Year 10, those with low household income or whose main source of income is a government benefit or allowance, those who speak a language other than English at home and those of Aboriginal or Torres Strait Islander descent (ANZ, 2003, 2005, 2008, 2011).

The full report of the results from the 2011 ANZ Survey argues that financial attitudes have an association (whether positive or negative) with most behavioural indicators of financial literacy. The ANZ identifies five behavioural indicators of financial literacy adapted from the UK FSA (2005). They are: keeping track of finances; planning ahead; choosing financial products; staying informed; and financial control. "Financial self-efficacy" was found to have a positive association with all of these behavioural indicators, whereas finding "money dealings stressful" was found to have a negative association with most behavioural indicators (ANZ, 2011). Meanwhile, a "thrifty" attitude was found to have a relatively strong positive association with most components of financial literacy (ANZ, 2011). It would be useful to investigate whether children reveal attitudes to money during the course of financial literacy teaching and learning.

In 2003, the Commonwealth Bank established the Commonwealth Bank Foundation (CBF) to encourage developments in financial literacy education. Following ANZ's lead, it also undertook to measure the financial literacy of Australians in 2004. The CBF survey was repeated in 2010, with a representative sample of 3,000 participants aged 16-65 interviewed by phone. Participants answered a series of 20 scenario-based questions about financial products and decisions exploring issues such as personal financial stress, attitudes to financial management, personal history, and sources of financial knowledge. Like ANZ, the CBF reported finding that the least financially literate Australians tend to be those aged 16-25, those who leave school early, those unemployed or studying, low income earners and non-English speakers (CBF, 2010). In this survey, "real life" financial scenarios were used to assess students' financial knowledge and skills (i.e., whether they could arrive at the "correct" answer). Even with the best of intentions, assessments of this nature rarely account for the diversity of student backgrounds – so while items may be realistic for some students, they can be unrealistic for others. There is the potential to study students' responses to open-ended scenarios or mathematical problems focusing on the "big ideas" of earning, spending, saving and sharing money. Such problems would reveal insights into the ways and means by which students' responses reflect not only their financial knowledge and skills, but also their values and attitudes towards money. This approach to financial literacy data collection is a distinct point of difference to my research project, compared with other research in this field.

Citibank are also committed to researching financial literacy and developing resources and programs for financial literacy education. Citibank commissioned the Citi Fin-Q Survey in 2007. It was designed to measure the Financial Quotient (Fin-Q Score) or financial well-being of consumers in Australia, China, Hong Kong, India, Indonesia, Korea, Malaysia, Phillipines, Singapore, Taiwan and Thailand. The sample consisted of 400 adults aged 18 years or older in each of these countries (a total of 4,400 participants). Data were collected online, focusing on citizens living in metropolitan regions with Internet access, the majority of whom were employed either full or part-time. The survey scored respondents on 11 questions closely related to financial wellbeing and 11 attitudinal and lifestyle questions. This particular study is limited due to sampling issues and a reliance on self-report measures. It is, however, interesting to note that 29 per cent of participants reported sourcing personal finance information mainly from family and friends and this was the most popular response (Citibank, 2008). This finding suggests that an educational intervention involving constructivist and sociocultural approaches has the potential to enhance financial literacy teaching and learning

In various ways, the ANZ, CBF, and Citibank studies reveal the previous shortcomings in our education system in terms of approaches to financial literacy education. The studies also

highlight the need for the *Australian Curriculum* to ensure that students become financially literate at school. They also highlight the need for further research. Unfortunately, there have been very few Australian studies focusing on financial literacy levels among young people or financial literacy education at school. One example is the Australian Financial Literacy Assessment (AFLA) commissioned by the CBF in 2005 to determine the level of financial literacy of Year 9 and 10 students (14-16 year olds). AFLA was repeated in 2006 with 50,000 student participants from over 500 schools. AFLA consisted of 48 multiple choice questions requiring students to apply a range of knowledge and skills to everyday financial situations. The questions were distributed across six categories: Managing Income and Finances; Consumer Decisions; Personal Finances; Consumer Rights; Business and Technology; and Economics and Investment. The results revealed that, despite being active young consumers, this demographic lacked fundamental numeracy skills and basic financial knowledge. For example, many students showed difficulties reading and interpreting a bank statement and around half were unable to critically evaluate comparison mobile phone plans (CBF, 2006). This study not only provided an indication of the financial literacy levels of 14-16 year olds, but reports and resources were available to teachers in participating schools to help them improve their financial literacy education programs. The AFLA program has been discontinued.

Another study into adolescent financial literacy was undertaken by the Financial Literacy Foundation. The Howard Government established the Foundation to focus on ways to help all Australians better manage their money¹. As part of its work, the Foundation commissioned a survey of 7,500 Australians aged 12-75, who were asked to self-assess their ability, understanding, attitudes and behaviour when it comes to managing money. As part of this study, phone surveys were conducted with 553 young people aged 12-17 years, with follow-up interviews with 21 randomly selected participants. The findings revealed that Australians are relatively confident in managing credit and debt, budgeting and saving, but are less confident and therefore motivated to learn about more complex issues such as investing and planning for retirement (Financial Literacy Foundation, 2007). Not surprisingly, young people reported being less confident in each of the above areas than adults (Financial Literacy Foundation, 2007). Overall, the findings of this study speak more to Australians' confidence and self-efficacy related to money management than their financial literacy, per se. Various findings seem to have been oversimplified. For example, 48 per cent of the adult population reported that dealing with money is stressful and overwhelming, and this finding is conveyed as a problematic financial attitude. In fact, feeling stressed and overwhelmed may be a reasonable emotional state depending on one's circumstances, and the study can only speculate what impact these

¹ The functions of the Financial Literacy Foundation were transferred to the Australian Securities and Investments Commission (ASIC) in 2008.

emotions may have on financial behaviour. However, of particular interest is the finding that significant numbers of Australians reported attitudes that have the potential to distract from effective money management. For example, 31 per cent of the adult population reported that when it comes to their personal finances, they like to “live for today”, 31 per cent said that dealing with money is boring, and 22 per cent reported not spending a lot of time thinking about financial information before making decisions (Financial Literacy Foundation, 2007). These attitudes and the related behaviour might be effectively targeted and changed through appropriate pedagogies at school. This research project involves developing, implementing, and researching such an educational intervention.

In 2003, a partnership between the NSW Department of Education and Training and YWCA NSW was established with funding by Citi Foundation, to develop *MakingCents* a national financial literacy education program for primary school children aged 7-12 and parents. Shortly thereafter, the NSW Department of Education and Training developed the *Financial literacy action learning project* which involved seven schools belonging to the NSW Priority Schools Program for low socioeconomic status school communities. An action learning approach involving students, their parents and their teachers was used. Two teachers from each participating school implemented the *MakingCents* program and data were collected through student, parent and teacher surveys, school reports and milestone activities. This quality research project explored the complexities of financial literacy education in disadvantaged school settings, educated parents, and involved them in teaching their children responsible money management. The project evaluation conducted by the University of Western Sydney revealed that the most successful programs were in school communities where parents were actively engaged throughout the course of the *MakingCents* program (NSW Department of Education and Training, 2009). This finding reinforces the potential for communication between parents and teachers to enhance financial literacy teaching and learning.

As an extension to *MakingCents*, a Financial Skills Assessment was designed to provide teachers and parents with information about student financial literacy levels and give a snapshot of financial literacy in Australian primary schools (Citibank Australia, 2009). A sample of 4,660 students aged 10-12 from more than 100 schools nationwide participated in the assessment. While 90 per cent of the participants acknowledged the importance of saving, 82 per cent experienced difficulty converting simple mathematics calculations into concepts involving money (for example, calculating change, calculating an account balance and calculating mobile phone charges) (Citibank Australia, 2009). These findings support that further research into the financial motivations, values, attitudes, knowledge, and skills among this age group is needed.

Taking a different approach, Pang (2010) used a learning study to enhance the teaching of financial literacy to Grade 12 students. Twelve teachers and 193 students participated in this study. Six teachers worked collaboratively in a lesson study group. Another six teachers worked in a learning study group and used variation theory to embed a cluster of core economic concepts into their financial literacy teaching. Aside from this difference, the procedures for planning, implementing and evaluating lessons were the same for both groups. Data included a pre-test written task and interviews with students, class observations and video-recording of the lessons, and three post-test written tasks and interviews with students (immediately after, 6 weeks after, and 6 months after the lessons). Comparisons were made between the experiment and control group. Of particular interest is the data collection technique that required student participants to make decisions under different complex financial conditions (scenarios or dilemmas) and explain their answers. The findings indicate that the learning study approach not only enhanced student financial literacy learning outcomes, but also sustained them over time. Pang's study highlights that integrating economic and mathematical understandings has positive implications for financial literacy learning. Pang's data collection protocols informed the development of the financial dilemmas for my project.

It is unfortunate that, by adolescence, many students do not understand some of the basic economic, consumer and financial principles of earning, spending, saving and sharing money. And yet young people today are interacting in the economy as consumers of more sophisticated products and services from a younger age (MCEECDYA, 2005; ASIC, 2011; OECD, 2013). Some of the products and services adolescents aspire to purchase are expensive and/or require a contractual financial commitment (i.e., mobile technologies such as iPhones) (MCEECDYA, 2005; ASIC, 2011; OECD, 2013). Parents and teachers have important roles and responsibilities as socialising agents in children and adolescents' lives – children need a suite of financial values, attitudes, knowledge and skills if they are to make informed choices when it comes to money. While the education system is charged with ensuring that Australian school leavers are financially literate, the reality is that schools' and teachers' work in this area is affected by the financial values, attitudes, knowledge and skills students bring to the classroom from home. What we know is that those with higher levels of financial literacy are better equipped to make the most of life's opportunities, achieve their goals, secure their financial well-being and contribute to the local and global economies (MCEECDYA, 2005; ASIC, 2011). What we do not know is what pedagogies have the greatest potential to improve financial literacy teaching and learning – although this has been speculated and debated.

Pinto and Coulson (2011) argued that financial literacy education programs tend to assume that all individuals come to financial life on an equal playing field and ignore the diverse

circumstances which cause people to experience money in very different ways. They concluded that without attention to issues of social equity, financial literacy education is reduced to replicating inequities, and continuing to marginalise already vulnerable low socioeconomic populations. Pinto (2012) argued that the development of financial literacy curricula that challenge the dominant public narratives around money may provide ways for teachers to critically address socioeconomic disparity. Gates and Jorgensen (2009) developed a similar argument for socially just mathematics education. They called for pedagogies that might actively confront the social and political structures that perpetuate disadvantage so as to begin to redress the gap in educational attainment that exists between the affluent and the marginalised. While the task is challenging, Jorgensen and Sullivan (2010) made a number of recommendations to teachers working in Aboriginal communities how they might better engage students in learning mathematics. They specifically refer to opportunities to connect mathematics and money, since students have some familiarity with the latter. With regard to financial literacy education, the above arguments underline the importance of taking into consideration different understandings about money students bring to school from home based on their financial realities, and situating financial literacy teaching and learning in “real life” contexts that engage with and/or appropriately extend upon students’ views and experiences.

This significant body of research into financial literacy and financial literacy education indicates the potential for a constructivist, sociocultural approach to improve financial literacy education. This insight is central to my study – financial literacy teaching and learning may be more effective if tasks and pedagogies connected with the understandings about money students bring to school from home. In the next section I discuss some of the recent developments in policy and curriculum frameworks designed to improve financial literacy education at school across the OECD and here in Australia.

2.1.1 FINANCIAL LITERACY POLICY, CURRICULUM AND RESOURCES

The OECD has demonstrated a significant commitment to new policy and curriculum initiatives to improve financial literacy among member countries. It launched its Financial Education Project in 2003 and has since directed considerable resources to the issue. One strategy has been to create the International Network on Financial Education (INFE), which involves 150 public institutions from 75 countries to draw on the experience and expertise of developed and emerging economies (OECD, 2012). Another has been to develop the International Gateway for Financial Education (IGFE) – www.financial-education.org - a one-stop-shop for bringing together data, research, resources and news on financial education issues and programmes around the world (OECD, 2012).

In 2012, as part of the OECD's *Programme for International Student Assessment (PISA)*, 15 year olds from 18 countries completed a financial literacy assessment (OECD, 2011). This was the first, large-scale international study to assess young people's financial literacy. PISA provides both support and incentive to member countries to take seriously the task of improving financial literacy education in their schools. When the results are released in June 2014, the spotlight will be on participating countries (including Australia) to see who has performed best and therefore who seems to be leading the way in policy, strategy, and practice. For the purpose of PISA, the OECD (2012) distinguishes between mathematical literacy (numeracy) and financial literacy while acknowledging the relationship between the two. For example, students who can apply number sense, are familiar with various representations of numbers, can undertake strategies for computation, and use mathematical reasoning to solve problems are likely to be more financially literate. This strong connection between mathematics and financial literacy is evident in the *Australian Curriculum: Mathematics*, where there is a designated substrand titled "Money and financial mathematics" each year from Year 1 to Year 10 (Australian Curriculum Assessment and Reporting Authority (ACARA), 2011). Then again, financial literacy can sometimes be demonstrated without even basic arithmetic processing.

The Australian Government has invested \$10 million in the *Helping Our Children Understand Finance* policy initiative. A number of government bodies are working in partnership to drive improvements in consumer and financial literacy education via this initiative. They are led by the Australian Securities and Investments Commission (ASIC) and include the Council of Australian Governments (COAG), the Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA), the Australian Curriculum, Assessment and Reporting Authority (ACARA) and the Australian Institute for Teaching and School Leadership (AITSL). Two key documents outline their policy agenda. The first is the *National Consumer and Financial Literacy Framework* (the *Framework*) (MCEECDYA, 2005) and the second is the *National Financial Literacy Strategy* (the *Strategy*) (ASIC, 2011a). The *Framework* was developed by the Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA) in 2005 and revised in 2009 in light of the newly developed *Melbourne Declaration on Educational Goals for Young Australians* and national education reforms. It sets out a rationale and plan to provide future generations with the knowledge, skills, attitudes and behaviour they will need to be financially literate. The *Strategy* was published by the Australian Securities and Investments Commission (ASIC) in 2011. It has four core elements, one of which is using educational pathways to build financial literacy for all Australians.

The *Framework* and the *Strategy* pay close attention to the contribution financial literacy education at school can make to the achievement of the *Melbourne Declaration on Educational*

Goals for Young Australians (MCEECDYA, 2008). Including financial literacy education in the official school curriculum is arguably a highly efficient and fair way to boost the financial literacy levels of a whole generation on a broad scale (OECD, 2013; ASIC, 2011a,b; MCEECDYA, 2005). There is the potential to promote equity by attending to the varying financial literacy learning needs of those who are advantaged and those who are disadvantaged by their socioeconomic background. There is the potential to develop successful learners who have a good level of financial literacy, but also the right values and attitudes to want to continue to build their financial literacy over their lifetime. The *Framework* and the *Strategy* argue that financially literate school leavers will not only be more confident and enterprising, but they will also be more active and informed citizens.

Since the curriculum spans early childhood to early adulthood, it provides a unique means to instil more responsible financial values, attitudes and behaviour amongst the future adult population (OECD, 2013). Together with the OECD's draft *Guidelines on Financial Education at School*, the *Framework* and the *Strategy* highlight the long-term value of financial literacy education in the compulsory years of schooling and propose what such an education might look like. They support an interdisciplinary approach to financial literacy education across Mathematics, English, Science, Business, Economics, Civics and Citizenship, and Information and Communications Technology (ASIC, 2011a; MCEEDYA, 2005).

Much of ASIC's work in the area of financial literacy has been focused on raising the profile of financial literacy education in the *Australian Curriculum* and developing interdisciplinary tools and resources for Australian teachers and students. This recent period of education reform has created both opportunities and challenges for ASIC, who have needed to be proactive, organised, flexible and responsive in order to achieve their goal of improved financial literacy education in schools. ASIC contracted an interdisciplinary consortium of national professional teacher associations to develop a Professional Learning Package to support the development of young people's consumer and financial literacy knowledge, skills, attitudes and behaviour. The consortium comprises the Australian Association of Mathematics Teachers (AAMT), Australian Association for the Teaching of English (AATE), Australian Literacy Educators Association (ALEA), Australian Science Teachers Association (ASTA) and Business Educators Australasia (BEA). According to the AAMT (2011), the Professional Learning Package was designed to:

- equip teachers with the knowledge and skills to be able to confidently and effectively integrate consumer and financial literacy into and across relevant learning areas of the *Australian Curriculum*;
- provide teachers with the tools and resources to support effective teaching of consumer and financial literacy to students through real-life contexts; and

- strengthen teacher capacity to engage their school community, including parents, in consumer and financial literacy education.

With particular reference to this third aim, in the next section I review findings of a range of previous international and local research studies examining the roles parents and teachers play in students' literacy learning.

2.1.2 THE ROLE OF PARENTS

Various studies have examined the role that parents play in developing children and adolescents' consumer, economic, and financial socialisation. Moschis (1985, 1987) has written extensively about consumer socialisation and learning processes. He argued that family communication processes influence children's consumer learning in a number of ways that are also relevant to financial literacy learning. For example, by performing certain activities, a parent may consciously or unconsciously communicate certain norms and expectations to his/her children. Positive and negative reinforcement might also be used to reward or punish particular behaviour. Additionally, social interaction mechanisms involving modeling and reinforcement between family members and children facilitate transfer of values, attitudes and behaviour. For these reasons, Moschis (1987) argued that even by the time a child enters school, the foundations of his/her values and attitudes about money are already well-established thanks to these processes. Technological changes have significant implications for how we understand the consumer socialisation and learning processes Moschis described. For example, it is difficult to tell what children learn about money when they regularly observe their parents withdrawing money from ATMs. Similarly, if parents use Internet banking to perform financial transactions, children might not be aware of their parents living prudently or otherwise. The abstract nature of these financial activities is difficult for children to understand.

Pritchard and Myers (1992) examined the role of family in adolescents' consumer socialisation, paying close attention to the relationship between the economic value orientation of students and their parents. High school students and their parents belonging to 16 households were surveyed using an adaptation of the Price (1968) Economic Values Instrument which classified participants in one of five categories: self-actualisation (money is used to promote self-development), faith (money problems will work themselves out), prestige (money is used to purchase prestige items), security (money is accumulated to achieve security), and self-indulgence (money is used to meet urgent wants). Security and self-actualisation were found to be the primary economic value orientations. In 88 per cent of the families, the adolescents shared either the primary or secondary value orientation with at least one parent. This study not only reinforces the important role parents play in children's economic, consumer and financial

socialisation, but confirms that parents and children's financial values and attitudes are likely to be closely aligned (i.e., financial values and attitudes pass from generation to generation).

Danes (1994) investigated parental perceptions of their children's financial socialisation. This study involved 182 parents who completed questionnaires designed to assess the age at which they felt it was most appropriate to share with children family financial information or involve them in various financial activities. Receiving pocket money and opening a bank account were experiences most parents perceived to be appropriate for children aged under 9. However, there was less consensus about when children aged 9-17 should be exposed to other financial knowledge and behaviour, including family income, savings and debt. The findings of this study reveal that if the discrepancy between parent perceptions and teacher practice is too large, teachers' work in financial literacy education will be less effective. As the parents involved in Danes' study believed that 9-13 years of age is an appropriate time to involve children in family finances, it seems sensible that financial literacy education targeting this age group might be enhanced if teachers created connections between students' financial literacy learning at home and in the classroom.

In another study exploring the home-school nexus, Brenner (1998) examined how the inclusion of everyday mathematics into classroom instruction can make the curriculum more meaningful to students. She interviewed and observed Hawaiian children from preschool through to Year 2, their parents and their teachers to understand their goals for children's acquisition and use of money concepts at home, while shopping, and in the classroom. Disparities were found between children's everyday understandings of money and what was being taught as part of the mathematics program at school. In fact, many of the children came to separate the two contexts as having different knowledge structures and values systems. This resulted in a lack of learning for the students and frustration for the teachers. Brenner (1998) successfully demonstrated the powerful socialising role teachers play in children's lives as the children in this study were found to share more of their teachers' viewpoints about money than those of their parents. She also demonstrated the value in opening the lines of communication between parents and teachers to help teachers better understand the ways and means by which students learn about money at home. My project aims to explore the financial values, attitudes, knowledge, and skills 10-12 year olds bring to school from home, find out what parents may have done to cultivate these understandings, and explore strategies teachers can use to help students consolidate their financial literacy learning at home and at school.

Lewis and Scott (2003) examined financial practices in the home and how these contribute to children's economic socialisation. A sample of 205 parents completed questionnaires about the

ways they interact with their children and adolescents under the age of 16 about money. Participants were also asked their views on the role schools can play in teaching practical economic competencies. This study found that parents' practices and preferences differed depending on their level of education and income. Financial activities were found to become more common as children grew older and when parents were in professional occupations. This is consistent with Valentine and Khayum's (2005) study into the influence of economic socialisation on financial literacy which found that students from middle-class families who worked 10-20 hours per week and had a savings account had higher levels of financial knowledge than their peers. Most of the parents in Lewis and Scott's (2003) study (59 per cent) felt that secondary schools in the UK were doing little or nothing to help their children learn about personal finance (by contrast, in Australia, 64 per cent of 12-17 year olds reported having learned about money management in school and of those, 82 per cent found the information provided useful (Financial Literacy Foundation, 2007)). These studies reinforce the potential for communication between parents and teachers about the prior financial understandings students bring to the classroom from home to enhance financial literacy teaching and learning.

Hibbert, Beutler, and Martin (2004) also explored parents' impact on their children's financial behaviour. They examined the influence that parents have in reducing next generation financial strain to the extent that they model prudent financial behaviour for their children and adolescents. A sample of 537 undergraduate and graduate college students completed self-report questionnaires that measured financial prudence in their family of origin, their own debt avoidance and credit card behaviours, and their experienced level of financial strain. There were found to be some seemingly straightforward ways that parents can improve their children and adolescents' financial literacy, with many important lessons being embedded in the daily routines of family life. Parents who model prudent financial behaviour by living within their income, saving money, paying bills on time, and avoiding unnecessary debt have a modest but favourable influence on the financial attitudes, knowledge, behaviour and wellbeing of their children. It is important to consider that as financial transactions today often take place in the virtual realm (i.e., via online shopping and the use of phone and Internet banking), children and adolescents may not have same opportunities to observe their parents' financial behaviour as the participants in this study. My project explored the ways and means by which children in the 21st Century learn financial values, attitudes, knowledge and skills from their parents.

Similarly, Webley and Nyhus (2006) investigated whether Dutch parental behaviour related to inter-temporal choice (i.e., the impact of present-day decisions on available options in the future) influences the economic behaviour of children. The future orientation (tendency to consider future consequences and willingness to delay gratification), conscientiousness and saving of

16-21 year olds were compared with those of their parents. This study substantiated that parents have an impact on their children's economic attitudes and behaviour. Economic socialisation activities such as being encouraged to have a bank account, earning or being given money, and discussing financial affairs with parents were found to be associated with future orientation, education level and a preference for saving rather than spending surplus money. These findings prompt the question whether financial literacy education at school can achieve these learning outcomes, and if so, by what ways and means?

Beutler, Beutler, and McCoy (2008) examined 11-13 year old students' aspirations associated with perceptions of 'living well'. They developed the Living Well Feedback Form to collect students' open-ended descriptions of their future income, financial habits and expenditures, and current and future financial aspirations. Grounded theory was used to code participants' responses as relating to extrinsic or intrinsic concepts. Nearly 42% of the sample revealed extrinsic aspirations associated with living well, meaning they perceived "living well" to be about having the right social image, participating in status careers and activities, and owning prestige possessions (i.e., homes and vehicles). Intrinsic themes were expressed by around 36% of the sample, meaning they perceived "living well" to be about working, becoming a better person, and using resources to be with and care for family and friends. Beutler et al. (2008) point to the fact that little is known about the emergence of financial values and attitudes during childhood and adolescence; but propose that children and adolescents who are socialised to become economic contributors through financial literacy education at home and at school are better prepared to transition into adult roles. This suggests that financial literacy education might be conceived as a partnership between parents and teachers.

More recent research has sought to investigate factors that are influential in predicting responsible financial behaviour in young adulthood. From these studies it seems that financial literacy education might be improved if teachers targeted the factors that have been demonstrated to influence behaviour while teaching knowledge and skills. Shim, Xiao, Barber, and Lyons (2009) described and tested a conceptual model of the potential antecedents and consequences of financial well-being in young adulthood. The conceptual model was developed based on the theory of lifespan development (Baltes, 1987), the hierarchical model of personal values, attitudes and behaviour (Homer & Kahle, 1988), consumer socialisation theory (Moschis, 1987), and the theory of planned behaviour (Ajzen, 1991). The conceptual model describes the relationships among three domains: 1. socialisation agents and personal values; 2. financial attitudes, behaviours and wellbeing; and 3. overall life success. The study focused on young people's financial wellbeing as indicated by debt, financial satisfaction, financial worries and coping. The findings of this study suggest that self-actualising personal values, financial literacy

education at home, and formal financial literacy education at school may play important anticipatory socialisation roles in ways that young adults learn about money matters and form attitudes and behavioural intentions based on that knowledge. By placing emphasis on developing strong self-actualising values, parents may have better success at guiding their children to place a greater value on accomplishment and to adopt a constructive and responsible attitude with regard to money matters. Talking with children about responsible money management and setting clear normative expectations were found to predict responsible financial attitudes and behavioural intentions in the next generation. Shim et al. (2009) not only reinforce the important role parents play in children's financial literacy learning but also establish that financial values and attitudes are key to financial behaviour.

In another study involving some of these researchers, Shim, Barber, Card, Xiao, and Serido (2010) surveyed 2098 first-year college students to test a financial socialisation process model combining theories of consumer socialisation (Moschis, 1987) and planned behaviour (Ajzen, 1991). The model specifies four levels that connect anticipatory socialisation during adolescence to young adults' current financial learning, to their financial attitudes, to their financial behaviours. Structural equation modelling indicated that parents, work and high school financial literacy education during adolescence predicted young adults' financial learning, financial attitudes and financial behaviours, with the role played by parents substantially greater than the role played by work experience and high school financial literacy education combined. Parental financial modelling was found to broadly predict all aspects of next generation financial attitudes. Financial knowledge was found to predict perceived behavioural control, financial attitudes and financial behaviours. It is important to note that this study is limited by its reliance on self-report measures requiring the participants to reflect back on their adolescent financial literacy learning experiences. A "real time" study involving both students and their parents and the processes by which financial literacy develops during children's transition to adolescence would enable Shim et al's (2010) model to be tested further.

Parents are not equally equipped to transmit responsible financial values, attitudes, knowledge, skills and behaviour to their children (OECD, 2013). Demographic descriptors such as gender, educational attainment, employment status, ethnicity, and family background as well as financial knowledge, values, attitudes and behaviour have been found to affect parents' ability to provide their children with adequate financial literacy education at home (Lewis & Scott, 2003; Hibbert et al., 2004; Webley & Nyhus, 2006; Mandell & Klein, 2007; Shim et al., 2010; OECD, 2013). Shim et al's (2009, 2010) studies highlight the need to educate parents about the lessons that their own financial values, attitudes and behaviour impart and about the importance of direct teaching. Shim et al. (2010) also argue that in the absence of appropriate parental engagement in

informal financial literacy education, formal financial literacy education at school is not likely to have the optimal impact on students. It therefore seems reasonable to suggest that financial literacy education might be improved if teachers better understood the ways and means by which parents were teaching their children about money. Strategies to help teachers explore the understandings about money students bring to school from home might enhance financial literacy teaching and learning at school.

In their report to the UK Money Advice Service, Whitebread and Bingham (2013) emphasise the important role parents play in educating their children about money. They draw on educational research literature to provide insights and ideas on what parents and teachers might do to prepare the next generation to manage their money. They argue that since children have little in the way of financial resources they control independently, teaching explicit forms of financial knowledge is unlikely to be effective in shaping their future financial behaviour (Whitebread & Bingham, 2013). Rather, they argue that pedagogies that allow children to experience a process or idea are likely to be more successful than simply telling students what they need to know, and specifically refer to “habituating” self-regulation and effective problem-solving strategies. The current research project explores the possibilities of an educational intervention designed in line with these arguments.

In effect, each of the above studies show that the prior understandings each child brings to their formal financial literacy education at school can vary considerably. This builds further support for the argument that a constructivist, sociocultural approach is appropriate and might enhance financial literacy teaching and learning. In the next section I review the findings of the few recent studies that have investigated teachers’ capability, motivation and confidence to teach in this area.

2.1.3 THE ROLE OF TEACHERS

To the extent that they are ultimately responsible for enacting the curriculum, teachers are fundamental to financial literacy education at school. Teacher attitudes and beliefs have been found to be a significant mediator in curriculum implementation (Handal & Herrington, 2003). Loibl (2008) investigated the scope, determinants and nature of personal finance instruction in Ohio high schools. A sample of 710 high school teachers completed an online survey consisting of 54 questions, which included items relating to teacher financial literacy levels, attitudes towards teaching financial literacy, and engagement in teaching financial literacy in their schools. Participants’ responses were compared across four academic content areas: business education; family and consumer sciences; social studies; and mathematics, science, technology and agricultural sciences. Loibl (2008) found that in most schools, financial literacy topics were

addressed in elective courses. The four academic content areas differed significantly in their interest toward teaching personal finance, the significance they attached to these topics, and diligence in researching them. Business education teachers were more likely to have completed formal education in finance areas, were more likely to teach elective courses, and attached great significance to teaching financial literacy compared with their colleagues. Even so, the mean personal finance quiz scores for all four academic content areas were below 50 per cent. Loibl's (2008) study reveals the variance in teachers' attitudes towards and work in financial literacy education and highlights the need for improved pre-service teacher education and professional learning programs to build teacher capability, motivation and confidence in financial literacy education.

Way and Holden (2009) investigated the extent to which pre-service and in-service teachers in the US have the capacity to teach personal finance. They surveyed a national sample of 504 K-12 teachers, and 627 pre-service teachers about their personal financial literacy education and training, perceived level of financial literacy, preparation to teach financial literacy, opinions and beliefs about the importance of teaching financial literacy and willingness to participate in professional development in the area. They found that while most teachers agreed that financial literacy education was important, only 30 per cent were involved in teaching personal finance topics. Almost half the participants in this study believed that financial literacy education is too complex for primary school-aged children. This study raised concerns whether teachers have the necessary knowledge and skills to competently teach financial literacy. Teachers with backgrounds in mathematics, social and vocational education were better qualified and more likely to include financial literacy education in their lessons. Fewer than 3 percent of teachers reported having taken a tertiary course with content related to the teaching of financial literacy education. These findings indicate that pre-service and in-service teachers need specific education and training to improve both their personal financial literacy and their competence in financial literacy curriculum and pedagogy.

Otter (2010) also investigated teachers' attitudes and beliefs about teaching financial literacy and their own understandings of several core personal finance concepts. A large sample of California classroom teachers were surveyed about financial literacy policy, concept knowledge, instruction, and professional development. The participants strongly supported the teaching of financial literacy in K-12 schools. Contrasting Way and Holden's (2009) findings, close to 80 per cent of participants believed that financial literacy education should begin in elementary school (the equivalent of primary school in Australia). They also believed that the best way to teach financial literacy is through both stand-alone courses and embedding concepts in other courses (i.e., an interdisciplinary approach).

The above studies highlight the need for teacher professional learning designed to strengthen teachers' awareness what understandings about money students bring to school from home and their capacity to leverage these understandings to teach financial literacy teaching and learning. In the next section, I explore research into numeracy and mathematics education that may be relevant to financial literacy teaching and learning.

2.2 PART 2: RESEARCH INTO NUMERACY AND MATHEMATICS EDUCATION

Financial literacy, numeracy, and mathematics education are closely related. Many financial tasks involve some mathematics. Hence, those who are numerate are likely to be more financially literate. The term numeracy is generally used to describe the capacity to attend to and make sense of quantitative aspects of life (Goos, Dole, & Geiger, 2011). The Australian Association of Mathematics Teachers (1998, p.1) defines numeracy as involving:

...the disposition to use, in context, a combination of: underpinning mathematical concepts and skills from across the discipline (numerical, spatial, graphical, statistical and algebraic); mathematical thinking and strategies; general thinking skills; [and] grounded appreciation of context.

In Australia, financial literacy education has always been included in balanced mathematics programs (Manuel & Morony, 2011). The close relationship between financial literacy, numeracy, and mathematics education is represented in the *Australian Curriculum* in two ways. First, the *Australian Curriculum: Mathematics* includes "Money and financial mathematics" as a substrand of the "Number and Algebra" content strand. Second, numeracy is identified as one of seven *General Capabilities* that apply across all discipline content. This means that financial literacy is to be taught as part of the school mathematics curriculum, with practical applications of numeracy also featuring in other disciplines where financial literacy topics are identified (i.e., *Economics and Business* and *Civics and Citizenship*).

Because financial literacy education is essentially an emerging field of study, it is sensible that mathematics education research literature be used to guide and inform the current research project. There is a substantial body of literature into research-based approaches to mathematics teaching and learning. Much of this literature emphasizes the need for school mathematics to prepare numerate citizens who are well-equipped to participate fully in life beyond school. This is an important argument that aligns with the *Melbourne Declaration on Educational Goals for Young Australians* (MCEECDYA, 2008). Steen (2001) insists that for numeracy to be useful to students, it must be learned in multiple contexts and in all school subjects, not just mathematics. This implies the need for interdisciplinary teaching and learning. Jablonka (2003, p.78), argued:

Any attempt at defining “mathematical literacy” faces the problem that it cannot be conceptualised exclusively in terms of mathematical knowledge, because it is about an individual’s capacity to *use* and *apply* this knowledge. Thus it has to be conceived of in functional terms as applicable to the situations in which this knowledge is to be used.

Jablonka further argued that “it is questionable whether mathematical skills can be separated from the social dimension of action and from the purposes and goals of the activity in which they are embedded” (p.79). These arguments suggest the need for mathematics teaching and learning to be conceived in such a way that empowers and activates its use, and that this might be achieved through the use of mathematical problems involving authentic contexts drawn from “real life”. In his review of evidence-based strategies for teaching numeracy, Sullivan (2011) made three convincing arguments related to the above points:

- that numeracy has particular meanings in various contexts, and these meanings have implications for school mathematics curriculum and pedagogy;
- that there is a numeracy dimension in many social situations that can productively be addressed by mathematics teachers; and
- that numeracy perspectives can enrich the study of other curriculum subjects.

These arguments were viewed as a rationale to develop, trial, study, and refine mathematical problems involving financial contexts (financial dilemmas) drawn from “real life” scenarios 10-12 year old children might be familiar with.

2.2.1 RESEARCH INTO MATHEMATICAL PROBLEMS INVOLVING “REAL LIFE” CONTEXTS

A number of researchers have explored the use of mathematical problems involving authentic contexts drawn from “real life” in mathematics and the potential for these to teach students to apply mathematical reasoning. Gravemeijer (1997), for example, argued that problems in textbooks seldom ask students to undertake more than one operation, so “the name of the game becomes finding the proper operation and executing it” (p.390). He called for the types of problems used in mathematics, the pedagogies associated with them, and classroom cultures to be transformed to show students that realistic considerations are valued over “flawless but senseless calculations” (p.393). In their report on the national Middle Years Research and Development Project, Russell, Mackay, and Jane (2003) argued that many students are alienated from schooling and called for teachers to use more interesting, functionally relevant classroom tasks that might enhance engagement in learning. These arguments are consistent with the findings of research into mathematical modelling that propose realistic problems can motivate students to study mathematics by helping them see its relevance and importance

beyond school (see Zbiek & Conner, 2006; Stillman, Brown, & Galbraith, 2008; Galbraith, 2011; Galbraith, 2013).

So, teaching and learning that provides meaningful “real life” contexts in which mathematical concepts are situated seems to be critical. However, constructing mathematical problems involving authentic contexts drawn from “real life” is recognised as being challenging. Borasi (1986) examined structural characteristics of mathematical problems. She defined context as a situation in which a mathematical problem is embedded that provides problem solvers with information that may enable the solution of the problem. Borasi (1986) emphasised that students are the ultimate judge whether a problem is appealing enough to attempt to solve it, according to its perceived difficulty, interest, and importance. She argued that in making this judgement, students establish the amount of time and effort they are prepared to dedicate to the problem-solving process. In this respect, the choice of context can make or break a mathematical problem. Borasi (1986) argued that problem solving in school mathematics necessitates providing students with richer problems of various kinds. This requires teachers to learn how to assess the meaningfulness and educational implications of the problems they choose for classroom use.

Meyer, Dekker, and Querelle (2001) argued that context plays five interdependent roles in mathematics curricula, including: motivating students to explore new mathematics; offering students a chance to apply mathematics; serving as a source of new mathematics; suggesting a source of solution strategy; and providing an anchor for mathematical understanding (p.523). Meyer et al. (2001) outlined a number of characteristics of high quality contexts. These included that a context should: support the mathematics and not overwhelm it; be real or at least imaginable; be varied; relate to real problems to solve; be sensitive to cultural, gender and racial norms; and not exclude any group of students; and allow the making of models. However, they agreed with Borasi (1986) that a context that interests and motivates one student might hold no interest for another. This is a key challenge in creating and/or selecting mathematical problems for classroom use.

It has been argued that student social class is an important factor that impacts whether a given context is judged to be meaningful by students. In their comprehensive review of the national testing system in the UK, Cooper and Dunne (1998) argued that students’ ability to perform on realistic items on the National Curriculum assessment in mathematics varied by sociocultural background, with working class students being disadvantaged. They argued the disparity in achievement could be explained by the different material conditions of life experienced by students. Jorgensen and Sullivan (2010) wrote about remote Aboriginal contexts to highlight the

ways and means by which social heritage converts to academic success. They gave examples of items about money that were included on the 2008 Australian numeracy assessment to show how contextualised mathematical problems can be realistic for some students and unrealistic for others, thereby creating opportunities for scholastic mortality among already disadvantaged students. They argued that “the greater the synergy between the habitus of the student and school mathematics, the greater the probability of success” (p.25). Lubienski (2000) found that contextualising mathematical problems made the purpose of tasks less clear for students she classified as being from lower socioeconomic backgrounds. These researchers highlight the need for care to be taken to create and/or select contexts that are in fact meaningful to students’ backgrounds and characteristics.

Sullivan (2011) presented a range of quality sample problems suitable for upper primary students that involve both social and mathematical dimensions (p.20-21). The tasks share common features in that they are contextualised, open-ended, involve multiple solutions, and invite students to explain their reasoning. Tasks of this nature have been found to engage students in productive exploration of mathematics (Christiansen & Walther, 1986) and enhance student motivation (Middleton, 1995). These tasks provided a model for the development of the mathematical problems for my research project.

2.2.2 RESEARCH INTO EFFECTIVE PEDAGOGY IN MATHEMATICS EDUCATION

A number of theoretical frameworks and models have been developed with a view to enhancing mathematics education. Several of these provided important insights to the current research project by guiding and informing the development of the mathematical problems and associated pedagogies. For example, Cobb and McClain (1999) proposed a sociomathematical framework that delineates mathematical norms and sociocultural norms as distinct but complementary standards of activity in mathematics classrooms. Wood (2001) elaborated these dimensions, describing the mathematical as the interplay between children’s developing cognition and mathematical structure, while acknowledging that rich social interactions with others contribute substantially to children’s learning. She argued that teaching involves “not only having knowledge of the developing child and the content of mathematics but, more importantly, knowing the points at which the two converge and deviate” (p.111). Additionally, she suggested that if students are to learn mathematics with understanding, they need to be encouraged “to problem-solve, reason, and communicate their ideas and thinking to others” (p.116). These would be important pedagogical demands inherent in quality mathematical problems.

Goos, Dole, and Geiger (2011) developed a model for numeracy in the 21st century that emphasises *mathematical knowledge*, *dispositions*, and *tools* applied to a range of *contexts*,

and the importance of taking a *critical orientation*. They elaborated each of these elements to argue the need for students to: learn to make decisions; make and challenge arguments; apply their mathematical knowledge beyond school settings; develop problem-solving strategies; and use material, representational and digital tools to mediate thinking. A critical orientation is particularly important since being numerate involves not only knowing and using efficient mathematical methods, but evaluating the reasonableness of mathematical thinking to given situations in order to make informed decisions. This model was particularly useful as a reference point as the mathematical problems and associated pedagogies were being developed, trialled, studied and refined.

Sullivan's (2011) review of research-informed strategies for teaching mathematics was also useful. Sullivan (2011) drew on a range of national and international research reviews and recommendations to suggest six principles for effective teaching of mathematics, as follows:

1. **Articulating goals:** Identify key ideas that underpin the concepts you are seeking to teach, communicate to students that these are the goals of the teaching, and explain to them how you hope they will learn.
2. **Making connections:** Build on what students know, mathematically and experientially, including creating and connecting students with stories that both contextualise and establish a rationale for the learning.
3. **Fostering engagement:** Engage students by utilising a variety of rich and challenging tasks that allow students time and opportunities to make decisions, and which use a variety of forms of representation.
4. **Differentiating challenges:** Interact with students while they engage in the experiences, encourage students to interact with each other, including asking and answering questions, and specifically plan to support students who need it and challenge those who are ready.
5. **Structuring lessons:** Adopt pedagogies that foster communication and both individual and group responsibilities, use students' reports to the class as learning opportunities, with teacher summaries of key ideas.
6. **Promoting fluency and transfer:** Fluency is important, and it can be developed in two ways: by short everyday practices of mental processes; and by practice, reinforcement and prompting transfer of learnt skills.

(Sullivan, 2011, p.24-30)

These principles guided my thinking about how to assist teachers to plan lessons using the financial dilemmas and associated pedagogies. So too, did the early research findings of the Encouraging Persistence, Maintaining Challenge (EPMC) project, in which Stages 2 and 3 of

this doctoral study were situated. The EPMC project involved researching and identifying ways to support teachers in converting challenging mathematics tasks into successful classroom lessons (Sullivan, Askew, Cheeseman, Clarke, Mornane, Roche, & Walker, 2014a). The research team suggested that the traditional lesson structure of teacher explanations followed by student practice and correction of answers is inadequate, and instead asked their teacher participants to use Lappan, Fey, Fitzgerald, Friel, and Phillips' (2006) launch-explore-summarise lesson sequence. Specifically, Sullivan et al. (2014a) proposed that their teacher participants open the lesson by posing a challenging mathematics task; give students time to work on the problem individually and/or in small groups; then hold a plenary lesson review that includes both student discussion and teacher summary. There are two important distinguishing features of this approach. The first is the idea that students be allowed time for what Smith and Stein (2011) refer to as "Doing Mathematics" for themselves while being encouraged to persist. The second is the expectation that students articulate both their problem-solving strategies and mathematical reasoning (Sullivan & Davidson, 2014). The EPMC project established the validity and power of the lesson structure and associated pedagogies, showing that these are clear and able to be readily implemented by teachers (Sullivan, Clarke, Cheeseman, Mornane, Roche, Sawatzki, & Walker, 2014b) and that they foster student engagement (Sullivan & Mornane, 2013). Interestingly, the EPMC project also found that the majority of both primary and secondary students involved in the study preferred lessons that involved challenging mathematics tasks and the above-mentioned pedagogies (Sullivan, Clarke, Cheeseman, Mornane, Roche, Sawatzki, & Walker, 2014b).

2.2.3 RESEARCH IN CLASSROOM SETTINGS

Various researchers have conducted research in classroom settings. Such research has the benefit of capturing learning "live" and in the social context in which it takes place. Voigt (1994) undertook a microethnographical case study which highlighted that social dimensions are not peripheral conditions of learning mathematics, but rather are intrinsic to learning mathematics. Drawing on sociological perspectives, he argued that in order to make sense of an object or event mathematically, students tended to use background knowledge and form a sensible context for interpreting the object. He also found that any ambiguity associated with a particular object may be reduced by relating a context taken to be shared by the members of a class. This study further reinforces the importance of context to mathematics teaching and learning.

Yackel and Cobb (1996) used design-based research to explore ways to support teachers as they establish classroom environments that facilitate students' mathematical concept development and investigate children's mathematical learning in classroom settings. They distinguished between social and sociomathematical norms in classrooms with the former

referring to general social conventions and the latter including “normative understandings of what counts as mathematically different, mathematically sophisticated, mathematically efficient, and mathematically elegant in a classroom” (Yackel & Cobb, 1996, p.461). However, their description of social norms does not seem to take into consideration those originating outside the classroom setting – i.e., in families. Interestingly, Yackel and Cobb (1996) found that when asked to explain their thinking, students initially gave explanations with social rather than mathematical bases. However, they noted that participation in inquiry mathematics facilitated progression in students’ explanations to the extent that some became able to take explanations as valuable objects of reflection. This study highlights the complexity of inquiry mathematics and the significance of social and sociomathematical norms to student problem-solving.

Based on their extensive research in mathematics classrooms, Cobb, Stephan, McClain, and Gravemeijer (2011) provide an interpretive framework for analysing collective and individual mathematical activity and learning in terms of social and psychological perspectives. However, the focus of this framework is the classroom, its members, and mathematics, and not students’ social backgrounds and experiences outside the classroom and how these may impact their thinking and learning. And yet there is substantial sociological and psychological research literature to suggest that these factors are critical.

2.3 MOVING FORWARD WITH THE RESEARCH

This literature review has demonstrated that a range of organisations and academics from diverse fields are involved in researching financial literacy and financial literacy education. Financial institutions, in particular, have invested significant resources in measuring financial literacy levels and developing financial literacy education programs: it is reasonable to assume that these resources will continue to be made available on the basis that the programs are making a difference as intended. Hence, research into financial literacy learning has tended to focus on immediate and follow-up program evaluation measures designed to capture program impact. The use of financial literacy assessments and self-report scales that are imperfect indicators of financial literacy have been prevalent. These procedures exist as measures of accountability more than financial literacy, but serve to provide governments and other stakeholders with simplified information about a complex phenomenon. Meanwhile, mathematics education research offers insights that might be productively applied to enhancing financial literacy education. So, it seems there is much to be gained from a mixed-methods educational research project incorporating:

- the voices of parent, teacher, and student participants;

- open-ended mathematical problems involving financial contexts (financial dilemmas) drawn from “real life” situations 10-12 year old children might be familiar with;
- the use of researched pedagogies and practices recommended to enhance mathematics education; and
- research in classroom settings.

The above features were distinctive and essential to the current research project. In the next Chapter, I provide a synopsis of the research approach, including the theoretical framework, methodology, and methods that guided this work.

CHAPTER 3: A SYNOPSIS OF THE RESEARCH APPROACH

This chapter gives a synopsis of the research approach. First, the research aims and questions are identified. Next, the relevance of constructivist and sociocultural perspectives to mathematics education is discussed. The theoretical underpinnings to the research; namely an elaboration of the theory of planned behaviour (Ajzen, 1991) are then described. The fourth section explains why a design-based research (DBR) methodology was selected and how it was applied to the research and writing of this thesis. The next section outlines the research aims, questions, contexts, participants, and data sources involved in the research stage-by-stage, and highlights the iterative, mixed-methods nature of the project. The chapter concludes by explaining each of the steps taken to enhance the validity and reliability of the research findings.

3.1 RESEARCH AIMS AND QUESTIONS

Research aims outline what a research project sets out to achieve. Research questions, on the other hand, illustrate the process of inquiry that frame a research project. This research project explores the following research aims and questions, which are presented as they align with each other:

AIMS:	QUESTIONS:
a. To explore parents', teachers' and students' views about financial literacy teaching and learning.	1. What do parents say is important to teach to 10-12 year olds as part of financial literacy education at school? What explanations do they give? 2. What do teachers say is important to teach to 10-12 year olds as part of financial literacy education at school? What explanations do they give?
b. To explore the understandings about money 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.	3. What understandings about money do 10-12 year olds bring to school from home? Have parents done anything deliberate / specific to cultivate these understandings? If so, what?

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- | | |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c. To develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and learning. | 4. Can an educational intervention involving “real life” financial dilemmas and associated pedagogies enhance financial literacy teaching and learning? If so, in what ways? |
| d. To formulate recommendations to improve financial literacy teaching and learning in schools. | 5. What can be done to improve financial literacy teaching and learning in schools? |
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The decision to focus this research project on 10-12 year olds was based on the findings of a number of studies discussed in the literature review which suggested the need and potential to explore the emergence of financial literacy during childhood and adolescence (real-time, as opposed to retrospectively). For example, Moschis (1987) argued that even by the time a child enters school, the foundations of his/her values and attitudes about money are already well-established thanks to socialisation processes and Danes (1994) found that parents believed that 9-13 years of age is an appropriate time to involve children in family finances.

3.2 RATIONALE FOR DRAWING ON CONSTRUCTIVIST AND SOCIOCULTURAL PERSPECTIVES

In the previous chapter, a number of studies highlighting the significance of parents as agents of consumer, economic, and financial socialisation in childhood and adolescence were reviewed. These studies point to constructivist and sociocultural perspectives on learning as being relevant to financial literacy teaching and learning at school.

As mentioned in Chapter 1, there is considerable theoretical debate concerning the role of constructivist and sociocultural perspectives in education in general, and in mathematics education in particular. Constructivists claim that “knowing” is an active process that is both “individual and personal, and that is based on previously constructed knowledge” (Ernest, 1994, p.2). Socioculturalists typically link learning activity to participation in culturally organised practices (Cobb, 1994b). Vygotsky (1978), for example, saw development as the unfolding of cognitive understandings of social beings within contexts and theorised that social, cultural and historical factors all play a part in children’s development (Wells, 1999). Individuals are therefore part of, and the product of, the collective culture to which they belong (Daniels, 2001). Drawing on Vygotsky’s sociocultural theory, Vasquez (2006, p.36) argued that:

What an individual comes to know and believe is largely based on the social and cultural processes in which he or she is raised. As learners interact with others in their social

environment, they not only acquire new forms of knowledge and skills but also acquire the ideas, language, values and dispositions of the social group, making their experience a “cultural learning experience”. It is through the process of acquiring these cultural resources that learners achieve membership in the social group.

While constructivist and sociocultural perspectives are sometimes proposed as distinct and oppositional, Cobb (1994b, p.13) argued that they are complementary:

The sociocultural perspective informs theories of the conditions for the possibility of learning, whereas theories developed from the constructivist perspective focus on what students learn and the processes by which they do so.

This suggests that students develop by making sense of teaching episodes at home and in the classroom against the backdrop of their own previous observations and experiences. Bruner (1990, 1996) describes this process as adaptive to the extent that children come to develop a system of shared meanings that enable them to participate as members of their culture, including what behaviours are expected. In this way, each of the two perspectives “tells half of a good story, and each can be used to complement the other” (Cobb, 1994b, p.17).

So it would seem that in order to be effective, mathematics education should situate learning within meaningful social and cultural contexts while taking into consideration differences in individual thinking that might exist as a result of differences in the communities to which students belong and participate. Both constructivist and sociocultural perspectives can be thought of as useful frameworks within which to develop instructional materials and address pedagogical issues (Cobb, 1994a).

This is particularly true and challenging in relation to teaching students about money since, as the literature review showed, students’ existing understandings about money are powerfully tied to their family backgrounds and everyday financial realities. Pinto (2012) drew on the work of Gee (1990) to argue that:

an examination of any form of literacy – including financial literacy – requires consideration of how it operates within social contexts and how the social contexts influence (and are influenced by) individuals’ understandings. Without attention to such issues, financial literacy education is reduced to replicating inequities and contributes to the continued marginalization of already vulnerable populations...

(Pinto, 2012, p.113).

The current research project is based on the premise that constructivist and sociocultural perspectives on learning are both relevant to financial literacy teaching and learning at school, and might be drawn upon in complementary ways to develop mathematical problems involving financial contexts (financial dilemmas) drawn from “real life”.

3.3 THEORETICAL FRAMEWORK: AN ELABORATION OF THE THEORY OF PLANNED BEHAVIOUR

The theory of planned behaviour (Ajzen, 1991) is foundational to this study. The theory of planned behaviour argues that attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) have a direct effect on intentions and an indirect effect on behaviour through intentions. The relationship between these factors is depicted in Figure 3.1. Ajzen (2005) defines **attitudes** as latent, evaluative responses to a target object (for example, money) that manifest themselves in observable responses (for example, financial problem-solving and decision-making). According to DeBellis and Goldin (2006), attitudes are affective and describe orientations or predispositions toward certain sets of emotional feelings in particular contexts. Ajzen (2005) defines **subjective norms** as the perceived social pressure (i.e., from socialising agents like parents and teachers) to perform or not to perform a behaviour. The resources and opportunities available to a person also dictate the likelihood of behavioural achievement. However, **perceived behavioural control** or self-efficacy plays an important role in behaviour. According to Ajzen (2005), **intentions** capture the motivational factors that influence behaviour. As a general rule, the stronger the intention to engage in a given behaviour (for example, informed financial problem-solving and decision-making), the more likely the behaviour will be performed.

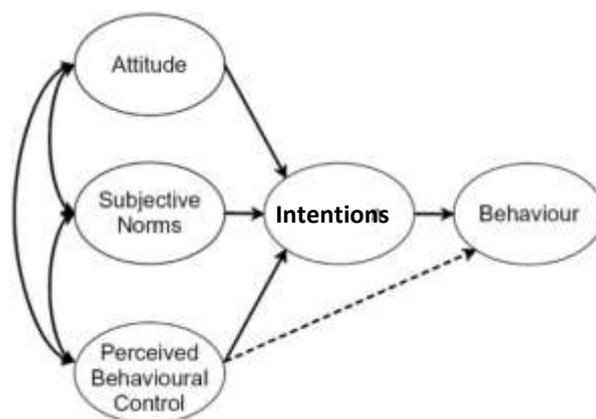


Figure 3.1. Theory of planned behaviour.

Given its established relevance to financial literacy (see Shim et al., (2009) and Shim et al., (2010)), I was interested to explore whether this conceptual model might provide a useful

framework to guide and inform financial literacy teaching and learning. It seemed reasonable that since the more complex financial problems and decisions in life tend to involve researching and evaluating multiple options, teaching and learning that involves critical exploration of the factors that have been found to influence financial problem-solving and decision-making might be productive.

However, values have also been found to be important to the formation and development of attitudinal and behavioural tendencies (Homer & Kahle, 1988). Halstead and Taylor (2000) define **values** as "... the principles and fundamental convictions which act as general guides to behaviour, the standards by which particular actions are judged as good or desirable" (p.169). DeBellis and Goldin (2006) conceptualise values as affective, and define them as deep "personal truths" or commitments cherished by individuals that help motivate priorities and choices. Several consumer behaviour researchers have demonstrated that personal values are the most fundamental of the factors that influence attitudes, which in turn influence behaviours (Shim & Eastlick, 1998; Shim et al., 2009). So, it was important that the current research project also explore the role values might play in Year 5 and 6 students' financial problem-solving and decision-making.

The distinction between the factors that influence behaviour is best understood by way of an example related to financial problem-solving and decision-making. Students from different socioeconomic backgrounds might have different values and attitudes towards money. Their attitudes will reflect the emotional experience of living with or without resources, and also complex sociocultural and psychological factors (such as parental expectations, parental modelling, access to resources, and confidence about the future), all of which impact motivation and financial behaviour. These students' financial values are likely to be quite rational. A child might be thrifty rather than carefree in spending money if he/she feels anxious about his/her financial present and future. The value is that money is not to be wasted, which can manifest in conservative but not necessarily informed, financial problem-solving and decision-making.

Understanding the above factors and the role each can play in influencing financial behaviour led me to elaborate upon the theory of planned behaviour for the current research project. Figure 3.2 shows how I depict the relationship between values and attitudes and distinguish between the affective and motivational domains that influence financial problem-solving and decision-making. Values, attitudes, subjective norms (expectations), perceived behavioural control (self-efficacy), and intentions are conceptualised as understandings that are socially constructed and situated that might impact behaviour – in the case of the current research

project, cognitive engagement with a task requiring application of social and mathematical understandings for the purpose of financial problem-solving and decision-making.

This elaboration of the theory of planned behaviour provides a framework for understanding why financial literacy education at school is complex and challenging. Students from disadvantaged backgrounds may be less confident about their financial present and future than their more advantaged peers, so may lack motivation to engage with what might be described as “middle class sensibilities” around money and how it might be earned, spent, saved, and shared. Teaching about investing may seem irrelevant to students whose families struggle to make ends meet, let alone consider saving or investing. More broadly, teaching about superannuation is similarly fraught given retirement planning is generally not a priority for adolescents with more immediate financial interests. In these simple examples, financial literacy teaching and learning at school is not closely aligned with students’ observations and experiences with money at home. The subsequent chapters of this thesis include fascinating accounts of data collected from students, parents, and teachers. The data collected have been analysed in relation to the elaboration of the theory of planned behaviour. The findings support that values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) manifest in students’ financial problem-solving and decision-making during financial literacy teaching and learning. Given these factors are inherently sociocultural and psychological, as well as interrelated, they are referred to as social understandings for the purpose of this thesis.

Understandings that are socially constructed and situated

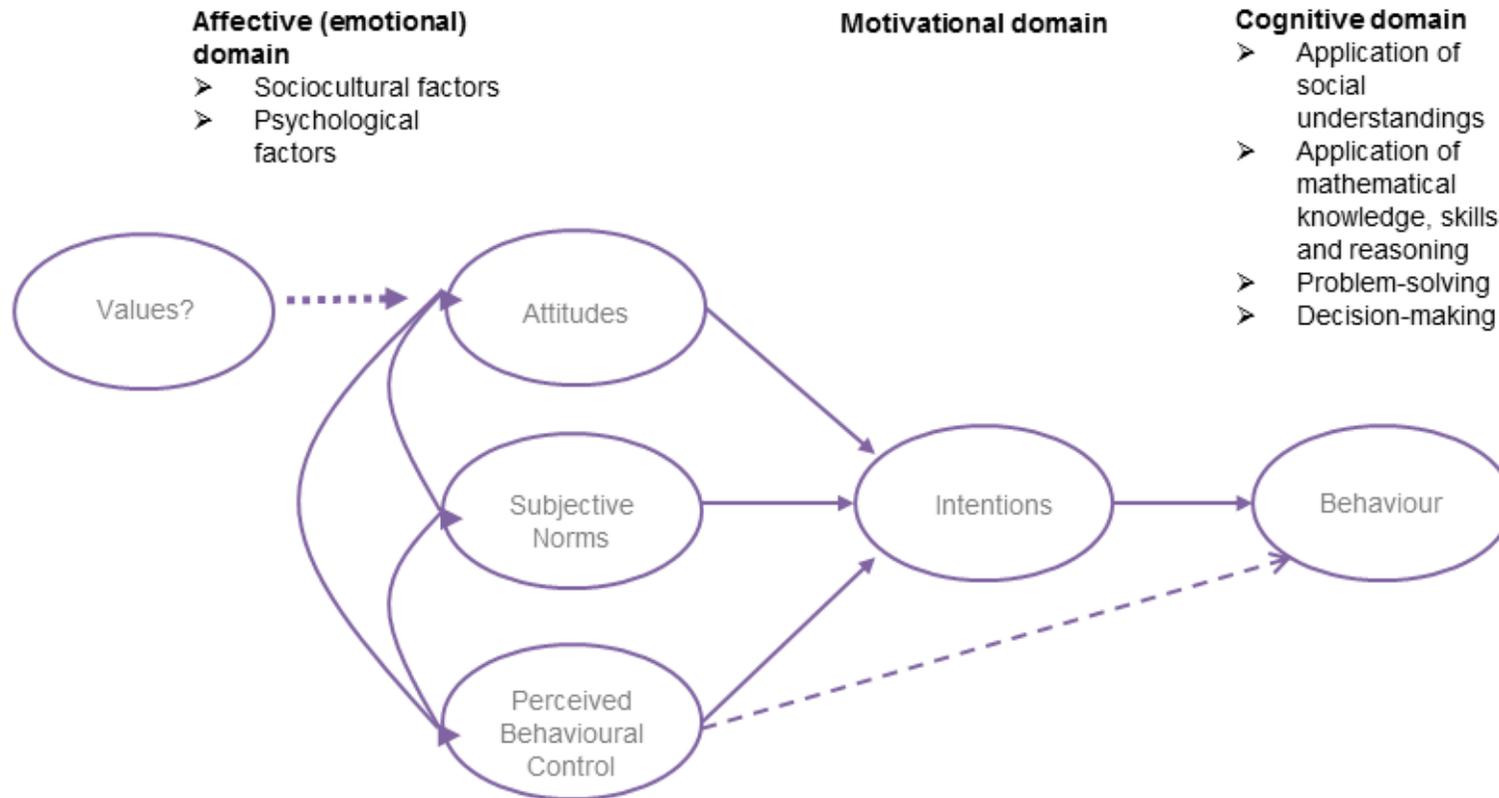


Figure 3.2. An elaboration of the theory of planned behaviour.

The research aims, questions, methodology and methods stem from this initial interest in exploring factors found to influence behaviour, with a focus on financial literacy teaching and learning.

3.4 METHODOLOGY AND METHODS

This section describes design-based research (DBR) as the methodology chosen for this study as well as the mixed-methods approach to data collection and analysis. DBR has become recognised as a valuable methodological approach to study, transform and evaluate the practice of mathematics teaching and learning. In education, DBR generally comprises a series of experiments involving sequences of instructional design and classroom-based research (Cobb, Stephan, McClain, & Gravemeijer, 2011). It is a practical research methodology that seeks to increase the impact, transfer, and translation of education research into improved teacher practice (Anderson & Shattuck, 2012). Anderson and Shattuck (2012) draw on a range of definitions of DBR to explain it as:

- being situated in a real educational context;
- focusing on the design and testing of a significant intervention;
- using mixed-methods;
- involving multiple iterations;
- involving a collaborative partnership between researchers and practitioners; and
- promoting design principles that have an impact on practice.

DBR entails the collaborative development and conduct of a series of small-scale, bounded experiments (Kelly & Lesh, 2000; Barab & Squire, 2004). Design-based experiments have established themselves as productive approaches to examining intervention effects in classrooms, allowing responsive management of complex, interacting sets of variables, and providing rigorous small-scale prototyping of intervention elements prior to the work-up of larger, scalable studies.

This thesis tells the story of a process of DBR that facilitated the development, implementation, and evaluation of an educational intervention that was initially based on three assumptions:

1. that the elaboration of the theory of planned behaviour might provide a useful framework to better understand financial literacy teaching and learning at home and at school;
2. that “real life” financial dilemmas inviting students to engage in both social and mathematical thinking might help to explore critically the roles values, attitudes,

- subjective norms (expectations), and perceived behavioural control (self-efficacy) play in upper primary students' financial problem-solving and decision-making;
3. that financial literacy teaching and learning might be enhanced by an educational intervention based on research-informed approaches related to the above.

Bannan-Ritland (2003) outlined four components and sub-components of design-based experiments which might be understood as stages of research. While it is acknowledged that the structure is unusual, this thesis has been written to align with these four stages. This means that each of Chapters 4-7 begins by describing the research aims, questions, context and data sources pertinent to the stage of the study being reported, before proceeding to report the relevant research findings. In this way, Chapters 4-7 might be considered as "stand-alone" papers. As per Bannan-Ritland's (2003) framework, the concluding chapter, Chapter 8, includes an evaluation of the potential broader impact of the research project. Hence, the format of the subsequent chapters of this thesis is as follows:

- | | |
|----------------------------------------------------------|------------------|
| 1. Stage 1: Informed exploration, development and design | Chapters 4 and 5 |
| 2. Stage 2: Enactment, intervention | Chapter 6 |
| 3. Stage 3: Evaluation of impact | Chapter 7 |
| 4. Stage 4: Evaluation of broader impact | Chapter 8 |

This study is characterised by a mixed-methods approach. The data were predominantly qualitative, meeting the following ten critical elements of qualitative research described by Lichtman (2006):

- the main purpose is to describe, understand and interpret human experience;
- the research is dynamic;
- there is no single way of researching;
- an inductive approach is taken;
- an holistic approach is taken;
- a variety of data in natural settings is considered;
- the researcher plays a pivotal role in collecting, analysing, and interpreting data;
- the study is in-depth;
- the study focuses on thick description in order to see underlying meanings; and
- the study is not linear.

However, quantitative data were also collected and analysed.

The process of becoming familiar with the data was facilitated by the fact that, for the most part, I was involved first-hand in its collection. The basic approach to data analysis was to use logico-inductive analysis to identify major themes related to the elaboration of the theory of planned behaviour. Sub-categories within those themes were also able to be identified. For example, values emerged clearly from the transcripts of data reported in Chapters 4, 5, & 6 and so “values” became a first-level category. However, the types of values evident in the data varied. The importance of working to earn an income, living within one’s means, and saving for the future were regularly reported and seemed to be shared values. These then became second-level sub-categories. Essentially, the approach was similar to what qualitative data analysis software programs do, but the analysis was completed by "hand". By checking, re-checking, and synthesising the data, minor adjustments were made to the sub-categories. The result was that data became clearly aligned with the elaboration of the theory of planned behaviour. The data and findings reported in Chapter 7 were analysed using a similar approach – except the elaboration of the theory of planned behaviour was not relied upon.

Table 3.1 matches the research aims, questions, contexts, participants, and data sources involved in this research. Using a variety of data collection methods and instruments helps to overcome weaknesses in individual methods and instruments and strengthen findings overall. Owing to the unconventional structure of this thesis, these are described in detail in the first section of each of Chapters 4-7.

Table 3.1. An outline of the research aims, questions, participants, and data sources.

Research aims	Research questions	Research contexts	Participants	Data source	Findings
Stage 1: Informed exploration, development, and design (2012)					
a. To explore parents', teachers', and students views about financial literacy teaching and learning.	1. What do parents say is important to teach to 10-12 year olds as part of financial literacy education at school? What explanations do they give?	School A	One Acting Principal and two Year 5/6 teachers.	Face-to-face interviews.	Chapter 4
			Eight parents of Year 6 students.	Phone interviews.	
b. To explore the understandings about money 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.	2. What do teachers say is important to teach to 10-12 year olds as part of financial literacy education at school? What explanations do they give?		Eight Year 6 students.	Face-to-face interviews.	Chapter 5
				Copies of mathematical workings recorded by Year 6 students during their face-to-face interview.	
			3. What understandings about money do 10-12 year olds bring to school from home? Have parents done anything deliberate / specific to cultivate these understandings? If so, what?		
Stage 2: Enactment, intervention (2013)					
c. To develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and	4. Can an educational intervention involving "real life" financial dilemmas and associated pedagogies enhance	School B	Researcher (as teacher) 26 Year 5/6 students	Audio and video recordings of instructional and summary phases of the mathematics lessons.	Chapter 6
		School C	1 x colleague (as teacher) 26 Year 5/6 students	Hand-written	

learning.	financial teaching and learning? If so, in what ways?	literacy and so, in what ways?	School D	1 x Maths Leader (as teacher) 23 Year 5 students	observational and reflective notes I made during and immediately after the mathematics lessons. Copies of students' worksheets completed during each of the mathematics lessons.	
			School L	2 x Year 6 teachers 55 Year 6 students		
Stage 3: Evaluation: Local Impact (2013)						
			16 primary schools	35 teachers	Paper surveys completed by teachers before and after the educational intervention (pre-and post-test versions).	Chapter 7
				857 students	Online surveys completed by students before and after the educational intervention (pre-and post-test versions).	
Stage 4: Evaluation: Broader Impact (2014)						
e. To formulate recommendations to improve financial literacy teaching and learning in schools.	5. What can be done to improve financial literacy teaching and learning in schools?				Holistic analysis of all data sources.	Chapter 8

3.5 STEPS TAKEN TO ENSURE VALIDITY AND RELIABILITY

The terms validity and reliability stem from scientific approaches to research. Guba and Lincoln (1994) advocated the use of different terms for qualitative research, namely trustworthiness, authenticity, dependability, and confirmability. Regardless of the terms used, the central tenet is that there are certain principles that must weave their way through qualitative research if it is to be viewed as honest and believable (Ely, 1991). Given my close involvement in collecting, analysing, and interpreting data, it was necessary to take steps to minimise any impact that I might have on the research. Patton (1980) recommends six specific strategies to strengthen validity which are equally useful to aiding reliability: triangulation; member checks; long-term observation; peer examination; participatory modes of research; and researcher's biases. They are described in relation to this study as follows:

1. **Triangulation.** Triangulation compares one source of information against another to check quality, to develop a more complete understanding, and to put the whole data set into perspective (Fetterman, 1989). This study involved triangulating data sources. Data sources pertaining to the same or similar questions were compared, contrasted, and checked within each stage of the study as well as across stages of the study to ensure coherent analysis. A process similar to grounded theory (Glaser & Strauss, 1967) was drawn upon to code data, initially in relation to the elaboration of the theory of planned behaviour (Ajzen, 1991), but also in relation to more general categories or themes as they emerged.
2. **Member checks.** Where possible, participants were asked to read what was written about the stage of the study they were involved in to find out whether the depiction of the data was accurate. For example, Jane and Bette (pseudonyms) provided feedback on drafts of Chapter 6 of this thesis.
3. **Long-term observation.** This involves gathering data over an extended period of time and observing the same, similar, or related phenomena to increase the validity of the research. The use of DBR was advantageous. As outlined in Table 3.1, an extensive range of data was collected and analysed over a 12-month period. This helped to contribute to the aggregate strength of the findings.
4. **Peer examination.** Peer examination was actively sought and deeply appreciated. The data analysis and findings were checked with a professorial supervisor in mathematics education who challenged the research by posing rigorous questions. A second supervisor in the field of social education provided a different lens to verify the accuracy and interpretation of the data collected. Academic and teaching colleagues in the field of primary mathematics education were also consulted in the process of researching and writing this thesis. One provided rigorous, circumspect

conversation about the elaboration of the theory of planned behaviour (Ajzen, 1991), the study of values as part of this model, and the application of the theoretical framework to this study. Others, particularly those on the Encouraging Persistence, Maintaining Challenge (EPMC) project team, provided feedback and advice on the development of the financial dilemmas and insightful commentary about the findings associated with their use in Year 5 and 6 classrooms. Each person who lent their expertise to this research strengthened it in some way.

5. **Participatory modes of research.** An important goal of data collection and analysis was to give a voice to parents', teachers' and students' financial literacy teaching and learning in average Australian homes and primary schools. This was achieved by inviting participation, and reconstructing participants' contributions in ways that were respectful of the theoretical framework and their stories.
6. **Researcher's biases.** My role in the research project and any potential biases were described in Chapter 1. This thesis has been written to ensure that the account of the study is as clear and transparent as possible so that the reader can verify for themselves the reasonableness of the interpretations and inferences made.

Each of the above strategies served necessary and complementary roles in strengthening the validity and reliability of this research.

3.6 MOVING FORWARD WITH THE RESEARCH

The next four chapters contain the findings of this research. Due to the unusual structure of this thesis, each of these chapters begins with a detailed description of the research aims, questions, contexts and data sources pertinent to the stage of research being reported, and concludes by addressing the implications of the findings for the subsequent stage of research and financial literacy teaching and learning at school.

STAGE 1 OF THE RESEARCH: INFORMED EXPLORATION, DEVELOPMENT, AND DESIGN

CHAPTER 4: STORIES OF WITHIN-FAMILY FINANCIAL LITERACY TEACHING AND LEARNING

Stage 1 of this research project involved informed exploration of within-family financial literacy teaching and learning that might provide useful insights towards the development and design of an educational intervention. This chapter begins by describing the research aims, questions, context, and data sources for the first stage of this study. Next, the findings of interviews with the Acting Principal, two Year 5/6 teachers and eight parents from School A are discussed. Eight case studies of within-family financial literacy teaching and learning are then presented to highlight the similarities and differences in the understandings about money 10-12 year olds bring to school from home. The chapter closes by the linking the findings presented to the research aims and questions and identifying the implications for financial literacy teaching at school.

4.1 THE RESEARCH AIMS, QUESTIONS, CONTEXT AND DATA SOURCES

This chapter explores the following research aims and questions:

AIMS:	QUESTIONS:
a. To explore parents', teachers' and students' views about financial literacy teaching and learning.	1. What do parents say is important to teach 10-12 year olds as part of financial literacy education at school? What explanations do they give?
	2. What do teachers say is important to teach 10-12 year olds as part of financial literacy education at school? What explanations do they give?
b. To explore the understandings about money 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.	3. What understandings about money do 10-12 year olds bring to school from home? Have parents done anything deliberate / specific to cultivate these understandings? If so,

As financial literacy is socially constructed and situated, what financial literacy education looks like varies from context to context. Even within a local area, prior understandings each child brings to their formal financial literacy education at school may vary considerably. For this reason, specific criteria were not used to guide the selection of a case study school for this initial stage of data collection. Rather, a government school was sought where the Principal and teachers were committed to engaging with me, in order to explore and improve financial literacy teaching and learning. Principals of schools who have participated in Monash University research projects in the past were approached via email and provided with a copy of the relevant Explanatory Statements (Principals, Appendix A; Teachers, Appendix B).

4.1.1 THE RECRUITMENT OF PARTICIPANTS

The Acting Principal and two Year 5/6 composite class teachers at School A were interested to meet to find out more about my research, and what being involved in the project would entail. By the end of this one-hour meeting, they were keen to participate, and we had reached mutual agreement to limit the first stage of data collection in 2012 to the soon-to-be graduating Year 6 students and their parents.

The Index of Community Socio-Educational Advantage (ICSEA), created by the Australian Curriculum, Assessment and Reporting Authority (ACARA), was used to understand the socioeconomic profile of School A. An ICSEA value brings together family background information (including parental education and occupation) provided to schools directly by families and/or sourced from the Australian Bureau of Statistics (ABS) Census data for the districts where students live. School A is best described as a small government school that services a diverse middle class school population (see Table 4.1).

Table 4.1. *myschool Index of Socio-Educational Advantage (ICSEA) profile of School A (2012)*

	Enrolments	ICSEA Value	Bottom quarter	Middle quarters	Top quarter
School A (Government)	171	994	14%	40%	12%
Australian distribution	-	1000	25%	25%	25%

The career profiles of the Acting Principal and two Year 5/6 teacher participants are presented in Table 4.2.

Table 4.2. *Basic profile of the educators that participated in the first stage of this study*

Educator	Years teaching experience	Preferred year level to teach
Acting Principal	More than 35 years	Years 5/6
Teacher A	More than 20 years	Years 5/6
Teacher B	Graduate teacher	-

Convenience or opportunity sampling was used to recruit families (one Year 6 student and one of their parents) to participate. Of twenty-eight Year 6 students across the two Year 5/6 composite classes, the teacher participants identified twelve they assessed as performing at or above VELS Level 4 in Mathematics, and therefore capable of attempting the mathematical problem-solving involved in the financial dilemmas. The teacher participants arranged for a copy of the Explanatory Statement and Consent Form for Parents and Students to be sent to these families (Appendix C). Eight families (four from each class) returned the Consent Form agreeing that one Year 6 student and one parent could be interviewed, and that the interviews could be audio-recorded. Two parents returned the Consent Form indicating that while they did not want to be interviewed, they were willing for their Year 6 student to be. Due to the need to match student and parent interview data, these families were excluded from the study. Two families did not return their Consent Forms.

Because parent educational attainment and employment status are among a number of demographic factors found to affect parents' ability to provide their children with financial literacy education at home (Lewis & Scott, 2003; Hibbert, Beutler, & Martin, 2004; Webley & Nyhus, 2006; Mandell & Klein, 2007; Shim et al., 2010; OECD, 2013), within this thesis, I have presented family, parent, and student data by socioeconomic status. To do this, I assigned a weighting to each parent's occupation based on the Department of Education and Early Childhood Development's (DEECD) Student Family Occupation (SFO) categories and weightings, which are used in the calculation of student based funding to Victorian government schools (see Appendix D for an explanation how this measure is calculated). The possible weightings range from 0-2 – the higher the number, the greater the socioeconomic disadvantage. While this indicator of socioeconomic status is imperfect, it was considered adequate, and certainly preferable to asking participants to disclose their household income, something that might be considered intrusive. A basic profile of each family involved in the first stage of this study is presented in Table 4.3.

Table 4.3. *Basic profile of the families that participated in the first stage of this study*

Student name	Parent interviewed	Number of children	Number of children living at home	Family Occupation Weighting
Samantha	Mother	4	4	0.5
Lara	Father	4	1	0.5
Isabel	Mother	2	2	1
Calvin	Mother*	4	4	1
Tayla	Mother	4	4	1.25
Bruno	Mother	3	3	1.25
Justin	Mother*	2	1	1.5
Elizabeth	Mother*	2	2	1.5

*denotes single-parent household

The sample included four married parent double-income households; one married parent single income household; and three single-parent single-income households. Despite these differences in family and socioeconomic background, it is important to acknowledge that convenience or opportunity sampling (parent participant self-selection), may have influenced the findings presented in this chapter. Implicit in the parents' decision to participate in this research project is the importance they place on financial literacy teaching and learning. Therefore, the nature of financial literacy teaching and learning in the home, and the associated values, attitudes, and expectations, may be over-represented. Nevertheless, as this chapter shows, there are at least some parents who take their role in their children's financial literacy learning seriously.

4.1.2 METHODS OF DATA COLLECTION

Individual face-to-face interviews were conducted with the Acting Principal and two Year 5/6 teachers at the school one afternoon. These interviews took between 25 and 35 minutes, and were audio-recorded.

The Principal interview protocol (Appendix E) was designed in three sections:

- a. questions aimed at exploring the Principal's own financial literacy education;
- b. questions aimed at exploring what financial values, attitudes, knowledge and skills the Principal says are important to teach to 10-12 year olds; and
- c. questions aimed at exploring financial behaviour in the school community.

The teacher interview protocol (Appendix F) was also designed in three sections:

- a. questions aimed at finding out about the teachers' own financial literacy education;

- b. questions aimed at finding out what the teachers know and understand about the financial values, attitudes, knowledge and skills their students bring to school from home; and
- c. questions aimed at finding out about current financial literacy teaching practices in their Year 5/6 classrooms.

The parent interview protocol (Appendix G) was intended to involve the parent participants in an open conversation about money and family life. The questions focused on the parent participants' own financial literacy learning in childhood and adolescence, what they want their children to know and understand about earning, spending, saving, and sharing money, and what they are doing or saying to teach them these things. Questions 14-17 included values-neutral propositions about work, credit (debt) and keeping track of money. These questions were designed to reveal insights into the parents' financial attitudes, values and behaviour, without directly asking them to talk about these things.

The parent participants were interviewed by phone, with each interview taking around 35 minutes, and being audio-recorded. Each parent was interviewed within 48 hours prior to their child being interviewed. The presentation of the "Three Jars" dilemma to parent participants, asking them to predict what their child might do, made it important to limit the time and opportunity for conversation about this scenario between parents and their children being interviewed. Parents were explicitly asked not to discuss this dilemma with their child until after their child's interview.

4.1.3 DATA ANALYSIS TECHNIQUES

All of the audio recordings of the interviews were professionally transcribed. Data were analysed in relation to the elaboration of the theory of planned behaviour presented in Chapter 3. Within-family data sources were matched, analysed, and categorised with a view to understanding students' family background, the nature of the social understandings about money students bring to school from home, and how these might influence the problem-solving pathways students took when making financial decisions. Matching within-family data sources also enabled similarities and differences in attitudes and values to earning, spending, saving, and sharing money within and between families to be identified.

The next section of this chapter presents the stories of financial literacy teaching and learning told during the interviews with the adult participants, beginning with what they described as being important in relation to teaching primary-aged children about money. The

similarities, differences, and relationships between the participants' accounts, and what the stories suggest about financial literacy teaching and learning are discussed.

4.2 TEACHERS AND PARENTS TALK ABOUT WITHIN-FAMILY FINANCIAL LITERACY TEACHING AND LEARNING

Because home is the hidden partner in the education of our young, we tend to forget how much of who we are, how we act, and what we know was learned is there when we were very young.

Jane Roland Martin (1992, p.18)

The literature review highlighted parents as significant agents of economic, consumer, and financial socialisation during childhood and adolescence (see Danes, 1994; Lewis & Scott, 2003; Webley & Nyhus, 2006; Shim et al., 2009; Shim et al., 2010). For this reason, I explored the extent to which financial literacy teaching and learning might be intergenerational, and what values, attitudes, knowledge, and skills regarding money were being transferred from parents to their children. To begin, I asked the teachers and parents about their financial upbringing - what they viewed as the most important thing they learned about money from their parents during childhood and adolescence, be it through what was explicitly told to them, what they observed, and everyday family experiences in their home and local community.

What the teachers and parents tended to identify and describe were values – “principles and fundamental convictions which act as general guides to behaviour...” (Halstead & Taylor, 2000, p.169). This finding aligns with the elaboration of the theory of planned behaviour and substantiates the inclusion of values in the theoretical framework. With the exception of Lara's father, who is discussed shortly, the adult participants seemed to acknowledge that within their family history, there were particular values that were shared from one generation to the next. The following values were consistently referred to:

1. the importance of working to earn an income;
2. the importance of living within one's means; and
3. the importance of saving for the future, whether it bring a rainy day, or a particular need or want.

For example, Bruno's mother explained that she wanted her children to learn the value of money and understand the importance of "...working for the money and then saving what

you've got to then buy something that you preferably need rather than something that you want." She expressed the family's commitment to saving, saying, "We're savers, and we save up for what we want."

Samantha's mother also described herself as a dedicated saver, and reported giving her children pocket money deposited directly to their bank accounts as a way of teaching them the importance of saving. She said, "I always had a savings account when I was little, so had to put money away and save. [I] was saving for my first car from when I was about eight [years old]." She reported wanting the school curriculum to teach children to spend and save money "wisely," saying she would like her children to learn to be "careful" and "not [go] into too much debt". With reference to the elaboration of the theory of planned behaviour, these accounts imply a values position - that money is a limited resource which should be treated conservatively.

Teacher A described her parents teaching her the importance of saving, and how that message has stayed with her, saying:

They always taught me to save my money; that I should always have a little bit in the bank in case something went wrong... I guess it's an important value that has been passed on and it's worked.

While the above reports were somewhat explicit, this comment by Samantha's mother reveals that within-family teaching and learning about earning, spending, saving and sharing money can be so deeply embedded in everyday life, one cannot be sure exactly how it occurs:

I don't really remember [my parents] ever teaching me or really saying anything, it was just a part of everyday life... We never splurged on anything, it was always we watched our pennies, I can remember that.

Related to this, when describing some of the conversations she has had with her daughters about shopping around and making purchase decisions, Isabel's mother said, "I don't know if you'd call that educating them." And when talking about her own childhood and adolescence, Teacher A was not really sure whether her response was specifically related to financial literacy teaching and learning, and so almost devalued her stories, prefacing them by saying, "I don't know if it's relevant, but..." These statements speak to the fact that financial literacy teaching and learning often takes place by way of socialisation processes, in series of conversations, observations, and experiences that can be difficult to pinpoint.

Particular life experiences, events and milestones were reported as playing a role in shaping the adult participants' values, attitudes, knowledge and skills regarding money. Several of the adult participants reflected on or referred to an experience of financial hardship, like being raised by a single parent, or experiencing a marriage breakdown and divorce later in life, to explain the practical relevance of valuing working and earning, living within one's means and saving, particularly when one's financial circumstances change.

Teacher B reflected on the milestone of getting her first job at the age of fifteen. She explained that her parents insisted she gradually accept a level of financial independence and responsibility to purchase some of her own things now that she was earning an income, and that this built her confidence to set and work towards financial goals. She attributed this series of related lessons, learned during adolescence, as critical to her current goal to purchase her own home, and her self-belief that this is achievable. She also described her parents as significant financial role models, saying, "Well, if they can do it, and they didn't have a lot of money when they were my age, I can do it." Drawing on the elaboration of the theory of planned behaviour, this story speaks to the interrelated roles values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) can play in motivating financial behaviour.

There seemed to be close relationships between what the parent participants reported learning about money from their own parents, and what they in turn were trying to teach their children. More often than not, intergenerational values were closely aligned. Tayla's mother, for example, described choosing to be consistent with the approach taken by her parents, saying, "They always encouraged us to make money and put aside money. That's why I encourage my children to do the same." Isabel's mother spoke about learning from her mother, who was a single parent, to be an informed and prudent consumer, and now teaching her daughters the same things:

[My mother] was always quite thrifty with her money... shopping around for the best price, that sort of thing... not impulse buying so to speak... I do tend to shop around a fair bit although the internet makes things so much easier. I'm a big fan of internet shopping... If there's something that [the girls] are after, I'll try my hardest to research and get the best price and the best deal...

Some parents, however, were trying to teach their children different things or in different ways. Lara's father reported wanting his children to learn about investing, despite the fact this was not something he gained an orientation to from his own parents. When asked what

he viewed to be the most important thing he learned about money from his parents, he replied, “The honest answer is absolutely nothing.” He elaborated by saying:

[My parents] always struggled and were very conservative people, so wouldn't take any form of investment risk and didn't really spend much money... there's really nothing I took from them except that I didn't want to be as poor as they were all their lives... I always said that my family would not grow up that same way.

And yet it seems that the financial hardship Lara's father experienced during his childhood and adolescence may have motivated him to undertake various formal adult financial literacy education programs, and enrol his teenagers in similar, age-appropriate programs outside school. The negative experience of being a “have not” seems to have been the catalyst to learn more about money in the hope of securing a more promising financial future.

The parents' and teachers' reflections on within-family financial literacy teaching and learning during their own childhood and adolescence aligned with the elaboration of the theory of planned behaviour. In particular, values and subjective norms (expectations) related to money were identified in the parents' and teachers' interview responses, and these tended to influence what the parents and teachers wanted the next generation to learn about money.

4.3 EIGHT FAMILY CASE STUDIES

This leads me to the stories of the families that participated in this study. The literature review highlighted that parents are unequally equipped to teach financial values, attitudes, and behaviours to their children (MCEECDYA, 2005; CBF, 2010; ASIC, 2011a,b; OECD, 2013). Additionally, how much and how well they do so can contribute significantly to their children's financial motivations, financial literacy learning, and financial behaviour (Shim et al., 2009, 2010). The elaboration of the theory of planned behaviour provided a useful framework for exploring how what is taught and learned about money within families might influence financial behaviour, and was influential in guiding and informing the interpretation of the findings presented below.

The family stories you are about to read reveal the following:

1. Without exception, the parents interviewed described thoughtful decisions about what and how to teach their children about earning, spending, saving, and sharing money;
2. While the children were from diverse family backgrounds, there were consistencies in the values being emphasised at home. The importance of working to earn an income,

living within one's means, and saving for the future seemed prominent. Even so, while these values were shared, the parents interviewed reported a range of strategies for teaching them to their children.

3. There was a gap in the teachers' knowledge and understanding about student financial literacy learning at home, and some of the teachers' observations and judgements about students' attitudes and values regarding money were misconceived.

CASE STUDY 1: INSIGHTS FROM PROFESSIONAL PARENTS

Samantha (12) lived with her father, mother, brother and two sisters, aged 14, 12, 8 and 5 respectively. Samantha's father completed a Diploma of Business Marketing and was working as a Marketing Manager. Her mother, whom I interviewed, was a qualified primary school teacher who working as a relief teacher from time to time.

The importance of living within one's means

Samantha's mother spoke about the importance of living within one's means. She reported being raised to think carefully before spending, and to put money away for the future. This upbringing was reflected in how she was teaching her own children about money - she wanted them to understand that "money doesn't grow on trees. That if you work hard, you've got to think about what you do with your money and not... waste it."

Just as her own mother did, Samantha's mother managed the family budget. She described talking to her children about having to pay bills, saying, "If they want something, I'll say, "No, we can't get that this month because I know I have the electricity bill coming."" She also described talking to her children about her purchase decisions when taking them shopping. She wanted them to learn to "get a little bit more for their money rather than go for... a brand name... that's exactly the same really, it just hasn't got that label on it." She recalled a recent experience where she explained to her younger children, "Well, that one's on sale, we can get more because we can get two for \$5 compared to this other item which might be \$5 [for one]."

Pocket money and banking as teaching tools

Samantha's parents were using pocket money to teach Samantha and her siblings about earning. Their thinking about pocket money and the strategy they were using was well-considered. The children were paid for doing household chores. When they were little, they received 5 cents per chore, which they would save to their money box. Now their pocket money was deposited directly to their bank accounts. Each child has two bank accounts – a

low interest account for keeping money that might be withdrawn, and a bonus saver account which paid a higher interest rate for not making withdrawals. The children also received money as birthday gifts from relatives and friends. Samantha's mother explained that the children tended to save this money too, and she recounted them saying to her, "Mum, I really don't have anything I want to buy, I don't know what I want to buy, I'll just keep it."

Sharing personal financial resources for the benefit of others

Samantha's family donated to various charities, helped raise money, and volunteered their time in the local community for the school and kindergarten. Samantha's mother believed it was important that her children "understand how lucky they are... our needs are met, we don't have much to complain about." Samantha's mother reported teaching her children that the family support social and environmental causes, as she wanted them to learn compassion and empathy for others.

With reference to the elaboration of the theory of planned behaviour, this case study reveals particular values and subjective norms (expectations) related to money – that it is important to make financial choices that enable the family to live within its means, that money should be earned and saved, and that others may be less fortunate.

CASE STUDY 2: INSIGHTS FROM PARENTS WHO INVEST

Lara (12) lived with both parents who owned and operated a business supplies company in Australia and New Zealand. She had three adult half-siblings who no longer lived at home, aged 26, 23 and 21. Lara's father, whom I interviewed, completed a double degree in Information Systems (Computing) and Business Accounting. Her mother completed a Certificate IV in Marketing at TAFE.

Lara's father was keen to talk with me about financial literacy teaching and learning. He readily recounted how his parents struggled financially throughout his childhood and adolescence, and the promise he made to himself, "that my family would not grow up that same way." It was almost with disdain that he described his own parents as conservative, thrifty and risk-averse. The experience of financial hardship at a young age seemed to have had a lasting impact on Lara's father, and motivated him to self-direct his own financial literacy education. He explained that as an adult, he had attended seminars, read books, and talked to what he described as "like-minded" people to build his knowledge about risk and investment. Lara's father believed in conversing with his children about his investment strategies. He reported this proudly, saying:

I sat all my kids down at one stage and explained to them about our investments and how they worked... since then, one's bought a house and another one attended a [financial] literacy course.

He believed that these conversations were helping Lara to understand “that if you don't invest, you're not going to get ahead.” He explained, “She knows that the bank owns [the rental properties], as they always do, and the tenants pay rent, and that rent goes to pay off the mortgage.” For Lara's father, being financially literate means “... knowing all the options for investing and making sure you [choose] one that is going to grow your money in the best possible way.” He described wanting Lara to “enjoy life... but at the same time... plan for the future.”

Attitude to working to earn an income

When asked what he was trying to teach Lara about work and how to earn an income, her father replied:

When I was 25, somebody asked me what I wanted to do with my life and I said I wanted to retire... I believe there are very few people in this world who end up in a job that they love.

This attitude to work is in stark contrast to the importance (or value) placed on work by the other parents interviewed, particularly Bruno's mother, who you will read about later in this chapter.

Gifted money and banking as teaching tools

Lara did not receive pocket money from her parents. Like several of her classmates, she sometimes received money for her birthday from various people. Additionally, her grandfather filled a pink piggy bank (a family heirloom from her great grandmother) with his spare coins. Each time it was full, it was given to Lara to empty, count, and take to the bank to deposit in her bank account. The idea was to teach Lara that saving and investing are long term strategies. When they return from the bank, Lara's father reporting logging on to Internet banking to check her account balance “so she can see it's there and [get] excited about it.” However, Lara's father believed she is exposed to two different approaches to money management, as he described his wife as tending to be more frivolous with money. He explained:

My wife likes to spend it and I don't... I'm happy to spend money if I need to spend money whereas, she will spend money because it's there. If there's money in my wallet, it could be there for weeks. If it's in my wife's wallet, you can rest assured it's gone.

Sharing personal financial resources for the benefit of others

Lara's family sponsored a child through World Vision, and supported a number of other charities by donating from time to time.

Drawing on the elaboration of the theory of planned behaviour, this case study also reveals values and subjective norms (expectations) related to money – however, the emphasis is on long-term saving and investment strategies.

CASE STUDY 3: INSIGHTS FROM PARENTS WHO RUN A FAMILY BUSINESS

Isabel (12) lived with both parents and her sister (10). Both her parents worked. Her father completed secondary school and went on to become a plasterer. Her mother completed a Certificate in Office Administration at TAFE, and worked part-time as a book-keeper for two companies, one of which was the family plastering business.

The importance of hard work and living within one's means

Throughout her interview, Isabel's mother emphasised the importance of hard work. She reported that her girls understood that money needs to be earned, saying, "With the way their dad works, they know he works extremely hard... They know that I work... I'm working for their education." Isabel's mother was trying to teach her girls that if they work hard at school, they won't struggle later. She described the family's financial situation in terms of work flow and cash flow - being a tradesman, Isabel's father relied on regular work and prompt payment from his customers. Isabel's mother described him as tending to be "a little bit more stressed about money" as the family waited for invoices to be paid in order to meet expenses. She reported being "a bit more blasé" but also keeping a close eye on income and expenses, saying, "I have to know pretty much on a day-to-day basis what's in the bank... and need to make sure the money coming in equals the money that's going out."

Isabel's mother described being careful how she spends money, and connected this to what she learned during her own childhood and adolescence. She explained that her mother, a single parent, was "always quite thrifty," and would shop around rather than impulse buy. She suggested this had impacted her own approach to money management, and cited shopping for her children as an example, saying, "If there's something that they're after, I'll try my hardest to research and get the best price." She reported enjoying shopping with her children online and in person, and talking with them about her purchase decisions. These conversations were inevitably an important teaching and learning tool, and a forum where

values, attitudes and subjective norms (expectations) regarding money were conveyed from one generation to the next.

Isabel's mother recalled what it felt like to go without things that her mother could not afford, and seemed mindful that her children be protected from feeling anxious about the family's financial situation. This was reflected in her comment:

I don't want [my kids] to have that in the back of their mind... or worry about that sort of thing... my husband and I are doing our best to provide them with everything they want... without [them] being little brats.

Related to this, she explained seeing their role as parents as being responsible for meeting their children's needs and wants within reason, saying, "I want them to understand that they can't just have everything they want..." but "I don't want them to feel guilty about having fun."

Gifted money and banking as teaching tools

Isabel's mother opened bank accounts for her daughters when they were little, and had arranged a small fortnightly direct deposit to each of them. The idea was to promote longer-term saving, perhaps towards a car when the girls each turned 18. She reported wanting Isabel and her sister to see the benefit of saving a small amount consistently, and earning interest. Isabel's mother reported taking the girls into the bank with her when she had business banking to do. However, Isabel and her sister did not receive pocket money on a regular basis. The girls sometimes received money for their birthday from relatives and friends, which they kept in their money box for spending on something they would like. Isabel explained this during her interview, saying, "If I see something that I like, well I think about it and see if I really need it." She indicated that if she received a large amount of money, she was likely to wait and spend it bit by bit. In Isabel's family, thrift seemed to be intergenerational, passed from grandmother to mother to daughter. Isabel seemed to understand the difference between needs and wants, and was able to delay gratification in favour of a purchase decision she would not regret. For example, during her interview, she reported wanting a pair of 'Vans' (branded casual shoes), and doing quite a bit of research with her mother "to find the right shop at the right price" before buying.

Sharing personal financial resources for the benefit of others

Isabel's family did not support a particular charity regularly, but donated to causes on occasions.

With reference to the elaboration of the theory of planned behaviour, this case study reveals insights into the ways and means by which the affective domain can influence financial motivations and behaviour. Isabel's mother reported feeling anxious about money during her own childhood and adolescence. Related to this, she reported wanting to protect her children from feeling insecurities and guilt about spending money on needs and wants. At the same time, she seemed to value saving small amounts of money consistently, and shopping around for the best price before making a purchase.

CASE STUDY 4: THERE IS A HAPPY BALANCE WHEN IT COMES TO MONEY

Calvin (11) lived with his mother, whom I interviewed, and three siblings – a brother (20) and two sisters (17 and 14). Calvin's mother completed a Diploma in Medical Secretarial Studies and worked part-time as a Medical Secretary. Her ex-husband, the children's father, was a Maintenance Supervisor for a pharmaceutical company.

The importance of hard work and living within one's means

Calvin's mother recalled her family being "quite well off" during her childhood and adolescence. However, she reported that her parents instilled in her the value of money, that it "doesn't grow on trees... you don't always get what you want, you have to work for it." She went on to explain that her parents would say, "Just because you have money, doesn't mean to say that you have to spend it." She also reported learning that if she received something new or expensive, "you really looked after it."

Consistent with her own upbringing, Calvin's mother explained wanting her children "to realise that you work to earn money, that by staying at home and doing nothing, that's [not] going to pay the bills." She said that being a single parent meant that budgeting is important, but also more difficult. She did not have a credit card, and was trying to teach her children to live within their means too by telling them, "If you can't afford it, then you have to wait." She reported keeping a close eye on her money, saying, "I know when money goes in and I know when money goes out and I know what my balance currently is... I use online banking a lot."

Calvin's mother described wanting her children to understand "there is a happy balance" when it comes to money. She explained, "...you do need money to live, but it's not the be all and end all of a happy life. You can get by cutting back on some things."

Gifted money and banking as teaching tools

While she received pocket money herself as a child, and believed “it works for a lot of families,” Calvin’s mother had chosen not to give her children pocket money. Instead, she rewarded them for helping out around the home (i.e., helping with tidying) by giving them small amounts of money intermittently. She explained that her children did not expect to be paid for helping her, and they did not help her purely for financial gain. Calvin’s mother used other strategies to explicitly teach her children about money. They each had a bank account, and she had explained to them that saving and earning interest meant you “use your money to work well for you.” She reported that any money Calvin received from his grandparents, he tended to want to save to his bank account, where he had accumulated nearly \$400. Important conversations also took place on shopping outings, where she would sometimes give the children a small amount of money to spend. She spoke about a recent time when she gave Calvin \$10 and said to him:

That’s for you to choose what you want to do with it. You can either go and buy yourself some food, or you can save it, or you can spend some and save [some]...

She volunteered her rationale for giving Calvin money in this way saying, “So he had the money and he had choices.” This comment was insightful in that it implied if a child is to learn to make good decisions with money as a resource, he or she must have the opportunity and freedom to practice doing so from time to time.

Sharing personal financial resources for the benefit of others

Calvin’s mother reported that she did not support a particular charity or charities, and her children did not know much about donating to causes. However, she had recently tried to explain the concept of sponsoring somebody who was participating in a particular event to raise money for a cause.

Drawing on the elaboration of the theory of planned behaviour, this case study reveals values, attitudes, and subjective norms (expectations) related to money. Emphasis is placed on the importance of working to earn money, living within the family’s means, and saving money whenever possible – these values appear to be associated with a frugal attitude towards money.

CASE STUDY 5: CULTURE AND ENTREPRENEURISM

Tayla (11) lived with her parents and three sisters, aged 16, 14 and 8. Tayla’s father completed his schooling in Australia, attended University, but exited before completing his bachelor’s degree in Engineering. He was working from home, running a small website

development business. Tayla's mother, whom I interviewed, completed her schooling in Hong Kong and Canada before migrating to Australia to complete a bachelor's degree in Mathematics. She was unemployed at the time of the interview.

Two ways to earn money: Teaching about active and passive income

Being of Chinese ethnicity, Confucius' quote, "Choose a job you love and you'll never have to work a day in your life" resonated with Tayla's mother, who reported trying to teach her daughters to "do something that you enjoy and make money at the same time... they need to find something they really love..." As small business owners, Tayla's parents wanted their girls to understand the benefits of being enterprising, and had explained to them the difference between active and passive income, based on Robert Kiyosaki's book, "Rich Dad, Poor Dad." Following this conversation, two of the girls invested their own savings to purchase two lolly vending machines, which were located in hotels in the Dandenong area. The money made from lolly sales was used to restock the machine, with the profits being divided between them and deposited to their respective bank accounts. Tayla's mother reported that the girls had been excited to see how much money they could make with little effort.

Tayla and her sisters did not receive pocket money, a decision that her parents had thought about carefully and explained. As Tayla told me during her interview, "My parents don't get money for doing chores." However, there was a clear distinction between domestic work that was expected for the contribution it made to the household, and work that contributed towards the family business. When the girls worked for the family business, they were paid for doing so.

The importance of living within one's means and saving

Tayla's mother recalled her own childhood and adolescence, and the importance her parents placed on living within one's means. Tayla's mother described herself as a committed saver, and said she encouraged her daughters to save their money too. Like her classmates, Tayla received money as gifts at Chinese New Year and on birthdays. She was encouraged to save half to her bank account, and enjoy spending the other half. Tayla's mother explained this expectation with conviction, saying, "It's the rule." Tayla's mother believed that her children "understand the value of money and save up to buy... what they really need or what they really want in the future."

Sharing personal financial resources for the benefit of others

Tayla's family did not support a particular charity or charities. Her mother reported thinking that her children did not understand or care about supporting social or environmental causes.

With reference to the elaboration of the theory of planned behaviour, this case study reveals unique values, attitudes, and subjective norms (expectations) related to earning money through entrepreneurship and investment opportunities. The children working for the family business and investing in lolly vending machines are examples of experiential teaching and learning about earning money taking place within this family. However, the importance of saving is also apparent, evidenced by the family rule to save half of any money earned.

CASE STUDY 6: WE'RE SAVERS

Bruno (12) lived with his father, mother, and two older siblings - a brother (18) and sister (15). Bruno's father left school when he was 15 and completed a baker's apprenticeship. He worked as a Storeman. Bruno's mother, whom I interviewed, completed a Certificate in Clothing Technology at TAFE, and worked part-time as a medical receptionist.

The importance of working to earn an income

Bruno's mother reported trying to teach her children that money does not come easily, it has to be earned. However, she placed importance on finding a job that one finds enjoyable. She explained, "I love what I do, and I'm very good at what I do." She reported wanting her children to do "something that they love doing and that they want to do" and telling them, "If you can do something that you actually like doing it's not a chore to go to work."

The importance of living within one's means and saving

Bruno's mother spoke about how the experience of financial hardship in her husband's childhood and adolescence seemed to have had a lasting impact on his values, attitudes and expectations regarding money. She explained that her husband's mother passed away when he was young, so he was raised by his grandmother, who "had nothing." As times were tough, he began working to pay his way from a young age. Bruno's mother explained that when the children asked their father for something, he would say, "No, we can't get that, we can't afford it... doesn't matter how much it costs... we can't afford it."

Bruno's mother reported keeping close track of the family finances, saying, "I usually know pretty close to how much I've got because I don't have a lot." She also reported the most important lesson about money she learned from her parents as being to save. She

expressed the family's commitment to saving as an affirmation, saying, "We're savers and we save up for what we want." She described Bruno as a saver who could also "tell you to the nearest \$5 how much he has in his wallet." When shopping, Bruno's mother looked for value for money and tried to make savings where possible. She reported that her children understood the difference between buying things on credit compared with waiting and saving up. She explained, Bruno "knows that if he wants something, he needs to save... and I'll say to him, "Why do you want it? Why do you have to have it now? ... If you want [us] to get it for you, what can you do that will... contribute towards you being able to get it?""

Gifted money as a teaching tool

Bruno did not receive pocket money. His parents had set and communicated the subjective norm (expectation) that the children must help out around the house, but they would not be paid for doing so. Bruno's mother was matter-of-fact about this, saying, "The jobs need to be done regardless." The children sometimes received money from their grandparents when they visited, or for their birthdays from relatives and friends. They were encouraged to save what they received, although Bruno did not yet have a bank account.

Sharing personal financial resources for the benefit of others

Bruno's family donated to a range of causes on occasions. His mother described her children as being "socially responsible" and "aware that not everybody is as lucky as they are."

Drawing on the elaboration of the theory of planned behaviour, this case study reveals values and subjective norms (expectations) related to working to earn money and keeping careful track of income and expenses so as to live within the family's means. Conversations that involve evaluating the difference between needs and wants, discussing what's affordable, and questioning what purchases might be delayed facilitate the transfer of values and subjective norms (expectations) from one generation to the next while generating a frugal attitude towards money.

CASE STUDY 7: INSIGHTS FROM A WORKING CLASS SINGLE MOTHER

Justin (11) lived mainly with his mother, whom I interviewed, and her de facto partner. He stayed with his father every second weekend. Justin also had an adult sister (26). Neither of Justin's parents completed secondary school. Justin's mother worked as a cleaner, and her ex-husband was a bus driver. As a general rule, Justin's parents avoided speaking to each other.

The importance of working to earn an income and living within one's means

When asked what she was trying to teach Justin about working to earn an income, his mother replied, "Not much really. He's too young... He has no idea what he wants to do in the workforce, so yeah, nothing really." Later though, she spoke about wanting Justin to learn the value of money, and then referred to work, saying, "Money doesn't grow on trees mate. You have to get out, work for it, earn it, pay your bills. He doesn't think where the money is coming from."

When asked to reflect upon her own childhood and adolescence, including her family's financial situation, Justin's mother recalled her parents telling her, "Pay your bills first. Whatever you [do], pay your bills first... that was all we were taught. I worked [the rest] out for myself." This 'rule' was one Justin's mother reported living by as she tried to live within her means – she would meet her priorities and live off what remained of her income.

When asked about her own approach to money management, and what she thought Justin knew and understood about keeping track of money, his mother replied:

[He] wouldn't have a clue. That's only because I have to be very careful what I say money wise because he goes back and repeats it to his father. So I've got to be very careful there. My partner checks the bank account every day. I don't. I personally believe if you are checking a bank account every day, you have major issues. I believe that you have a budget, work it out, if you need a bit extra, you need a bit extra. My partner is different. He counts and worries about every cent.

When asked to talk further about her reference to budgeting, Justin's mother explained, "I sort of have a fair idea in my head what we can afford and what we can't... as long as the house payments are made and the bills are paid... you've got to live."

Throughout the interview, Justin's mother gave very brief, often one word responses, whereas the other parent participants gave richer responses that revealed greater consideration to teaching their children about money. It was not until the very end of the interview, when I asked, "Is there anything else that you'd like to tell me about financial literacy teaching and learning?" that she became more animated and went on to describe in detail the socioeconomic landscape at Justin's school, and the challenges she faced in helping him understand his family's financial situation, and how she perceived it as being different to his peers'. She explained:

He's got a couple of mates who I have a bit of trouble with because what they want, they get. [Their] parents believe every Christmas you spend a thousand dollars on each kid. I

don't believe in that. I do it pretty hard, and I tell him that... A couple of his mates... they have the best of everything and what they want, they get. They've got mobile phones, they've got everything...

She went on to describe ways she was able to meet Justin's needs and wants while saving money, such as shopping at factory outlets and op shops.

Money from time to time as a teaching tool

Justin's mother reported not using pocket money to teach him about money management, and she was confident that his father didn't use it either. However, she explained giving Justin \$6 each week they attend local football matches together, a discretionary amount to last the day, but for him to spend as he pleased. This was similar to the approach taken by Calvin's mother. Both women spoke about how this strategy had helped their sons to learn about making choices with money over time. Justin's mother reported:

At first he blew it in five minutes. Now he's learnt he can spread it out because he doesn't get any more... he's had to learn the hard way. I gave him the money and once it's gone it's gone... He's learnt if he goes to the fish and chip shop he gets more for his money than buying at the canteen.

Sharing personal financial resources for the benefit of others

Justin's mother reported that her family did not support a particular charity or charities.

With reference to the elaboration of the theory of planned behaviour, this case study reveals values and subjective norms (expectations) related to budgeting to live within the family's means. The emphasis is placed on meeting financial obligations such as home repayments and bills before accounting for other living expenses. This case study shows that while a low-income family might value financial responsibility, living within a limited means can be challenging, and necessitates teaching and learning thrifty financial behaviour, including how to "make do".

CASE STUDY 8: WHEN PARENTS' FINANCIAL VALUES CLASH

Elizabeth (12) lived with her mother (a single parent) and brother. Elizabeth's mother, whom I interviewed, was a qualified chef, but was working as a Sales Assistant in a bakery. Her father was also a qualified Chef, but had not worked since sustaining a back injury "quite some time ago," soon after the marriage separation. Elizabeth's mother commented with a level of cynicism that her ex-husband's injury coincided with her request for child support, which he was now unable to pay.

Elizabeth's maternal grandparents played an important part in family life, including teaching the children about money. Elizabeth's mother explained that her children "get spoiled" by their grandparents, who she described as "quite wealthy." She did not seem comfortable with their generosity, and reported telling her children "to remember where and how we live" and to "appreciate the value of a dollar."

The importance of working to earn an income

Elizabeth's mother described her work situation with a level of regret, saying she loved being a Chef, but being a single parent had meant changing careers to avoid working late nights and weekends – "It's just not the right time for me to be able to do that unfortunately." She had explicitly told her children about her work decision, that while she didn't really love working at the bakery, "I have to have money, I can't survive without a job". She was trying to teach her children "to find a job that you can at least turn up to and be happy with every day." Elizabeth's mother reported feeling upset that her ex-husband and his new partner didn't work, and wondered what her children thought about it. She said she would be "very disappointed" if her children chose not to work given the other role models available to them to emulate. This was reflected in her comment, "Everyone else in my family is very hard-working, so I'm hoping that they will learn to work and save their money."

Gifted money and banking as teaching tools

While Elizabeth and her brother regularly received money from their grandparents (in fact, in her interview, Elizabeth likened this to pocket money), their Mother did not give them pocket money. She explained:

I don't believe in pocket money. I don't get money for cleaning the house and doing chores around the house and I don't feel that they should either. They're part of the family and we all need to do our bit to survive.

Note that Elizabeth's mother's comment is consistent with the philosophical view of most of the mothers I spoke with.

Elizabeth's grandfather opened bank accounts for her and her brother when they were three, and he deposited money to those accounts each birthday and Christmas. Whenever the children received money as gifts from other family members and friends, they were encouraged to save what they didn't spend to their bank accounts too. Elizabeth's mother told me she had thought carefully about what would be an appropriate age for her children to be given access to these savings. She explained:

I don't want them growing up knowing that this money is there for them. There'll be quite a few thousand [dollars] I imagine by the time they're 21, and I don't want them to think that's going to get them through their life...

Again, she referred to the importance she placed on working to earn money, as follows:

Until they have a few years of working under their belt, like if they need to go to Uni or something, or they need a car or something, then maybe we can take a small amount out for that, but to give them the entire amount [before they're 25] I don't agree on.

Later in her interview, Elizabeth's mother referred back to the same point, saying she would like her children to get part-time jobs when they were older, and "if they want a car, I'd like them to contribute to that and not just expect granddad to pay for it."

The importance and challenge of living within one's means

She reported keeping close track of her money, and being careful to explain to her children the difference between needs and wants in relation to the family budget. On a recent occasion when Elizabeth asked for a particular material thing, her Mother replied:

You don't really need it, you want it, and I've got \$38 [left] for the week... I'm going to keep that in case we need food or petrol, a necessity might come up... you might need to go to the doctors.

This statement revealed the challenge some families face trying to live within their means. Related to this, Elizabeth's mother explained having a credit card that she used as a matter of necessity when she first became single, as follows:

There were weeks where you just needed to eat and it was sort of, "I'll just put that on the credit card and work it out later." And now later has come the credit card doesn't get used and it's just all getting paid off.

Elizabeth's mother reported talking to her children about budgeting to live within her means, and how making certain choices how she spent money meant there would be more left over to pay for things like co-curricular activities and treats. For example, she explained her goal was to save for a family trip to Bali, and that the children were aware "that at the moment, we've got to try and suck things in a little bit if we want to go on a holiday." She also reported enjoying playing Monopoly with the children, and using the board game to teach them about money and mathematics (i.e., calculating change). In this family, as in others, open conversations about money and ways it can be earned, spent, saved and shared, rather than the provision / availability of money as a resource, was the main teaching tool. It was

these conversations that helped the children to think critically about the financial choices they might face in life.

Sharing personal financial resources and volunteering for the benefit of others

Elizabeth's mother reported making donations to a few charities. When asked what she would like her children to know and understand about supporting social and/or environmental causes, she spoke at length about volunteering her time and expertise as a Chef two days per fortnight – one in a local community kitchen, and one in the school canteen. She reported trying to clarify for her children, “even though I do work, I don't actually get paid those days.” Her volunteer work was a way for Elizabeth's mother to do what she enjoyed. She explained:

I love cooking, so that's my way of continuing with my cooking as well. It started as a two-week project, and now it's been going for just over two years, so I'm quite proud of that.

In this way, Elizabeth's mother was trying to teach her children that there are ways to make a contribution to society other than donating money.

When values clash

Throughout her interview, Elizabeth's mother alluded to what might be described as 'values clashes' between her and her parents, and her and Elizabeth's father. As previously mentioned, she was somewhat concerned that her children “get spoiled” by their grandparents, who were in a position to indulge them financially. She also believed she and her ex-husband, who the children visit at his home interstate once a year, differed in what and how they were teaching the children about money. She described him as a big spender, saying:

...when we were together he would give me his pay... he knew he was shocking with it... he would go straight to the pokies or to the pub or go shopping... whereas my priority is you pay your rent, you buy your food, you pay your bills – actually, I pay my rent, I pay my bills and then what's left I make do with food. If I've got less one week, we have less...

Drawing on the elaboration of the theory of planned behaviour, this case study reveals values and subjective norms (expectations) related to earning, budgeting, and saving money. This case study is particularly fascinating because Elizabeth's mother reports the different, sometimes oppositional financial values her children are exposed to, and seems to be aware

that the values that resonate with her children most will inevitably guide their financial behaviour.

* * *

At the close of our conversation, I asked each parent participant whether they thought that the sorts of things we'd spoken about would be useful to their child's teacher to know. The majority replied yes, and elaborated by speaking about ways in which their children's school experience is impacted by social pressures to be a "have" rather than a "have not" together with assumptions, misunderstandings and sometimes unrealistic expectations about what families can afford. So it seemed the parents interviewed wanted teachers to better understand their children and to create connections between students' financial literacy learning at home, at school, and in the broader community.

The eight case studies of within-family financial literacy teaching and learning reported in this chapter demonstrate that even within a local area, there are similarities and differences in the prior understandings about money each child brings to school from home. While the importance of working to earn an income, living within one's means, and saving for the future seemed to be shared values, the parents reported a range of ways these were being taught and learned – through series of conversations, observations, and experiences. The case studies suggest that while socioeconomic status has a role to play in financial literacy teaching and learning, it seems to do so by shaping values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) regarding money. For the purpose of this thesis, these are termed social understandings. Hence, it seems important that teachers do not make assumptions based on socio-economic background alone, but rather seek to understand the sociocultural and psychological factors that have been found to influence behaviour, from students' family backgrounds to the social understandings and financial practices to which they have been exposed.

4.4 TEACHERS AND PARENTS TALK ABOUT FINANCIAL LITERACY TEACHING AND LEARNING AT SCHOOL

One of the inferences from the literature was that financial literacy teaching and learning might be enhanced if teachers knew more about the prior understandings about money students bring to school from home. For this reason, I was interested to explore what the teachers knew about the approaches parents might be taking in teaching students about money, what students seemed to know and understand about money, and the extent to

which this knowledge was being used to guide and inform financial literacy teaching and learning at School A.

The teachers clearly knew their students well. This was evident from our first meeting, when they began to consider who among their classes would be suitable to invite to participate in this research project, given that I was seeking students from diverse backgrounds who had been assessed as performing at or above VELS Level 4 in Mathematics. However, when asked what their students seemed to know and understand about earning, spending, saving, and sharing money, the teachers did not situate their responses in terms of their teaching and learning programs. Rather, they spoke about observations they had made of student financial behaviour at the school canteen and on excursions. When asked if there were ways they had tried to explore students' values and attitudes about earning, spending, saving and sharing money in their lessons in the past, or if they could suggest ways they might do so in the future, their responses revealed an uncertainty. Teacher A said, "I don't really know a lot. I don't actually cover that in school." Teacher B also said, "I don't know, probably just, <pause> Without knowing it, I probably have talked to them about it." These responses suggested a gap in the teachers' knowledge and understanding about student financial literacy - a gap which would inevitably compromise their ability to effectively plan financial literacy teaching and learning in line with students' backgrounds, characteristics and interests.

When asked what schools should be teaching primary-aged children about money, the Acting Principal, teachers, and parents were in strong agreement that it is important that financial literacy be included in the school curriculum. The Acting Principal explained why she believed this, saying, "One, to give [students] some understanding of the demands of their future, but two, it makes learning mathematical skills relevant." When asked what students should understand about money by the time they leave primary school, the adult participants varied in their responses. The Acting Principal viewed this question in relation to the Mathematics curriculum, and listed mathematical understandings as follows:

Estimation, giving change... counting, subtracting money, working with large amounts of money and being able to put values of things in order - so ordering money, ordering numbers.

By contrast, Teachers A and B spoke more generally. Teacher A, a parent of teenagers and young adults, replied almost philosophically, saying:

I don't know. That they need to earn money... money's not everything. It's the other things you get out of life than money but you do need to have an education I guess to understand how you're going to earn your money and use your money.

Teacher B spoke about the need to teach children "how important money might be in their lives" while acknowledging students needed basic numeracy skills such as "how to add and subtract money." Repeatedly, both teachers spoke about the importance of teaching students in ways that situate knowledge and skills in "real-life."

When asked what financial literacy education he would like to be included in his children's school curriculum, Lara's father replied:

I would love for them to have [financial literacy] in there, but they don't... I'm not sure that it's a Primary school thing. I don't think they're old enough to appreciate it then... I'd be saying more your sort of 15, 16 [years of age] so, what they're Year 10 maybe?

While this comment is consistent with his view and experience that financial literacy is best taught by what he described as "like-minded" financial experts running financial literacy education programs outside school, the statement revealed a limited awareness about the money-related content being taught as part of the primary school curriculum. By contrast, most other parents reported wanting their children to learn insights associated with their own values, as described earlier in this chapter - for example, that it takes hard work to earn money, the value of money, and more about banking. Bruno's mother referred to the importance of learning about earning, giving this example:

Up until recently, Bruno used to say "Well, just go to the hole in the wall." I go, "No, no, it actually has to go in the other side before we can get it out this side". So yeah, they actually need to learn where the money comes from in the first place... before it actually comes back out of the bank at you.

Calvin's mother also referred to banking, but in relation to earning money through interest, saying:

He's only just getting to the concept now... the bank's got my money, but they're paying me to keep it, because he doesn't really understand that whole concept and the fact that... you can use your money to work well for you.

While she is clearly talking about interest and interest rates, it is interesting to note that Calvin's mother did not use these terms at any point during her interview. Lara's father spoke about wanting the school curriculum to explore credit and investment, and related to this, he spoke about the importance of teaching children about interest and interest rates.

Interestingly, the possibility of teaching about interest and interest rates conceptually, or as part of the school mathematics curriculum, was not identified by the teachers, although the Acting Principal stated that learning to calculate interest rates was the most important thing she learned about money at school at the student participants' age:

I don't remember learning a lot about money at school, except for calculating interest rates... because at the time it blew me away how much money the banks were making, I remember thinking "Wow!"

These examples reveal that what the teachers and parents interviewed believed schools should be teaching primary aged children about money is not currently included in the primary school curriculum. For example, the *Australian Curriculum: Mathematics* includes a designated substrand titled "Money and financial mathematics" which stipulates that at Year 5, students will learn to create simple financial plans, and at Year 6, they will investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies. There may be the potential for upper primary teachers to situate the teaching of interest rates as a "real life" example of percentage.

One of the reasons the Acting Principal and teachers gave for wanting to participate in this study was a desire to learn more about teaching financial literacy. I was therefore interested to find out how the teachers described their current practice in this area. When I initially invited the project school to participate in this study, the Acting Principal was immediately interested, but told me she was unsure whether the school was a suitable choice given their perception that a minimal approach to financial literacy education was being taken. Such enthusiasm about financial literacy education moderated by apprehension about the school and teachers' capacity to provide it was also evident in the interviews with the Acting Principal and teachers. When asked broadly, "In what ways is financial literacy taught and learned here?" the Acting Principal replied, "Very limited I'd say..." before referring to the ways and means by which teachers might use the Nelson Maths program, including selecting open-ended tasks with a focus on money, particularly "if some kids are quite motivated by money..."

Teacher A said, "To my knowledge, it's not part of the curriculum..." And yet later, when I showed her the *Australian Curriculum: Mathematics* and drew her attention to the content descriptors for Years 5 and 6 under the substrand titled "Money and financial mathematics," she exclaimed, "Yes, we've done exactly that!" With reference to the content descriptor, "Create simple financial plans," Teacher A described the students being involved in planning and budgeting an event of interest to them, like an excursion, a BMX race, or a trip around

the world. Teacher B described working with her students to plan, cost and run a talent quest as a school fundraising event. With reference to the content descriptor “Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies,” Teacher A said, “Yeah, we’ve done that.” Late in her interview, Teacher A said, “I didn’t actually realise how much I’ve actually been doing without even knowing!”

The view that financial literacy education is ‘new’ to the school curriculum seems to be a common misconception, perpetuated by various financial commentators who have little knowledge about or insight into school curriculum, teachers’ work or how students learn. In fact, financial literacy education has always been included in balanced Mathematics programs (Manuel & Morony, 2011) and has also featured in Business, Economics, and Civics and Citizenship education. Much of ASIC’s work in the area of financial literacy has been focused on raising the profile of financial literacy education in the *Australian Curriculum*, not revolutionising it. In some ways, their efforts have created a ‘brand’ called financial literacy, a term to describe aspects of teaching and learning, although teachers do not necessarily recognise their work in these terms. That is not to say that financial literacy teaching and learning need not be improved – just that it certainly is taking place in schools.

In fact, throughout their interviews, the Acting Principal and teachers recounted stories that demonstrated financial literacy teaching and learning in action both in and out of the classroom. Teacher A spoke about a recent excursion to Sovereign Hill, where it was suggested to students they might like to bring \$10 spending money. She explained that some students brought more or less than \$10, while some brought no money at all. She also commented on students’ spending, saying, “[Some children], because they had the \$10, they had to spend it. And then there’s other kids that said, “Well, I want this, this, and this but I’m going to keep the change.”” She recounted a similar story about students having money to spend at the school canteen:

They’re all different... there’s kids that bring money to school and just go silly at the canteen. There’s kids that don’t even spend money at the canteen, don’t even bring money [to school] at all.

Outside the classroom, learning to save and bank money was taught through the Commonwealth Bank School Banking Program. These are all concrete examples of ways that the school provided experiential opportunities for students to practice being consumers alongside the formal school curriculum.

In similar ways, students had the opportunity to learn to be active citizens. As in most government schools in Australia, there was a culture of fundraising in the school community. Each year, Year 6 children fundraised towards their Graduation Dinner by selling icy-poles. The Student Council also raised funds for various social and environmental causes of their choosing throughout the year, generally by way of casual dress days. Additionally, the Parents and Friends Association fundraised for the school, with proceeds being spent on school facilities and resources (i.e., a running track, shade and shelter areas, playground equipment). Experiencing fundraising activities teaches children a range of values, from the important work done by social and environmental organisations, to the merit of sharing personal financial resources for the benefit of others (i.e., the school or local community, or society at large).

The interviews with the educators highlighted a limited awareness of their students' existing understandings about money. This, together with an apprehension about the positioning of financial literacy in the school curriculum, compromised the teachers' ability to tailor financial literacy teaching and learning to meet their students' backgrounds, characteristics, and interests.

4.5 LINKING THE FINDINGS TO THE RESEARCH QUESTIONS

The findings reported in this chapter serve to illuminate the nexus between home and school when it comes to financial literacy teaching and learning. Without exception, the parents interviewed described thoughtful decisions about what and how to teach their children about earning, spending, saving, and sharing money. What the parents valued as important regarding money seemed influential in these decisions. With reference to the elaboration of the theory of planned behaviour presented in Chapter 3, values, attitudes, and subjective norms (expectations) were able to be identified in the parents' responses to the interview questions, and these factors seemed interwoven. For example, the parents placed importance on saving for the future and reported encouraging their children to save. The resources and opportunities available to the families seemed to influence the values, attitudes, and subjective norms (expectations) discussed by the parents. In many cases, there were intergenerational patterns in the ways and means by which values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) influenced within-family financial literacy teaching and learning.

Despite being from diverse family backgrounds, there were consistencies in the values being taught and learned at home. These included the importance of working to earn an income,

living within one's means, and saving for the future. Notably, these shared values were being taught and learned in different ways - by way of socialisation processes, in series of conversations, observations, and experiences. Only one parent reported giving her children pocket money as a strategy for teaching and learning about money. The other parent participants reported that their children received money as gifts on special occasions and/or small amounts from time to time as a teaching tool. The parents described that this "income" provided opportunities for early conversations with their children about money being a limited resource that might be budgeted – some for spending and some for saving.

The parents and teachers identified a range of understandings as being important to teach to 10-12 year olds in a "Money and financial mathematics" program. The parents interviewed wanted teachers to better understand their children's family background and to create connections between students' financial literacy learning at home, at school, and in the broader community. Most reported wanting their children to learn insights associated with their personal financial values - for example, that it takes hard work to earn money and the value of money. The parents also reported wanting their children to learn knowledge and skills associated with banking (i.e., about interest).

The Acting Principal and two teachers gave diverse responses when asked what schools should be teaching primary aged children about money. While the Acting Principal seemed to see financial literacy as an opportunity to apply mathematical understandings to money, Teachers A and B spoke about values and the importance of teaching students through "real life" contexts.

It is important to connect the eight case studies of within-family financial literacy teaching and learning to the educators' responses. Since they reveal the rich approaches to financial literacy teaching and learning taking place at home, the case studies might form an important part of teacher professional learning designed to build teacher capacity to plan, design, and implement financial literacy education programs that align closely with students' backgrounds, characteristics, and interests.

4.6 MOVING FORWARD WITH THE RESEARCH

The family stories provided rich insights that help conceptualise the understandings about money students bring to school from home, including the ways and means by which parents can cultivate these understandings. The elaboration of the theory of planned behaviour presented in Chapter 3 provided a useful framework for data collection and analysis. Values,

attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) – termed social understandings - were identifiable in the parents’ and teachers’ interview responses. These factors, separately and together, were useful for describing the parent participants’ decisions about what to teach their children about earning, spending, saving and sharing money, and the strategies they selected to do so. For example, only one family reported using pocket money. The other parents spoke about wanting their children to help out around the home because doing so contributes positively to family life. Several mothers spoke about this decision being practical in the sense that domestic labour is not tied to financial rewards in “real life”. In this way, most of the families seemed to value, and set expectations for their children about money, that reflected the financial realities of the world around them. It is important to note that perceived behavioural control (self-efficacy) was not as easily inferred as the other factors. This factor, which describes resources and opportunities, may help to explain why Lara’s father spoke confidently about investment possibilities, while the other parents seemed more modest, and emphasised the importance of saving money – either by budgeting to “make do” with limited means or putting money aside for the future where possible.

The findings presented in this chapter suggested that a gap existed in the teachers’ knowledge and understanding what students are learning about money at home. Some of the teachers’ observations and judgements about students’ values and attitudes regarding money were misconceived. Additionally, the educators were unable to fully describe what financial literacy teaching and learning at school might involve. These factors inevitably compromised the teachers’ ability to tailor financial literacy teaching and learning to meet their students’ backgrounds, characteristics and interests.

Based on the similarities and differences between the family stories, it seemed reasonable that an educational intervention designed to critically explore the social understandings about money 10-12 year olds bring to school from home while teaching knowledge and skills might enhance financial literacy teaching and learning at school.

The next chapter revolves around a series of seven financial dilemmas that were developed as the basis for face-to-face interviews with the Year 5/6 students whose family stories you have just read. The financial dilemmas were essentially open-ended mathematical problems involving financial contexts drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in. The purpose of the student interviews was to trial the financial dilemmas and study the students’ responses to them so as to establish whether

these tasks and/or others like them might form part of a useful educational intervention to enhance financial literacy teaching and learning at school.

CHAPTER 5: STORIES OF STUDENTS FACING FINANCIAL DILEMMAS

This chapter presents the findings of individual face-to-face interviews with the eight Year 6 students who participated in Stage 1 of this study. This chapter is presented in three sections. First, the research aim, question, context, and data collection and analysis procedures are outlined. The next section discusses how students approached a series of seven “real life” financial dilemmas focusing on earning, spending, saving and sharing money, including how they explained their financial problem-solving and decision-making. Drawing on the elaboration of the theory of planned behaviour presented in Chapter 3, students’ responses are analysed to make sense of the social and mathematical understandings they applied when thinking about each financial dilemma. In the final section, the findings presented in this chapter are linked to the research aim and question and the implications for financial literacy teaching at school are identified.

5.1 THE RESEARCH AIM, QUESTION, CONTEXT AND DATA SOURCES

This chapter explores the following research aim and question:

AIM:	QUESTION:
b. To explore the understandings about money 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.	3. What understandings about money do 10-12 year olds bring to school from home? Have parents done anything deliberate / specific to cultivate these understandings? If so, what?

This stage of the project was undertaken in a small eastern suburban primary school in Melbourne (School A). As explained in Chapter 4, the Index of Community Socio-educational Advantage (ICSEA), created by the Australian Curriculum, Assessment and Reporting Authority (ACARA), was used to understand the socioeconomic profile of the school communities. School A is best described as servicing a diverse middle class school population (see Table 5.1).

Table 5.1. *myschool Index of Socio-Educational Advantage (ICSEA) profile of School A (2012)*

	Enrolments	ICSEA Value	Bottom quarter	Middle quarters	Top quarter	
School A (Government)	171	994	14%	40%	34%	12%
Australian distribution	-	1000	25%	25%	25%	25%

5.1.1 THE RECRUITMENT OF PARTICIPANTS

Of 28 Year 6 students across two Year 5/6 composite classes, the teachers identified 12 they assessed as performing at or above VELs Level 4 in Mathematics (i.e., these students had demonstrated achievement of the knowledge and skills necessary to attempt the financial dilemmas). Eight parents (four from each class) returned the Consent Form agreeing that their child could be interviewed, and that the interview could be audio-recorded.

5.1.2 METHODS OF DATA COLLECTION

Data were collected through individual face-to-face interviews with a sample of eight 11-12 year old students towards the end of their time in Year 6, the final year of primary school. The audio recordings of the interviews were professionally transcribed. Data also included hand-written observational and reflective notes made by me, and students' completed worksheets.

The student interview protocol (Appendix H) was designed to explore students' observations about and experiences with money, and to work with them to solve a series of "real life" financial dilemmas focusing on earning, spending, saving, and sharing money. The financial dilemmas were written to engage the students in a level of mathematical problem-solving appropriate to VELs Level 4 in Mathematics plus social thinking (usually a values judgement). Students were interviewed in person, individually, in a private room adjacent to one of the Year 5/6 classrooms. Each student participant was read a verbal explanation (Appendix H), and his/her verbal consent to participate was audio-recorded at the start of his/her interview. It is important to note that each student was explicitly told that I was interested in how they solve mathematical problems involving money, and that I would be working with them to solve some mathematical problems. It was also explained to the students that financial dilemmas involve multiple options to choose from, rather than right or wrong answers. I emphasised to the students that I was most interested in how they explained their thinking. The financial dilemmas were graduated in level of difficulty. The first three financial dilemmas were scaffolded for students to help them feel comfortable and perhaps build their confidence about the work we were doing together, whereas the final two dilemmas, "Helping Frank and Nellie save" and "Comparing charities – Where do the funds

go?” were more open and challenging. The time taken for each student interview varied between 15 and 40 minutes, depending on each child’s preparedness to engage in mathematical problem-solving and conversation about their financial decision-making.

Prior to the student interviews, I had decided that if a student was unable to answer a question, I would not pressure them to do so. However, since the more information students search for and consider, the more likely it is they will make an informed financial decision, I made a point of asking students whether they would like to undertake mathematics as part of their problem-solving, and sometimes explicitly guided them in doing so.

5.1.3 DATA ANALYSIS TECHNIQUES

All student data sources were matched, analysed, and categorised. This process involved referring to the elaboration of the theory of planned behaviour to identify in the students’ comments their values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) – termed social understandings. The idea was to explore the nature of the understandings about money students brought to school from home, and how these seemed to influence the problem solving pathways students took when making financial decisions. Student and parent data sources were also matched in order to identify and understand similarities and differences in values and attitudes to earning, spending, saving, and sharing money within and between families.

5.2 SEVEN “REAL LIFE” FINANCIAL DILEMMAS

This section explores how the eight student participants introduced in Chapter 4 approached each of the seven financial dilemmas posed during their interviews. The financial dilemmas were designed to promote conversations that would elicit broad insights into students’ financial problem-solving and decision-making. For each of the financial dilemmas, there were three important considerations. The first was the extent to which social and mathematical understandings guided and informed students’ financial problem-solving and decision-making, particularly whether they performed mathematics and used it to justify their judgments. The second consideration was the extent to which the students seemed to be enabled by the context – i.e., did it constrain, confuse, or contribute to their mathematical thinking? The third point of interest was whether the factors defined as being part of the elaboration of the theory of planned behaviour were evident in students’ responses. The rationale for each financial dilemma is briefly explained before the students’ responses are discussed. Each of the financial dilemmas elicited fascinating and unexpected responses that showed the students had sophisticated social understandings which they drew on more

readily than, and often instead of, their mathematical knowledge and skills. The findings reported in this chapter were used to guide and inform the development of an educational intervention.

5.2.1 A FINANCIAL DILEMMA ABOUT EARNING MONEY

“Being enterprising” was designed to explore students’ attitudes to helping out around the home, whether for financial reward or not, together with their enterprise behaviours. This financial dilemma also enabled me to examine students’ ability to apply their mathematical knowledge and skills to evaluate and choose between two payment options – per weed and per hour. Moreover, “Being enterprising” provided a means for checking for consistency between parent and student data – the approach individual parents had reported taking in order to teach their child about earning money was compared and contrasted with individual student responses to this financial dilemma. The task was presented as shown in Figure 5.1.

BEING ENTERPRISING

It's the school holidays. Your Mum suggests that you might earn some money by helping in the garden. She is prepared to pay you 10c per weed pulled from the garden OR you can negotiate an hourly rate of pay.

- a. Would you prefer to be paid per weed pulled, or by the hour? Why?
- b. *If student indicates an hourly rate of pay...* What hourly rate of pay would you want Mum to agree to? Explain why.
- c. How would you feel about doing this job?
- d. Is helping in the garden something you would do without being paid?

Figure 5.1. Being enterprising.

It was anticipated that students would estimate the number of weeds that might be pulled from the garden in an hour, and consider an hourly rate in relation to this estimation. However, more influential in motivating the children’s approach to this task were the values and practices being taught and learned at home in relation to earning money for completing household chores. Seven of the eight parents interviewed reported they did not pay their children for completing household chores (an extrinsic reward system termed “pocket money” in Western cultures). Four parents spoke about their children being expected to participate in domestic work because doing so makes an important contribution to the household. The strength of these values, attitudes, and subjective norms (expectations) being taught and learned at home may explain why the students interviewed were generally prepared to help out in the garden if asked, without being paid. Calvin, Tayla and Justin indicated that they

sometimes help out in the garden without being paid anyway. Bruno vacillated, saying, "...Well, it depends if she really needs help. If she didn't, I guess I wouldn't, but if she did, yes I would." Isabel and Elizabeth viewed this job as enjoyable, and an opportunity to spend time with their fathers. Isabel said, "Yes, I do it already without being paid... As much as it sounds weird, I enjoy doing it." She went on to describe being outside with her father, pet rabbits, and the native birds as better than "sitting on the couch watching TV and stuff, [or] in your room." Elizabeth explained that helping her father in the garden when she visited him in Queensland each year is was way to spend time with him without her half-brothers interrupting. For these students, a context involving being paid to pull weeds from the garden was not realistic.

Most of the students interviewed indicated they would prefer to be paid per weed, and explained their response in relation to maximising the financial reward while minimising the time invested in the task. Implicit in these students' responses was an understanding of an important concept in economics and business - productivity. Even though it seemed that the students valued their time, they did not use mathematics to its fullest advantage to make sense of the financial dilemma or justify their thinking.

Bruno was direct and confident in evaluating this dilemma:

Bruno: Ten cents per weed.
I: Why's that?
Bruno: Because you'd get more money in the process.

Samantha and Justin took a similar line of thinking to Bruno when justifying their responses. Samantha said, "Because... you might get more money than [by] the hour because it might not take that long." Justin was able to qualify his response with an example, saying, "Because... you pull out more weeds. If you pull out 100 weeds you get \$10." Bruno, Samantha, and Justin's assertions may or may not be true – two unknown and variable factors are the number of weeds to be pulled and the number that might be pulled in an hour. While there was the potential to draw on mathematics to build and substantiate their arguments, these students did not do so convincingly.

By contrast, several students indicated that their decision might vary depending on the size of the job. These students seemed to be seeking to make an informed decision. When first considering this dilemma, Isabel and Tayla indicated a need for more information. Isabel wanted to find out more about the size of the job before committing to a decision, saying, "It

really depends on what the garden's like." before deciding she would like to be paid ten cents per weed. She explained, "I could probably get it done pretty quickly."

Tayla, whose parents were small business owners, and who were trying to teach her the benefits of being enterprising, also wanted more information, this time about the hourly rate:

- Tayla: Well, it would actually depend on how much you get for the hour.
- I: What does it depend on?
- Tayla: It depends which one you get more.
- I: So, tell me a bit more about that.
- Tayla: I don't know.
- I: How would you figure it out?
- Tayla: Well, let's see. Well, you will have to try by pulling weeds out for an hour and see how much you pull and see how much they'll pay you and then see how much ten cents you'll get like compare them I guess.

Tayla's response suggests a common-sense approach – she seemed to be weighing up that the rate per weed pulled should be equivalent to the rate per hour. However, she did not use mathematics to guide and inform her problem-solving and decision-making.

Lara and Calvin indicated they would prefer to be paid an hourly rate. Lara suggested an hourly rate of \$5, what she described as "a rounded off number." Like Isabel, she seemed conscious of the size of the job, and what time commitment might be involved. This was reflected in her justification why she would prefer an hourly rate of pay – "Probably by the hour, because it doesn't really tell you how many weeds you've got, so just go with the safe bet and go for the hour." It is interesting that Lara and Isabel made different decisions even though they were both concerned about the number of weeds to be pulled and the time that might be required to complete the job.

Calvin suggested a range when asked what hourly rate he would like to be paid – "Ten dollars or five dollars. Ten to five dollars." Considering the highest figure in the range was exactly double the lowest, I asked Calvin to write down his answer so we could talk about it some more:

- I: If mum was going to pay you ten cents per weed, how many weeds would you need to pull to earn \$5?
- Calvin: Five hundred. Wait, wait. Fifty.
- I: Write that down for me too. And what if she was going to pay you \$10? How many weeds would you have to pull at ten cents per weed to earn around about \$10?

Calvin: A hundred or...

I: How are you trying to figure it out?

Calvin: There's ten cents that goes in like 10 times into 100 which is a dollar and then... 1,000?

I: You said something really interesting then. You said "ten cents per weed". So, how many weeds do you need to pull to earn one dollar?

Calvin: A hundred weeds.

I: A hundred weeds would be the same as how many dollars?

Calvin: A dollar.

I: Why don't you write down for me how you figure it out?

Calvin: I don't really know how to explain.

I: So, what we've figured out here or what you've figured out here - which is pretty clever - is that if you're going to earn \$5 an hour, basically you need to collect around about 50 weeds for it to be the same amount of pay.

In this example, Calvin became confused as he was prompted to do some mathematics. Calvin did not seem to see that \$5 per hour is the same as 50 weeds at ten cents per weed, and \$10 is double the amount of money and double the amount of weeds. Performing mathematics did not seem to illuminate the context for Calvin.

Elizabeth's response revealed rich insights into her family background:

I think per weed because [per hour]... I might be getting paid for work that I haven't done, so I don't want to do that because [Mum's] not a rich... she's just, yeah, so... If she's happy to pay me, I'd only want \$5 because I don't want to say, "Oh no, that's not what I want. I want \$10, \$15, \$20." That's what you get paid in a real job for an hour, so yeah...

Elizabeth was being raised by a single-mother. The above response reveals her understanding that money is a scarce resource at home, a level of discomfort about earning money for helping out around the home, and an understanding what a minimum wage looks like. In this example, Elizabeth's financial problem-solving and decision-making is influenced by the values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy) related to money being learned within the home. These social understandings seemed to result in a desire to be paid quid pro quo, rather than take the opportunity to maximise the possibility for personal financial gain.

Students' responses to "Being enterprising" suggested that they did not see the relevance of mathematics to the problem and/or did not know how to apply their mathematical knowledge and skills to the context for the purpose of modelling the pros and cons of the two payment

options. While the students seemed confident making and justifying a decision, they did so with reference to their values, and without contending with the mathematical dimension of the problem.

5.2.2 FINANCIAL DILEMMAS ABOUT SPENDING MONEY

The following two financial dilemmas about spending money were designed to uncover students' values and attitudes regarding money in situations where a financial decision impacts at least one other person. In this way, there was an ethical dimension to the problems.

"Oops... incorrect change" enabled me to examine students' ability to perform some straightforward calculations involving dollars and cents, and what they reported they would do if an error was made. Ethical understandings were implicit in students' responses to this financial dilemma, although there was the risk that students might answer by saying what they thought I might expect them to say. The task was presented as shown in Figure 5.2.

OOPS... INCORRECT CHANGE

Your Mum asks you to buy 2 litres of milk on your way home from school today. The milk costs \$3.50. You also buy an ice-cream for \$2.50. You pay using a \$10 note. The woman is distracted by another customer and gives you \$10 too much change.

- a. What is the correct amount of change?
- b. What will you do about the error?
- c. *If student indicates they would give back the money...* What if you were given \$20 too much change?
- d. *If student indicates they would keep the money...* What if you knew the woman would have to pay \$10 out of her own money for the cash register to balance at the end of the day?

Figure 5.2. Oops... incorrect change.

All of the students interviewed used mental calculation, and most were able to figure out the correct amount of change. Tayla was the only student to make an error. As I interpreted she may have told me the total cost of the purchase, instead of the change, I sought to clarify her response:

Tayla: She should have given me \$6.

I: Do you want to do some figuring out with the pen and paper, or do you want to use the calculator at all?

Tayla: I don't know.
I: So, you think you should have \$6 change?
Tayla: Yep.
I: And she's given you \$10 too much. So, how much change do you now have?
Tayla: \$16.

All but one of the students did not hesitate to respond they would correct the error by giving the additional \$10 back to the woman, and would certainly do the same if given \$20 too much change. Were the students simply telling me what they thought an adult would want to hear? Given the opportunity in "real-life," would they actually keep the money? These are important questions. I believe the students were being honest - I have no reason to believe otherwise. However, a similar question was included in the online assessments completed by students in Stage 3 of this research project to draw responses from a larger sample of students given the opportunity to answer anonymously.

Elizabeth and Justin's responses were particularly interesting given their household income was most limited. As though she'd experienced a similar situation before, Elizabeth replied:

I'd say, "Excuse me," and if she's got a name tag on I'd say her name... "Excuse me, you've given me too much change." and I'd give her the \$10 back and then, yeah, that's what I'd do."

Elizabeth's polite response revealed maturity and ethical understandings. Since her mother worked as a bakery assistant, it may have been that Elizabeth had been exposed to conversations about the importance of calculating change correctly so as to balance the till.

Justin was the only student to falter in his response, and the conversation we had reveals the potential for this particular dilemma to be used as the basis for teaching and learning ethical understandings. As I sensed from Justin's tone of voice and body language that he wasn't being truthful, I sought clarification:

I: And what do you do about the error? She's made a mistake in giving you too much. What do you do about it?
Justin: Tell her?
I: Would you?
Justin: Probably, it depends really.
I: What does it depend on?
Justin: I don't know, just sometimes, like if it's something like a couple, like ten or twenty cents, it doesn't really matter that much... probably give it back.
I: You'd probably give it back. Would anyone know if you didn't?

Justin: No, not really.
I: So is it okay to keep it then?
Justin: Probably, if no-one knew.
I: What if she gave you \$20 too much change, what would you do then?
Justin: I'd still give it back.
I: You'd give it back.
Justin: If not, give it to my mum and my mum might do something.
I: Ok, so I just want to make sure I understand. When she gives you \$10 too much change you said you'd probably give it back but you might keep it.
Justin: Yeah.
I: And when she gives you \$20 too much change you'd definitely give it back, is that what you said?
Justin: Yeah because it's too much.

We were both smiling, as though we had shared a secret. Here, Justin indicated that his values were conditional on the amount of money at stake. He seemed to imply that it is ok for the business or individual concerned to sustain a relatively small loss (\$10) that might be a windfall for him and/or his mother, but if the error was more significant (\$20), he would be more likely to admit that an error had been made.

The mathematics associated with this financial dilemma was not particularly challenging, nor did the students struggle. The ethical consideration inherent in this problem could make for productive whole-class discussion where varying scenarios are debated. For example, asking questions in the third person like, “Nick found \$20 change left behind at the self-serve checkout at his local supermarket – what should he do?” and “Nick found a \$50 note dropped beside the ticket machine at the train station – what should he do?” compared with “What would your parents expect you to do in this situation?” might allow competing values, attitudes, and subjective norms (expectations) to be critically explored. Alternatively, poll findings might be presented as the stimulus for conversation – for example, “In a recent survey, 25% of shoppers indicated they would keep amounts up to \$20 they found left behind at the self-serve checkout at their local supermarket”.

“Sharing holiday accommodation” was designed to find out how students view sharing payment for a particular resource, their ability to use multiplication and division, and what factors they considered and valued when making a financial decision that affected others. This problem was scaffolded in two parts to help students feel comfortable and build their confidence to tackle more complex problems later in the interview. It was presented as shown in Figure 5.3.

SHARING HOLIDAY ACCOMMODATION

A single person and a married couple are planning a holiday together. The friends will share a two-bedroom holiday unit at a caravan park for 5 nights. One bedroom has a double bed, the other has two single beds. The cost is \$100 per night.

- a. What is the total cost of the accommodation?
- b. How much should the single person pay, and how much should the married couple pay? Justify your decision.

Figure 5.3. Sharing holiday accommodation.

It was anticipated that students would perform two calculations – one to figure out the total cost of the accommodation, and one to distribute the cost between three people, two of whom are married. Since there are different ways to approach the second calculation, the choice of an option would vary depending on students' perception of fairness. The ways and means by which students justified their thinking were of particular interest to me, since these explanations revealed the extent to which students relied on social and/or mathematical understandings to guide and inform their financial problem-solving and decision-making.

All of the students were able to mentally calculate that the total cost of the accommodation was \$500. Figuring out how much the single person should pay, and how much the married couple should pay, and justifying their thinking proved more challenging. Lara gazed wide-eyed at her worksheet, and said, "Gosh, I didn't think about that... [pause]... Oh my god." Isabel was apprehensive, and seemed reluctant in case she might say the wrong thing - "Oh... <giggle>... <pause>... ummm, oh, I don't know, ummm... <pause>..." It was at this point in the student interviews that I often had to be encouraging and supportive. The students seemed to be unfamiliar with open-ended mathematical problems. For example, I said to Isabel, "Remember, there's no right or wrong answer, I'm just interested in what you think." This reassurance seemed to help the students to relax a little, and have a go at answering the question. Each financial decision was able to be organised into two categories (A and B), presented in Table 5.2. The incidences of mathematical error were also recorded.

Table 5.2. *The range and frequency of responses to “Sharing holiday accommodation”*

	A. Share the cost equally	B. Share the cost one-third to two-thirds	Incidences of mathematical error	Total number of responses per student
Samantha	X	X	X	2
Lara		X		1
Isabel		X		1
Calvin	X			1
Tayla		X		1
Bruno		X	X	1
Justin		X	X	1
Elizabeth		X		1
Total	2	6	3	9

Two students suggested that the cost of the accommodation should be shared equally, with the single person and the married couple each paying half (Option A). Calvin readily suggested that “The married couple should pay \$250, and the single person should pay \$250.” When asked why, he simply replied, “It’s fair.” He did not justify his thinking in relation to the available information about the accommodation (i.e., the different descriptions of the bedrooms). Being able to explain one’s social and mathematical thinking is an important aspect of these financial dilemmas. While Calvin believed his solution was fair, the real question is whether he would be able to convince others that this is the case during a whole-class discussion.

Seven students applied mathematical strategies that would have the cost of the accommodation shared with the single person paying one-third and the married couple paying two-thirds (Option B). Lara, a student being extended in Mathematics, used mental estimation to do this rather efficiently:

- Lara: I’d probably go with about \$350.00 to \$150.00.
 I: So, the married couple pays?
 Lara: \$350.00.
 I: And the single person pays?
 Lara: \$150.00.

Justin had the same idea, but was less successful in working with the numbers. He had correctly identified the total cost of the accommodation as being \$500, but seemed to substitute his starting figure as \$600 part way through this conversation:

Justin: Maybe the single person \$175 and like the married couple <pause> \$425 maybe, or \$200 for the single person because you've got to kind of put it into one-third each...

I: You'd like them to pay a third each would you?

Justin: Yeah.

I: How would you figure that out?

Justin: $200 + 200 + 200$ is 600 and then divide the 100 which I don't know if it can be divided.

I: <pause>... Would you like to write down some of your workings out?

Justin: No, not really.

I: <giggle>

Justin: I'm not that good at writing down problems.

I: So basically you'd like them to split the \$100 [per night] three ways but you're not quite sure how to figure it out?

Justin: Yeah.

Bruno was confused, and responded that the single person should pay \$100 and the married couple should pay \$200.

Tayla, on the other hand, capably used mathematics to decide how to split the bill:

Tayla: Well, if they're staying together then they should split it up.

I: How should they split it up?

Tayla: Like divide 500 by three which is, I don't know.

I: Do you want to figure it out with the pen and paper or maybe the calculator?

Tayla: The calculator... <pause>... One hundred and sixty-six, six, six, six, six, six.

I: So what's that in dollars and cents, roundabout?

Tayla: Probably \$160.66. Sixty-five, since there's no one cents.

I: So, you think each person should pay the same amount of money?

Tayla: Well, the couple should pay a little bit more because there's two people.

At this point, I wanted to clarify what she was saying, and see if she would figure out $2 \times \$166.65$ for the married couple so as to finalise her response. She did not seem to want to do any more calculations:

I: So, how are we going to work this out?

Tayla: Well, every person could pay \$166.65.

In this conversation, Tayla reasoned that the cost of the accommodation should be apportioned on a per head basis, and used mathematics to make a financial decision how much each person should pay. While she explained that the married couple should pay more

on the basis there are two of them, she did not refer to the difference between the bedrooms to justify her decision.

Elizabeth took a different approach to this question compared with her classmates. She was the only student to hone in on the difference between the bedrooms, and the implications this might have on the amount to be paid. She also started by splitting the cost per night (\$100) and then multiplying that by 5 nights, whereas her peers tried to split the larger figure (\$500), either arbitrarily, or in Tayla's case, by dividing. She was also the only student prepared to write down her workings out:

Elizabeth: Well, if they've got a double bed, probably like \$300 or something? Oh no, oh, it's \$100, whoops... \$60 or something... \$65 and then the person with the single bed pays like \$30.

I: Per night?

Elizabeth: Yes.

I: Okay. So then can you figure out for me - you might want to write that down - can you figure out for me then what the total cost for the single person and the married couple is?

Elizabeth: So \$65 for the married and then \$35. So five nights <pause>... I don't think I've done that right. I like money but I'm really bad at maths. Five times 35 is - <refers to her workings out> I always do this - I just find it easier.

I: Okay, that's alright.

Elizabeth: That's \$17.50. No, 700. 175.

I: 175 what, Elizabeth?

Elizabeth: Dollars.

I: Good girl! You did a really good job of figuring that out.

Elizabeth: That's for the single person and now... <pause>... so they have a whole big unit to themselves?

I: It's like they're sharing a little house.

Elizabeth: <pause> 325 and then...

I: 325 what, Elizabeth?

Elizabeth: Dollars and then 175... <pause>... yeah that equals \$500.

I: Yeah, so you just double checked that it equals that?

Elizabeth: Yeah.

I: Good on you Elizabeth! So you think it seems fair that the married couple pay a little bit more because they get the double bed, that's what you explained to me earlier?

Elizabeth: Yeah because the married couple have a bigger bed so it's probably a bigger room... and then the single person has got the small room with a small bed and all that sort of stuff, so...

The approach taken by Elizabeth shows the potential in this particular financial dilemma as a teaching and learning activity. Elizabeth drew on consumer and financial understandings to explain that since the married couple were getting a larger, more comfortable bedroom, they should pay more per night. She also used mathematics to support her decision how to split the cost of the accommodation. She used mental estimation to roughly split the cost of the accommodation per night one-third (\$35) to two-thirds (\$65), and multiplied those amounts by five nights. In the way that she drew on social and mathematical understandings simultaneously and in synergy, Elizabeth made a more informed financial decision than her peers. Pedagogies to encourage this type of financial problem-solving and decision-making would be an important feature of the educational intervention.

It is worth noting that despite my encouragement to write down their workings out, most students preferred to engage in mental computation. Without the figures written down in front of them, the students seemed to find it difficult to clarify and justify their thinking, as this conversation with Samantha shows:

Samantha: Well, I'd say \$350 each. Like, no. I'm not good at this.
I: No, that's all right. Explain that to me.
Samantha: Isn't three and a half half of five? Is it? I'm not good at this.

As a researcher, I was concerned that Samantha seemed to be feeling uncomfortable about her mathematical ability. I decided to proceed cautiously, as follows:

I: Okay, so you're trying to figure out what's half?
Samantha: Yeah.
I: Okay and do you think they should pay half each?
Samantha: Yeah.
I: Okay. So then you think the married couple will pay half of \$500?
Samantha: Yeah.
I: And the single person will pay half of \$500?
Samantha: Wait, no, can I change it?
I: Remember though, there's no right or wrong answer. So I'm just interested in what you think. So you explain to me what you think.
Samantha: I'm thinking that because there's two for the married couple and then there's one other person, that the married couple should pay a bit more than the single person.
I: Okay. So how much would you like the married couple to pay?
Samantha: I'd say about maybe \$345 and then the other one can pay \$250.
I: Okay. Okay. Thanks, Samantha.

Samantha seemed to be trying to estimate that the single person pay one-third, and the married couple two-thirds, of the total amount. But then she continued:

- Samantha: Wait, no, that's not – does that equal \$500?
- I: Do you want to write down your workings or use the calculator?
- Samantha: Yes. No, that doesn't make it work. Wait, no, I still think that they should pay half each.
- I: Half each?
- Samantha: Yeah.
- I: The married couple pays half, the single person pays half?
- Samantha: Yeah.

Despite initially agreeing she would do so, Samantha did not write down any workings out. This conversation shows how challenging it can be to engage students in conversation about their problem-solving and financial decision-making, particularly when they lack confidence in their mathematical ability and do not write down their workings out so that you can see what's going on in their mind. This conversation with Samantha is interesting for another reason though. She was the only student to suggest two ways the cost of the accommodation might be shared. However, she seemed focused on finding the “right” answer, and did not justify her decision either way. Since there are two possible ways of thinking about what's fair, and applying mathematical thinking, there is merit in further conversation so as to promote critical understandings about the alternative options, and the reasons why each option might be argued as fair by the parties concerned.

“Sharing holiday accommodation” highlighted particular characteristics that make for an effective financial dilemma. For example, the fact that this problem was open-ended and involved multiple solutions challenged the students, who seemed focused on finding one right answer. The problem being situated in a context that students had either observed, experienced, or could imagine was also important. In this way, students have the opportunity to construct their understanding against the backdrop of their own previous observations and experiences. It is worth noting that the context required clarification, meaning I had to explain to some students that a holiday unit at a caravan park was the same as a little holiday house. The accessibility of this particular task could be improved with accompanying pictures of a holiday unit including a floor-plan. Elizabeth's response illustrates the ultimate goal of financial literacy teaching and learning – to equip students to draw on both social and mathematical understandings simultaneously and in synergy. The final key feature is that students be required to share and explain their financial problem-solving and decision-

making with each other, including justifying their reasoning. This is a catalyst for students to learn from each other.

5.2.3 FINANCIAL DILEMMAS ABOUT SAVING MONEY

The following two financial dilemmas about saving money were designed to uncover students' values and attitudes regarding money in everyday situations. "Price, brand, and quality" provided a context students would inevitably be familiar with – shopping for clothing. "Helping Frank and Nellie save," on the other hand, involved making sense of the costs associated with running cars. While this was a "real life" context, it was not likely to be familiar to 10-12 year old students.

"Price, brand, and quality" was designed to find out about students' conceptions of the relationship between these three concepts, and whether their financial decision-making reflected values, attitudes, and subjective norms (expectations) about money learned from their parents. This financial dilemma was not mathematically demanding, but mirrored a "best buy" comparison. It was presented as shown in Figure 5.4.

PRICE, BRAND, AND QUALITY
You would like a vest for the cooler weather.



Large retailer
(like BigW, Kmart, Target)
\$25

Smaller, fashion brand
(like Pumpkin Patch)
\$30

a. Which of the above would Mum/Dad be more likely to buy you? Why?
b. Which of the above would you prefer for to buy if you were spending your own money? Why?

Figure 5.4. Price, brand, and quality.

All of the students interviewed responded without hesitation that their parents would purchase option A, three complementary items from a large retailer for \$25 over option B, a single, branded item for \$30. The students drew on consumer and financial understandings

to readily explain why their parents would make this choice. Lara's explanation revealed her perception that her parents placed importance on getting value for money:

I think they would probably go to the larger retailer, because I most likely would grow out of it soon and it's not worth spending [more] - even if it was \$5.00 more - for something that I might grow out of quite quickly.

Tayla's explanation demonstrated an understanding of her parents' attitude to branded clothing – “We don't really buy branded stuff because it's too expensive. Only my aunty does for us.” This response gives the impression that branded clothing is viewed as a luxury that might be received as special gifts from people outside the immediate family.

Justin's explanation revealed an understanding that quality (in particular, reliability) is an important consideration when purchasing clothing, and this is something he associates with bigger brands like big W, Kmart, and Target. He said, “Because it's cheaper and it's a bigger brand which is more reliable.”

When asked what they would prefer to buy if spending their own money, most of the students agreed that the larger retailer offered better value for money. As Samantha said, “You get more for less.” Isabel and Bruno responded similarly, but made the connection that getting value for money on purchase decisions is part of a broader savings strategy. Isabel justified her decision as follows, “Because you get more for five dollars [less]... yes, that would be the smartest saving idea.” Bruno and Justin's responses revealed attitudes and values that are closely aligned with what each of their single mothers spoke about in their interviews – the importance of living within one's means, looking for value for money, and making savings where possible. This means that subjective norms (expectations) are apparent in the boy's responses. Bruno was emphatic, saying, “Because it would cost less and I need to save my money.” Justin was almost confused why one might consider spending more, saying, “What's the difference? Like it's cheaper, that's probably why. They're the exact same, aren't they?”

Calvin was the only student to indicate a preference for branded clothing – a decision that was not only inconsistent with what he believed his parents would do, but also with what his peers were saying. He described what might be termed an affinity towards fashion brands, saying, “Because I just like fashionable brands. I like them.” Calvin did not reveal what in particular he likes about branded clothing. However, some insight might be gained from Calvin's mother's interview, where she referred to children “getting caught up in having the latest trends” and there being “a lot of peer pressure” associated with this. This is one

possible explanation why Calvin indicated a preference for branded clothing – his perception that branded clothing is more socially acceptable. Herein lies the value in this particular financial dilemma as a teaching and learning activity – by exposing students to each other’s financial problem-solving and decision-making, there is the potential to promote critical understandings of financial values and attitudes while teaching knowledge and skills. The more information students search for and consider, the more informed financial decision they will make. It is difficult to know whether Calvin would have changed his mind if he knew that both his parents and his peers preferred to purchase from the large retailer because of the cost savings associated with this financial decision. Pedagogies that encourage students to make their own financial decisions, but require them to engage in critical whole-class discussion about factors they consider and value in doing so might result in students changing their minds.

“Helping Frank and Nellie save,” was designed to explore how students read and interpret simple numerical information, including comparisons made in a table. This problem was open-ended and challenging – the idea was to see what students did with the information available to them, how they interpreted the goal to save some money, and to what extent social and mathematical understandings informed their financial problem-solving and decision-making. It was presented as shown in Figure 5.5.

HELPING FRANK AND NELLIE SAVE		
Frank and Nellie own two cars. Each weekday, Frank drives to the closest train station, and takes the train to work in the city. He drives a total of 20 km each week. Nellie, on the other hand, drives to and from work each day. She drives a total of 100 km each week. Frank currently drives Car B. Is there a way for Frank and Nellie to save some money? Explain how.		
	Car A	Car B
Size	Large	Small
Total running costs	30c per kilometre	15c per kilometre

Figure 5.5. Helping Frank and Nellie save.

The students did not seem to see this as a mathematical problem. They drew on social, rather than mathematical understandings, and often had to be refocused on the available information and/or encouraged to undertake mathematics. This resulted in students

suggesting multiple options. The eight students interviewed made a total of seventeen suggestions how Frank and Nellie might save some money. Each suggestion was able to be organised into one of seven categories (A-G), presented in Table 5.3. Only three suggestions made by three students involved mathematics (indicated by X).

Table 5.3. *The range and frequency of responses to “Helping Frank and Nellie save”*

	A. Nellie takes public transport	B. Nellie walks to work	C. Nellie rides a bike to work	D. Frank walks to the train station	E. Nellie drops Frank at the station on her way	F. Frank and Nellie swap cars	G. Sell the large car	Total number of responses per student
Samantha		X					X	2
Lara						X		1
Isabel	X		X					2
Calvin	X				X			2
Tayla		X		X	X		X	4
Bruno				X			X	2
Justin	X				X			2
Elizabeth	X				X			2
Total	4	2	1	2	4	1	3	17

“Helping Frank and Nellie save” elicited fascinating and unexpected responses that showed the students had sophisticated social understandings which they drew on more readily than, and often instead of, their mathematical knowledge and skills. Suggestions A, B, C, D, E, and G involved saving money by not using one car. It seems that these suggestions were made based on social understandings, without the students engaging in any calculations.

For example, students who suggested that Nellie take public transport (A) did so despite there being no information about the availability or cost of public transport to Nellie included in this financial dilemma. They seemed to be operating on a preconceived idea that public transport is generally cheaper than driving.

Similarly, students who suggested Nellie walk to work (B) reported the health benefits associated with doing so. However, they had not engaged with the numerical information presented in the financial dilemma – if Nellie is driving 100 km to and from work each week, she would be driving around 10 km each way, a distance that is too far to walk. Following responses such as these, I tried to redirect students’ attention to the information available to them, as in this conversation with Samantha, where I point out that walking might not be appropriate:

- Samantha: Maybe if - like if the work was close to Nellie, she could walk there instead of driving...
- I: Okay. Okay.
- Samantha: And then it wouldn't cost that much – as much as what it does.
- I: Okay. She's driving a long way at the moment though, isn't she? So she probably can't walk. Is there another way that they could save some money?
- Samantha: Ummm... I don't know... [pause]... if she got a smaller car too.
- I: Yeah.
- Samantha: It would cost the same as that - it would be 15 cents less.
- I: Okay. So if she's going to get a smaller car what's she going to do with the big car?
- Samantha: She would – she could sell the big car.

Interestingly, Nellie riding a bike to work (C), Frank walking to the station (D), and selling the large car (G) are plausible suggestions beyond the confines of the problem that I had not considered or predicted. The suggestion to sell the large car (G) would actually raise money for the household – through the liquidation of the large car as a saleable asset. Perhaps this suggestion reveals sophisticated financial understandings – when cutbacks and savings need to be made, behaviour needs to change, and there are things that can be sold to raise money.

To elaborate that what students do and say when presented with financial dilemmas provides insights to help better understand adolescent financial literacy, consider this conversation with Tayla, who made four suggestions how Frank and Nellie might save some money. This conversation typifies the students' approach to this problem, and the extent to which social understandings were relied upon to make financial decisions:

- Tayla: Well, they could both share the same car.
- I: How would that work?
- Tayla: Well, Frank and Nellie both drive to the train station, [Nellie] drops Frank off and then Nellie could drive to work, and then after work she... could pick Frank up...
- I: Ok. Is there any other way they could save some money?
- Tayla: Well, Nellie could walk to work and Frank could... walk to the train station. They could walk more and do more exercise and not get so fat.
- I: But gee, Nellie's driving 100 km to work each week. That's a long walk.
- Tayla: Well, Nellie could drive the car, drive the small car and Frank could walk to the station, cause it's the closest train station.
- I: And then what would they do with the large car if they're not using it?
- Tayla: Sell it or rent it out if that works.

Tayla seemed to understand that people sometimes need to change their behaviour in order to save money. Implicit in her response is the attitude that a second car is a luxury Frank and Nellie can do without. However, she did not use mathematics to find or defend any of her suggestions.

Bruno's response was unclear at first, and since he was continuing to twist his sunhat in his hands, I was conscious that he be encouraged and supported. I therefore sought clarification what he was suggesting – did he want Nellie to drop Frank at the train station, as Tayla had suggested?

- Bruno: If Nellie changes to the small car they could both save. Well, she could save some money. And if Frank could walk some of the way there, or like stop the car halfway there and start walking, he could save some money.
- I: Mmm... That's really interesting, so it sounds like you're not going to use the large car. So what will you do with it?
- Bruno: Sell it.

Justin also suggested Nellie use the small car to drop Frank at the train station before proceeding to work, but stopped short of recommending selling the large car. He simply wanted to leave it at home.

None of the above students attempted to do any mathematics without being prompted, despite being explicitly told that I would be working with them to solve some mathematical problems. Only three students could be persuaded to do some mathematics: Lara, Calvin, and Elizabeth. However, lack of mathematical precision impacted their ability to make informed financial decisions. Consider this conversation with Lara, a student being extended in mathematics:

- Lara: Well, they could swap cars.
 I: Could they?
 Lara: Yeah, that would save money for Nellie and Frank; 30 by 300, 3,000 – that’s not right. Have you got any paper I can use?
 I: Yeah. Right here, see.
 Lara: I probably know the answer though. Sometimes I hate these sums. I was right. It is three thousand. That’s a lot <working> So, that’s <working> So, he pays three hundred a week – three hundred dollars a week... for petrol - is that right? ... Whereas <working> that one...
 I: Just talk me through what you’ve done there. Which one’s Frank and which one’s Nellie?
 Lara: I don’t actually know what that is.

As Lara had written some workings out (Figure 5.6), I was trying to make sense of what she had done. She seemed to have forgotten that she was working in cents, and needed to convert her answer to dollars and cents:

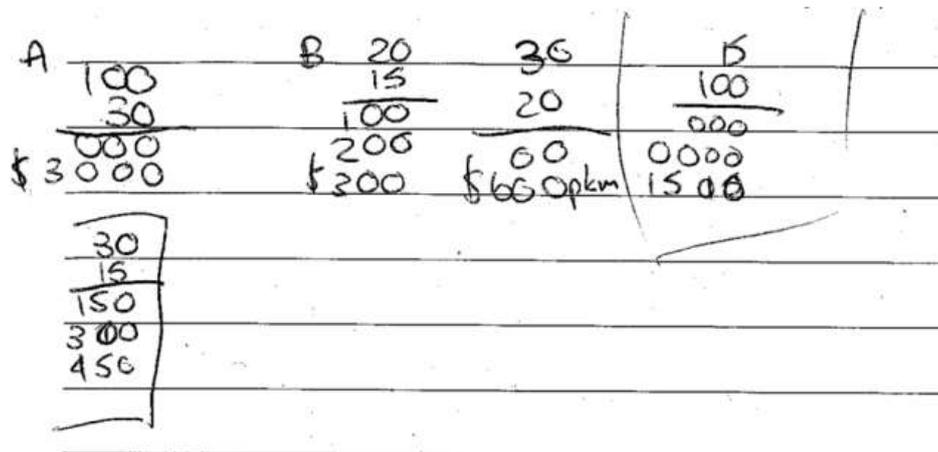


Figure 5.6. “Helping Frank and Nellie save” - Lara’s workings.

- I: So Nellie’s driving 100 kilometres and she’s paying 30 cents per kilometre.
 Lara: Yeah, that’s three thousand a week.
 I: Three thousand what per week?
 Lara: Three thousand dollars.
 I: Ok.

- Lara: 15 by a 100 <working>. Does that make sense? <working> Yeah, so she would only pay fifteen hundred if she were to use Car B. Whereas he only pays - oh my gosh - sorry, I love maths.
- I: Yeah, good on you.
- Lara: He would pay six hundred if he was to use the large car and she would only pay fifteen hundred [to use the small car].
- I: So, if they swapped cars, he would then only pay six hundred what?
- Lara: Six hundred dollars.

Lara made a critical error not converting cents to dollars and cents. She did not seem to realise that the figures she was citing – running costs of three thousand and six hundred dollars - were nonsensical. While it is hard to tell whether social or mathematical reasoning led Lara to suggest Frank and Nellie swap cars, she used mathematics to check and then reason that her suggestion was plausible.

While he made a different suggestion (that Nellie drive and drop Frank at the train station), Calvin's problem-solving followed a similar pathway. After listening to him suggest public transport, I decided to be more explicit in directing Calvin to the mathematics associated with this financial dilemma, to see what he could do with close guidance:

- I: Can you think of any other way when you look at those numbers? Would you like to do some maths at all?
- Calvin: Okay.
- I: So, at the moment Frank is driving Car B and it costs fifteen cents per kilometre. How many kilometres is he driving?
- Calvin: Twenty.
- I: Would you be able to figure out what 20×15 was? Would you be able to figure out how much it costs him to drive that car 20 kilometres?
- Calvin: I would probably have to work it out on a piece of paper.
- I: You can write on this piece of paper <reminding him of his worksheet>. This one's for you.
- Calvin: Now, can I put my?
- I: Yeah.
- Calvin: <working> Three hundred and ten.
- I: Three hundred and ten what?
- Calvin: Dollars.
- I: Are you sure about that? You looked a little bit confused then.
- Calvin: Two times five is - I am completely lost where I was up to - two times five is ten. Whoops, I should have made that a zero <corrects his own workings out>.
- I: So, does that change your answer?
- Calvin: Yeah. Now zero plus zero would be one. Three hundred.

I: Good on you Calvin. Good on you for correcting that error. So, three hundred what? It's going to cost three hundred...

Calvin: Dollars. Cents.

I: Say it a bit louder for me, Calvin. I think you're on the right track with what you just said.

Calvin: Cents.

I: Three hundred cents?

Calvin: Yeah. Which is three dollars.

I: Calvin, good on you! So, it's going to cost Frank three dollars to drive his car. How much is it costing Nellie at the moment?

Calvin: Can I do the same thing?

I: Please do. Yes.

Calvin: How many – I got it wrong – How many? A hundred and then times 30. Zero times zero is nothing. Zero times zero is nothing. I think this is what you did. Zero times one is zero and then you do zero times - like that? Three. Oh wait, that costs the same. That can't be. Whoops, I did an error.

I: Okay, can you figure out where you've gone wrong?

Calvin: Oh wait, I think I might have forgotten a zero.

I: Another zero where, buddy?

Calvin: I forgot the ten. I forgot zero here and so that would be zero.

I: So, then what's your answer? How much is it costing Nellie to run that car?

Calvin: Three hundred. Wait, thirty dollars.

I: Good on you Calvin. So, if it's costing Frank \$3 and it's costing Nellie \$30, is there a way for them to save money?

Calvin: They both go into the small car.

I: So, even though you've done the maths you stand by your idea that they should both take the small car?

Calvin: Yeah.

I: Just tell me how that works? Remember, Nellie has to drive to work but you want them to both go together. So, how does that work?

Calvin: Nellie wants to drive to work?

I: But it sounds like you want Nellie to take the small car.

Calvin: Yeah. They both go into the small car and she drops off - is it Frank? - to the train station and then he gets the train to the city and then Nellie goes to her work.

In a classroom situation, I would have liked Calvin to continue working on this problem. When prompted, he used mathematics to figure out how much money could be saved if Frank and Nellie simply swapped cars (total running costs would go from \$33 to \$21 per week, saving \$12 per week) – he had not yet done enough work to see this as an alternative. Just like the other students, Calvin did not see this financial dilemma as a mathematical

problem until it was deliberately contextualised as exactly that, and he was closely supported in applying his mathematical knowledge and skills to the information available to him. Calvin made a financial decision that actually resulted in a higher saving to the household than swapping cars (total running costs of only \$15 per week, and \$18 saving from the original scenario). However, he did not use mathematics to inform or explain his financial decision.

Earlier in his interview, when I asked whether Justin would like to write down his workings out, he politely responded, “No, not really. I'm not that good at writing down problems.” I tried to take a similar approach with Justin as I had with Calvin, by trying to focus his attention on the mathematics associated with this financial dilemma. Justin's resistance to mathematics continued, and my attempt to get him working was unsuccessful:

I: Is there a way that Frank and Nellie can save some money?

Justin: No, I don't know if there is.

I: Not sure?

Justin: No.

I: When you look at that question do you think about doing any maths at all?

What happened next was not mathematics. In a round-a-bout way, I finally established that Justin was making the same suggestion as Calvin – a clever idea that would certainly result in a cost saving to the household, but one that was not informed or supported by mathematics:

Justin: Yeah, maybe this car, A, could like go something like to the closest train station from her house like this one and then from the train walk to her work and walk back.

I: So you're thinking that Nellie might be able to take public transport just like Frank does?

Justin: Yeah.

I: What if there's no public transport that goes to her work, so she definitely has to drive, is there another way that they could save some money?

Justin: Instead of using that car they both use that car. One drives in it because it's smaller.

I: So how would that work, they both go in the small car and what do you mean?

Justin: And then one drives the other to work and then comes back.

I: So Nellie drops Frank at the train station and then drives to work herself.

Justin: Because if the work's – the car that goes the furthest work is there and the one's there they can go up there and back and it'd be the exact same distance.

I: So it sounds like you don't want to use the large car?

Justin: No.

This conversation demonstrates the lengths some students will go to in order to avoid doing mathematics.

Elizabeth demonstrated a different approach to financial decision-making - she engaged in mathematics and then used her findings to guide and inform a financial decision:

I: Is there any maths that you'd like to do?

Elizabeth: Well how much is the – thirty cents per kilometre... Okay, so he drives twenty so <working> so it's twenty times – we had this one yesterday <working>. So – then twenty one dollars for him to fill up his car.

I: So he's paying?

Elizabeth: It's fifteen cents every kilometre, and there's twenty kilometres, so it would be twenty one dollars for him, and then she's paying thirty. So thirty times 100 is <working> three thousand. Three thousand dollars. Thirty dollars.



Figure 5.7. “Helping Frank and Nellie save” – Elizabeth’s workings.

Using repeated addition instead of multiplying distance by cost (Figure 5.7) probably contributed to Elizabeth’s error in the total cost to Frank being \$21, rather than \$3. As Elizabeth did not check her workings out, a mathematical error led her to make and explain a financial decision that would save some money, but not as much as possible.

On the one hand, the students made insightful comments that revealed mature social understandings about saving money. Some students avoided doing mathematics. Others used mathematics, but did not draw on their social and mathematical understandings simultaneously or in synergy when tackling this financial dilemma. A reluctance or inability to do this would seem to be counterproductive to making informed financial decisions. These findings were concerning given the important role mathematics has to play in “real life” financial problem-solving and decision-making. Teaching that provides meaningful “real life” contexts in which mathematical concepts are situated would seem to be critical to financial literacy learning. In a classroom situation, “Helping Frank and Nellie save” would need to be introduced in such a way as to help students make sense of the information presented, perhaps through role play.

5.2.4 A FINANCIAL DILEMMA ABOUT SHARING MONEY

Like the previous financial dilemma, “Comparing charities – where does the money go?” was also open-ended and challenging. In Australia, charities are sometimes criticised for deducting administrative costs from donations. The information presented in the table was based on the websites of two real charities – World Vision (A) and The Smith Family (B) – so as to explore what factors students consider important when making choices about giving away money. In particular, this financial dilemma was designed to see whether students were interested in how the sponsorship money would be spent, and whether they were motivated to perform calculations to compare the cost of the sponsorship with the percentage that would reach the sponsored child. The task was presented as shown in Figure 5.8.

COMPARING CHARITIES – WHERE DOES THE MONEY GO?		
Your parents are thinking about sponsoring a child through a charity, and have asked you to research two particular charities. Here is a summary of your findings:		
	Charity A	Charity B
Amount	\$50 per month	\$40 per month
How the sponsorship money is spent	80% of the sponsorship amount goes to programs that benefit children and their communities. The focus is on providing clean water, food and medicine.	100% of the sponsorship amount benefits the sponsored child. The focus is on education, including school uniform, books, and school excursions.
Who benefits?	Children living in poverty overseas.	Disadvantaged children living in Australia.
Which Charity would you prefer to support? Explain why.		

Figure 5.8. Comparing charities – where does the money go?

It was anticipated that the students would calculate 80% or 20% of the total cost of Charity A and find that the amount benefitting the sponsored child was the same for both charities. However, the students did not seem to see this as a mathematical problem. Instead, they drew on particular values to evaluate the two charities, generally placing importance on how the sponsorship money would be spent with reference to social rather than mathematical

understandings. The range and frequency of responses to this financial dilemma is presented in Table 5.4.

Table 5.4. *The range and frequency of responses to “Comparing charities – where does the money go?”*

	Charity A	Charity B
Samantha	X	
Lara		X
Isabel		X
Calvin	X	
Tayla	X	
Bruno	X	
Justin	X	
Elizabeth	X	
Total	6	2

X The suggestions made where some mathematical problem-solving was undertaken

Six students preferred Charity A and justified their decision by explaining that clean water, food and medicine were more valuable than education-related resources, and/or that children living in poverty overseas are more in need of financial support than disadvantaged children living in Australia. Apparently these considerations were so important that the students would be prepared to donate more (\$50 compared with \$40). By contrast, two students preferred Charity B and justified their decision by explaining that it was important to them that 100% of money donated would benefit the sponsored child. While both these positions were reasonable, the students did not seem to have fully processed the information available in the table. In these ways, students’ responses tended to be motivated by their values.

Following responses such as these, I tried to redirect students’ attention to the mathematics associated with the financial dilemma. Most of the children were overwhelmed by the idea of calculating percentages, even though their teachers believed they had the necessary mathematical knowledge and skills to tackle this problem, and the students admitted having learned how to calculate percentages in class. This conversation with Isabel typifies how the students responded:

Isabel: Um [pause], well um [pause], probably charity B, not because it is less money, it’s more because 100% of it goes to it and then with charity A, there is another 20% that you don’t know where it is going sort of thing.

I: Yes.

Isabel: And if the child gets education and books and school excursions and uniform and stuff, that can also lead the education to more medicine and stuff so then that can benefit off that. When on the other side with

the water and stuff then once they do that they can go to school and get the education, but probably charity B because it is...

I: Do you want to do some maths at all when you look at that table, to help you make a different decision?

Isabel: I have no clue.

I: Do you remember doing percentages in class?

Isabel: Ages ago, a little while ago now, but no, I don't know.

I: If you could use a calculator, would you like to do some maths?

Isabel: I don't know how I would do it though.

Isabel's teacher believed she had the necessary mathematical understandings to tackle this task. Yet in this situation, Isabel was unable to apply her mathematical knowledge and skills to interpret the financial dilemma presented to her.

Only four students attempted mathematical problem-solving. Tayla's immediate response to this problem was that she needed to do some mathematics, but she was unsuccessful in calculating percentages:

Tayla Well, I need to work out what 80% of fifty is.

I: Would you like to do that? You can either use the pen and paper or the calculator.

Tayla: Ok. <long pause while Tayla fiddles with the calculator> I don't know how to do percentages.

I: So, what were you trying to do there on the calculator, because I couldn't see?

Tayla: Well, I tried typing eighty and the percent and then fifty equals and it just said fifty - which it probably didn't work.

I: Ok. So, what you want to do is figure out what 80% of fifty is?

Tayla Yes.

I: And you started by putting what into the calculator?

Tayla: I tried putting in eighty and then the percentage sign and the fifty but I don't know how to work out the percentages.

At this point, I wondered whether Tayla had another strategy for working out percentages, other than using the calculator:

I: Can you think of another way to help you figure out what 80% of fifty is?

Tayla: Not really, 'cause I don't know much about percentages.

I: So, why were you interested in finding out what 80% of fifty was?

Tayla: Because if 80% of fifty is less than forty dollars, then I'd go with Charity B, because they give more money to the children.

I: Well, I'm going to help you out with that. I'm going to tell you that 80% of

fifty dollars is actually forty dollars.

Tayla: Oh.

I: So what does that help you to decide?

Tayla: Well, I'll probably go with Charity A. Because it also pays the people that's working and then the \$40 helps people that needs to live. But in Charity B it's just for education and you can also learn a lot when you're at home. So, I think Charity A is better.

Tayla recognised that mathematics had a role to play in helping her to interpret the information presented in the table. She also had a rationale for wanting to calculate 80% of \$50, and could explain how knowing that would inform her financial decision. Furthermore, she seemed to understand that the \$50 donation would be used for two purposes: 1. to benefit the child being sponsored; and 2. to pay those employed to work for the charity. However, she was unable to do the mathematics. Lara, Justin, and Elizabeth engaged in mathematics when prompted to do so, but did not use their findings to inform or explain their financial decision. Lara, an extension mathematics student, described being told that it's important to find out how much of the donation will benefit the child concerned. Like Isabel, she preferred Charity B, saying, "It should be 100% of the money going to the child we're sponsoring. It's not about the cost or anything. It's about how much of it goes to the child." This is a valid response, but I wondered whether Lara had fully engaged with the table before making this decision, and so tried to refocus her attention on the information available to her:

I: When you look at that table, do you want to do any maths at all?

Lara: Not really, no <pause> not really.

I: Do you remember learning about percentages in class?

Lara: Yeah, I don't like percentages much though. I was never very good at them. I'm trying to work out 10% as a way. 10% is \$5.00, so that pays \$40.00 per month. It's the same thing - \$40.00 goes to the child.

I: So, just explain that to me again, because you figured something out there.

Lara: My dad always tells me to work out 10%, so 10% of that would be \$5.00. You take off the zero and then you just multiply that by eight.

I: So what did you find out?

Lara: That it's the same amount wherever you go, ah interesting, the same amount goes to the child...

In this case, an extension mathematics student avoided and resisted doing mathematics she was capable of, preferring to base a financial decision on a social understanding or value she had been taught. Through mental calculation, Lara was able to work out that the same amount of money benefited the child being sponsored whether she chose Charity A or B.

Justin and Elizabeth were the other two students to engage in mathematics, but only when prompted to do so. They chose Charity A, and reasoned that children living in poverty overseas are more in need of help than disadvantaged children living in Australia. Consider this conversation with Justin who, shortly after beginning to explain his decision based on the value he places on how the money is spent (on clean water, food and medicine), stopped to ask a question:

- Justin: Where does the other 20% go?
- I: I'm not sure. When you look at that problem do you want to do some maths at all?
- Justin: Maybe <pause>. I think it might be \$40 of that <refers to Charity A> goes – so that one's probably better.
- I: Just tell me what you just figured out then Justin?
- Justin: Like – <giggles> it's really hard to explain like...
- I: You did that in your mind, didn't you?
- Justin: Yeah.
- I: So somehow you came up with forty dollars. What did you figure out?
- Justin: Like \$10 would equal actually \$20 because it's only half of 50, so \$20 – like \$10 actually equals \$20.
- I: I see, so you've just figured out that either way <pause> \$40 is going to a child.
- Justin: Yeah.
- I: So does that change your mind about which child you're going to sponsor?
- Justin: No.

Here, Justin, who was vehemently opposed to writing any workings out, efficiently used mental computation to work out 20% of \$50. This meant he knew that the amount of money benefitting the sponsored child was the same regardless of the charity chosen. However, knowing this did not change his mind – he was prepared to pay more to donate to a charity he felt was doing more important work.

Elizabeth also chose Charity A, and explained that she believes children living in poverty overseas are more in need of help than disadvantaged children living in Australia, whose families may be able to lend a hand. As I had with her peers, I tried to refocus her attention on the mathematics involved in this problem:

- I: When you look at that table, do you think about doing some maths at all?
- Elizabeth: Well, yeah because if it was the other way around, so if it's \$40 a month or \$50 a month that would make it a lot easier because I can just think of it now but so \$50 – 80% is – pretend that's \$100 and then that would be 80 and 80% here is \$40. Okay so it's \$40 going directly to the child and here it's also going – so \$40 yeah.
- I: So what did you actually figure out here?

Elizabeth: That if I was to spend \$50 there <points to Charity A>, \$40 of that would go to the child, like directly to the child. I'm not sure where the other ten goes... So \$40 of that benefits the child <points to Charity A> but \$40 here benefits the child as well <points to Charity B>. But I'd prefer this one <points to Charity A>.

In these examples, Justin and Elizabeth make more informed financial decisions than their peers who did not perform mathematics to interpret the table.

Justin and Elizabeth were the last students I interviewed. Prior to meeting with them, I had been wondering whether this particular financial dilemma was too difficult for Year 6 students, as so few had been willing and/or able to calculate percentages, despite their teachers' confidence they had been taught how to. Considering the students' mature social understandings, and that they have presumably been exposed to percentage discounts in media advertisements and while shopping with their parents, there is a case for teaching and learning that provides meaningful "real life" contexts that require percentage calculations to be performed. This might help students to see that being able to calculate percentages is useful beyond school, and motivate them to master the necessary mathematical knowledge and skills to execute such calculations with confidence. Ideally, students should be able to identify the mathematical dimensions inherent in a financial dilemma before developing problem-solving strategies that draw on both their social and mathematical understandings. Such a critical approach to problem-solving is likely to result in more informed financial decision-making.

5.2.5 A FINANCIAL DILEMMA ABOUT SPENDING, SAVING, AND SHARING MONEY

"Three jars" was designed to find out the extent to which students' financial decision-making aligned with the values, attitudes, and subjective norms (expectations) about money that the parent participants had reported teaching their children. Data related to "Three jars" were collected from the parent, teacher, and student participants. Prior to the student interviews, parents and teachers were asked what they would like students to do in this situation, and to predict what students might do. What parents and teachers said revealed their values, attitudes and subjective norms (expectations), but also their knowledge and understanding of students' backgrounds, characteristics, interests, and financial behaviour. The task was presented as shown in Figure 5.9.

THREE JARS Imagine you receive a gift of \$100. How will you split the money? There is one jar for saving, one jar for spending, and one jar for sharing.

Figure 5.9. Three jars.

Teachers A and B seemed confident that students would know what they wanted to spend the money on. They indicated that students might be inclined to save a small amount, but believed they would be unlikely to give any money away (despite hoping they would). Teacher A's response was clear and direct, "I would want them to say, "Save my money for something that's important." However, she didn't seem to think that this was likely, "I don't think you'd get too many saying sharing... I think some would say save. I think most would say spend." When asked what she predicted students would spend their money on, her reply was again clear and direct, "Junk." Teacher B seemed to share the view that students would know what they wanted to spend the money on. With regard to sharing money, she said:

They wouldn't just give money for giving money. So they have to get something out of it. So I don't think they would be inclined to give it away without getting something back.

These views, while somewhat sceptical, are consistent with a general sentiment in society and the media that kids are raving consumers with unlimited, if not insatiable, needs and wants. Implicit in these statements is the view that children do not have the necessary (or perhaps what adults might deem appropriate) values, attitudes, knowledge and skills to make responsible, informed choices what to do with money. By contrast, the parents were generally accurate in predicting that their children would choose to save and share some of the money.

The decisions the children made when presented with "Three jars" are summarised in Table 5.5.

Table 5.5. *How students decided to use a gift of \$100*

	Family Occupation Weighting	Spending Jar	Saving Jar	Sharing Jar (shared with whom)
Samantha	0.5	\$50	\$25	\$25 (to charity)
Lara	0.5	\$20	\$40	\$40 (to charity)
Isabel	1	\$20	\$60	\$20 (to charity)
Calvin*	1	\$25	\$50	\$25 (within family)
Tayla	1.25	\$25	\$50	\$25 (within family)
Bruno	1.25	\$20	\$60	\$20 (within family)
Justin*	1.5	\$25	\$45	\$30 (within family)
Elizabeth*	1.5	\$30	\$45	\$25 (within family)

*denotes single-parent household

All the students made decisions that were closely aligned with their family values when faced with a windfall of \$100. Their decisions highlight the relationships between family values,

attitudes, and subjective norms (expectations) regarding money, and affirm that these factors are influential in next generation financial motivations, problem-solving, and decision-making. As discussed in Chapter 4, the importance of saving for the future was a shared value referred to by all of the parent participants. While the teachers predicted their students would be unlikely to save or share their money, each student reported being willing to save between \$25 and \$60. No student said they would spend more than half of the money in the first instance. Additionally, the students reported being willing to share between \$20 and \$40, either with a charity of their choice, or a family member or friend. While self-report data are not always reliable, the amounts students volunteered to give away suggest their decisions were by no means tokenistic. The children whose parents reported that the family donates to charity (Samantha, Lara, and Isabel) were more likely to nominate a charity they would donate to. It is interesting to note that the students from lower socioeconomic backgrounds interpreted that the beneficiary of the sharing jar might be a family member or friend in need, rather than a social or environmental cause. The children of single mothers (Calvin, Justin, and Elizabeth) all reported wanting to share some of their \$100 with their mothers. This may reflect the students' awareness that money is tight at home, and the decision to share a windfall would be appreciated. This particular insight was influential in the development of a similar item that appeared on the student assessment in Stage 3 of the current research project reported in Chapter 7.

Several of the parents would no doubt be surprised to learn what their child decided in response to "Three jars". For example, Calvin's mother predicted that he would save half the money, spend most of the other half, and share a little bit. When asked what she would want him to do if given \$100, she said that she'd ideally like him to save half, spend one quarter and share the other quarter. In fact, this is exactly what he decided to do. This reveals that Calvin's financial behaviour aligns with his mother's expectations. What was particularly interesting about Calvin's response was his decision to share \$25 with his mother.

Bruno's mother predicted he would save all of the money offered to him, saying, "That's just the sort of kid he is... his first instinct would be to save it." However, she said she would like him to distribute the money more equally between the three jars. In fact, Bruno allocated \$20 for spending, \$60 for saving, and \$20 for sharing, a decision that is consistent with the importance his family place on spending cautiously and saving. Bruno indicated that he would spend \$20 on "some things I would be using a lot... games or books." In this way, he implied the importance of getting value for money in his purchase.

Justin's mother predicted that he would choose to spend and share the money, although she did not specify in what amounts. She said she would prefer him to "buy himself something,

but save a fair bit of it.” In fact, Justin indicated he would spend \$25, save \$45, and share \$30. When asked about his choice, Justin demonstrated a strong understanding of the value of money – he could not identify a material need that he wanted to spend the money on, but said the savings should be banked – “I save up for a couple of things, but only buy if it’s like a real good deal.”

Elizabeth’s mother predicted that Elizabeth would save \$10, share \$10, and spend the rest on herself. However, she said she would like Elizabeth to save half, spend \$25 to \$30 and share the remainder. In fact, this is close to what Elizabeth did – she intended to save \$45 to her bank account, spend \$30 on clothes or shoes, and share \$25 with her mother and brother. Elizabeth’s decision to spend \$30 on clothes or shoes reflects the family’s limited income, as she said, “I don’t get very many.” Similarly, the decision to share \$25 was followed by an explanation that money is sometimes shared within her family in order to meet expenses. Elizabeth’s decision reflects maturity, and her understanding that money is a limited resource to be treated conservatively.

A similar question to “Three jars” was included in the online assessments completed by students in Stage 3 of this research project. This was to explore how a larger, more representative sample of Year 5 and 6 students would respond when given the opportunity to do so anonymously and by providing advice to a fictitious character. These findings are presented in Chapter 7.

5.3 LINKING THE FINDINGS TO THE RESEARCH QUESTION

On the one hand, the students involved in this stage of the research project made insightful comments that showed mature social understandings about earning, spending, saving, and sharing money that were closely aligned with what their parents reported teaching them. For example, the students’ responses to “Helping Frank and Nellie save” revealed they had a range of strategies for cutting costs and saving money. Furthermore, their explanations were consistent with the importance their parents placed on saving for the future. As noted in the previous chapter, the findings suggest that values and subjective norms (expectations) are closely related. This shows the elaboration of the theory of planned behaviour in action – values, attitudes, and subjective norms (expectations) were particularly influential in motivating the students’ financial problem-solving and decision-making. Perceived behavioural control (self-efficacy) was difficult to account for in the student data. In some respects, the students seemed confident in their responses, but their confidence was ill-founded. The students did not draw on their social and mathematical understandings

simultaneously or in synergy when faced with “real life” financial dilemmas. A reluctance or inability to do this would seem to be counterproductive to informed financial decision-making.

5.4 MOVING FORWARD WITH THE RESEARCH

The findings presented in Chapters 4 and 5 had important implications for financial literacy teaching and learning at school. Figure 5.10 is a proposed model that represents the problem-solving pathways students took in order to make financial decisions. Students preferred to engage in social reasoning, drawing on values, attitudes, subjective norms (expectations), consumer, economic, and financial understandings when making financial decisions. Most of their financial decisions were made without the use of mathematical calculation or reasoning, although the dotted lines indicate some students took these pathways when encouraged to do so. This model provided a focus for the next stages of this research project.

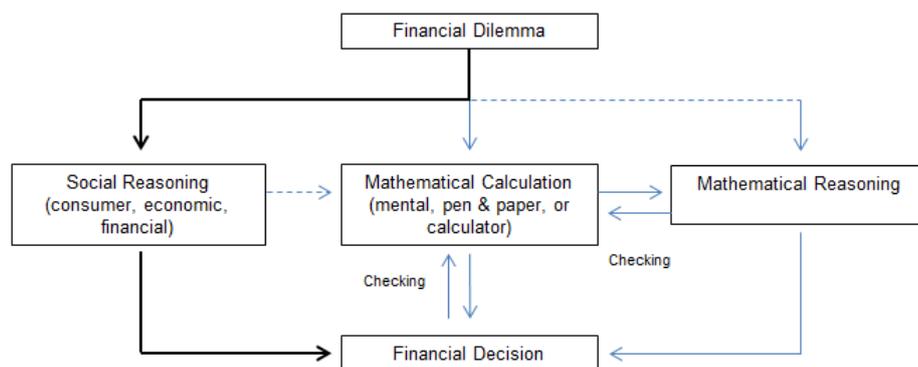


Figure 5.10. The social and mathematical pathways to students’ financial decision-making.

While the students interviewed tended to not apply their social and mathematical understandings simultaneously and in synergy in everyday contexts, it seemed reasonable that an orientation to do so might be developed through regular exposure to open-ended mathematical problems involving financial contexts (financial dilemmas) drawn from “real life” situations that 10-12 year old children might be familiar with, interested in, or able to imagine. This was an important juncture in the research project – improving financial literacy teaching and learning at school seemed to require a greater focus on the important role mathematics has to play in everyday financial problem-solving and decision-making. While it may be possible to make financial decisions without drawing on mathematical knowledge and skills, doing so enables more informed financial decisions to be made.

Based on these findings, I sought to develop an educational intervention that would enable teachers and students to identify and critically explore the various values, attitudes,

observations, and experiences regarding money existing among a class. The educational intervention consisted of five financial dilemmas and associated pedagogies. The financial dilemmas were essentially open-ended mathematical problems involving financial contexts drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in and/or able to imagine. Each financial dilemma would form the basis of a single mathematics lesson. The financial dilemmas required students to draw on both social and mathematical understandings simultaneously and in synergy, involved multiple solutions, and invited students to share and explain their reasoning. An important goal of the educational intervention was to strengthen students’ disposition to connect social and mathematical thinking as part of their financial problem-solving, the assumption being that doing so will likely contribute to informed financial decision-making.

The financial dilemmas were to be used together with researched pedagogies and practices that have been argued to enhance mathematics learning. These included:

- Providing a **rationale** for the lessons (Mandell & Klein, 2007) by defining financial literacy, explaining the difference between social and mathematical thinking, and emphasising the importance of both to informed financial problem-solving and decision-making.
- Building a strong **introduction** to the lesson through literacy and other strategies that give students confidence to begin problem-solving (Draper, 2002). Literacy strategies include: ensuring the problem is read aloud to the class; asking students to underline or highlight the information that they think is important to the problem; and asking students to identify any words they don’t know or understand so that these can be defined as a class. Other strategies that seem to help students make sense of financial dilemmas include the use of role play and concrete materials (i.e., notes and coins).
- Emphasising problem-solving **tools and strategies** that might help students, including creating tables to organise information and/or drawing pictures (Goos, Dole, & Geiger, 2011).
- Providing time for **individual thinking** and problem-solving, followed by **small group collaboration** where students can share and discuss their problem solving approaches and solution/s (Smith & Stein, 2011).
- Facilitating **critical whole-class discussions**, including: ensuring that a range of options (mathematical workings and explanations) are recorded, and asking open, sometimes provocative questions to stimulate different ways of thinking (Lappan & Phillips, 2009; Cheeseman, 2009; Sullivan, 2009; Walker, 2014).

The next chapter focuses on the classroom implementation of three financial dilemmas that were developed, trialed, and studied as part of the next stage of this research.

STAGE 2 OF THE RESEARCH: ENACTMENT, INTERVENTION

CHAPTER 6: TRIALLING THE EDUCATIONAL INTERVENTION IN YEAR 5 AND 6 CLASSROOMS

Stage 2 of this research project involved enacting the educational intervention through classroom trials. This was important to explore the alignment between the elaboration of the theory of planned behaviour, the educational intervention, and the potential impact of the thinking behind this research project in classroom settings. This chapter presents the findings resulting from the use of three financial dilemmas and associated pedagogies in four Year 5 and 6 classrooms in four different schools. Each financial dilemma was used as the focus for a 60-90 minute numeracy lesson, the aim being to trial, study, and refine the tasks and the associated pedagogies. This chapter is presented in five sections. First, the research aims, questions, contexts and data collection and analysis procedures are outlined. The next three sections focus on each of the lessons that I taught and/or observed during Stage 2. During each of these lessons, data were collected from a range of sources. Data were later analysed with a view to understanding the nature of the social understandings students bring to school from home, and how these seem to influence the problem-solving pathways students take when making financial decisions. In the final section, the findings presented in this chapter are linked to the research questions and the implications for the next stage of research are identified.

6.1 RESEARCH AIMS, QUESTIONS, CONTEXTS AND DATA SOURCES

This chapter explores the following research aim and question:

AIMS:

- c. To develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and learning.

QUESTIONS:

4. Can an educational intervention involving “real life” financial dilemmas and associated pedagogies enhance financial literacy teaching and learning? If so, in what ways?
-

An important feature of design-based research is the development of design principles that have an impact on teacher practice and therefore student learning. Mindful of this, I was

interested to explore whether the educational intervention was effective in engaging students in everyday applications of mathematics and orienting them to seek out and consider multiple alternative options before making financial decisions. I was also interested to explore whether the educational intervention might help students to consolidate their social and mathematical understandings by positioning both as having important roles to play in “real life” financial problem-solving and decision-making.

6.1.1 THE ENCOURAGING PERSISTENCE, MAINTAINING CHALLENGE (EPMC) PROJECT

Stages 2 and 3 of the research were situated within the Encouraging Persistence Maintaining Challenge project (EPMC), an Australian Research Council (ARC) Discovery Project (DP110101027). The EPMC project aimed to explore the characteristics of tasks that are appropriately challenging for school students, and ways of supporting teachers in converting such tasks into classroom lessons where students are encouraged to persist. The EPMC project involved teachers in trialling and reporting on challenging mathematics tasks. Much like this PhD research project, unique tasks and associated pedagogies constituted the educational intervention (for more details about this project, see Sullivan, Askew, Cheeseman, Clarke, Mornane, Roche, & Walker, 2014). Since the Chief Investigator of the EPMC project had received feedback that the teacher participants were interested in financial literacy teaching and learning, I was invited to contribute a range of financial dilemmas to be considered for inclusion. It is important to note that while the EPMC project was predominantly interested in students’ engagement with challenging mathematical tasks, I was interested in exploring tasks with both social and mathematical dimensions. Hence there was a synergy in and a distinction between our tasks. The decision to situate Stages 2 and 3 of the current research project with the EPMC project provided a number of advantages, particularly access to a broader set of participants and responses. It is stressed that I created the financial dilemmas and associated pedagogies as part of this doctoral study, and data were interpreted using the elaboration of the theory of planned behaviour – a theoretical framework that was unique to the doctorate.

Ten financial dilemmas were developed based on “real life” scenarios earning, spending, saving, and sharing money that were observed by, experienced by, or told to my supervisor and I. These included financial dilemmas involving “Sharing holiday accommodation,” “Buying a car,” “Buying a bicycle,” “Hiring a bus for a basketball trip,” and “Insurance for a hired bus” (Appendix I). Drafts of the ten tasks were circulated to leading academics with expertise in mathematics and financial literacy education so as to solicit expert feedback. The tasks were then discussed and appropriately modified. This peer review process enhanced the potential for the tasks to tap into Year 5/6 students’ existing social and mathematical understandings so as to be accessible but challenging.

Five of the ten financial dilemmas were selected to be part of the EPMC project:

- “Shopping for shoes”;
- “Making choices about spending”;
- “Anna and her friends”;
- “Catching a taxi”; and
- “The price of meal deals around the world”.

Each of these tasks is included in Appendix J at the level of detail they were presented in the *EPMC Teacher Participant Handbook*. The format included: a rationale for the lesson, particular pedagogical considerations; introductory, enabling, and extending versions of the task; a consolidating task; and some different approaches to the task. This information was provided to assist teachers prepare to use the financial dilemmas as the basis for a mathematics lesson. The order in which they might be used was not stipulated – this decision would be at the teacher participants’ discretion.

6.1.2 DATA COLLECTION METHODS

Data were collected through trialling the educational intervention in four upper primary classrooms in four different schools in Victoria, Australia. Researching how students responded to the financial dilemmas and associated pedagogies in classrooms provided insights to help better understand financial literacy in childhood and early adolescence, and ways that financial literacy education might be improved above and beyond what might have been possible through face-to-face interviews. In this way, the findings presented in this chapter build upon those presented in Chapters 4 and 5. School B is an eastern suburban Catholic school; School C is a northern suburban government school; School D is a Catholic school located in the north-west; and School L is a rural government school. As explained in Chapter 4, the Index of Community Socio-educational Advantage (ICSEA), created by the Australian Curriculum, Assessment and Reporting Authority (ACARA), was used to describe the socioeconomic profile of the school communities. The schools’ enrolment and ICSEA data are presented in Table 6.1.

Table 6.1. *myschool* Index of Socio-Educational Advantage (ICSEA) profile of Schools B-D (2012)

	Enrolments	ICSEA Value	Bottom quarter	Middle quarters		Top quarter
School B (Catholic)	251	1104	3%	16%	47%	33%
School C (Government)	233	1025	18%	26%	36%	21%
School D (Catholic)	547	1047	8%	37%	38%	17%
School L (Government)	583	1027	12%	29%	31%	28%
Australian distribution	-	1000	25%	25%	25%	25%

While each of the schools has some students in the bottom and top ICSEA quarters, they are best described as servicing diverse middle class school populations.

This chapter explores how the students approached three financial dilemmas selected for trial:

1. “Shopping for shoes” was used at School B with a class of 26 Year 5/6 students (11 boys and 15 girls). This lesson was taught by me.
2. “Making choices about spending” was used at School C with a class of 26 Year 5/6 students (16 boys and 10 girls). This lesson was taught by a University colleague (pseudonym Jane).
3. “Anna and her friends” was used at School D with a class of 23 Year 5 students (14 girls and 9 boys). This lesson was taught by the school Maths Leader (pseudonym Bette). It was also used at School L with a combined class of 55 Year 6 students (19 girls and 26 boys). This lesson was team-taught by two experienced classroom teachers.

As classroom trials can be time-consuming, this stage of the research was limited to three financial dilemmas implemented in four different upper primary schools and classrooms. The above three financial dilemmas were selected for trial for two reasons:

- a. because they were predicted to be most likely to resonate with students’ observations and experiences outside school; and
- b. because of their perceived potential to illuminate complex and related issues and insights into how students draw on social and mathematical understandings when engaging in financial problem-solving and decision-making.

Essentially, I sought to explore what might “make” or “break” implementation of the financial dilemmas and associated pedagogies in classroom settings. For example, “Shopping for shoes” involves two versions of the task – while the context remains the same in each version, the choice of mathematical model determines what constitutes a “fair” financial decision. I wondered whether the financial dilemma and associated pedagogies would facilitate this discovery by students. Since “Anna and her friends” involves similar principles, this allowed exploration of whether similar social and mathematical understandings influenced students in the pursuit of “fairness” across tasks and classroom settings. “Making choices about spending” involves a collection of price deals sourced in and around my local community that I thought students might have seen before. Again, this was intended to examine whether students became distracted by the social compared with the mathematical dimensions involved in interpreting value for money, and if so, which of the pedagogies might help to allow consideration of both aspects.

Each financial dilemma was used as the focus for a 75 minute numeracy lesson, the aim being to trial, study, and refine the tasks and associated pedagogies. These tasks are unique in that they involve social and mathematical dimensions. The calculations should be straightforward for students at this level. The challenge for students is not so much to determine one right answer, but to evaluate the differences between multiple options. In this way, the educational intervention models what financial problem-solving and decision-making looks like in “real life”. The tasks and the associated pedagogies make it clear to students that they are entitled to explain and/or defend any particular answer. The educational intervention emphasises argumentation and justification. Also, because of the degree of ambiguity, it allows for the consideration of sociocultural mediation in mathematics. A distinguishing feature of the financial dilemmas compared with other challenging mathematics tasks is that the context is central to the problem, and the calculations would not make sense in the absence of the context.

Data collected included audio and video recordings of the instructional and summary phases of the lessons, hand-written observational and reflective notes I made, and students’ completed worksheets. At School D, Bette was interviewed briefly before and after the lesson so that questions about her pedagogical decision-making and reasoning could be posed and her post-lesson reflections could be captured. The audio and video recordings were transcribed by a professional transcription service.

6.1.3 DATA ANALYSIS TECHNIQUES

Data analysis involved all student data sources being matched and categorised with a view to understanding the nature of social understandings students bring to school from home, and how these seem to influence financial problem-solving and decision-making. For example, individual students’ contributions to whole-class discussions were compared with the notes made on their worksheets, and categorised as reflecting social reasoning, or mathematical reasoning, or both. Additionally, students’ mathematical workings were categorised to the extent they reflected similar mathematical approaches. This enabled the frequency of mathematical approaches to be recorded and analysed. Hence, the reports presented in this chapter reflect the piecing together of various data sources so as to build accurate descriptive accounts of each lesson and in so doing fully address the research aims and questions.

6.2 LESSON ONE: SHOPPING FOR SHOES

“Shopping for shoes” was designed to find out how students interpret a situation where a sale offer is being shared by two people who must communicate and reach a decision

together about what is a fair amount for each person to pay. The task was presented as shown in Figure 6.1.

Task 1.1:
Jenny and Carly go shopping for shoes. Jenny chooses one pair for \$110 and another for \$100. Carly chooses a pair that costs \$160.
When they go to pay, the assistant says that there is a sale on, and they get 3 pairs of shoes for the price of 2 pairs.

- a. Give two options for how much Jenny and Carly should each pay?
- b. Explain which of these options is fairer.

Task 1.2:
Jenny and Carly go shopping for shoes. Jenny chooses one pair for \$110 and another for \$100. Carly chooses a pair that costs \$60. When they go to pay, the assistant says that there is a sale on, and they get 3 pairs of shoes for the price of 2 pairs (the cheapest pair becomes free).

- a. Give two options for how much Jenny and Carly should each pay?
- b. Explain which of these options fairer.
- c. Explain in what ways the fairer solution depends on the cost of Carly's shoes.

Figure 6.1. Shopping for shoes.

While the purpose of the task is to link social and mathematical reasoning in the minds of students, the task also allows consideration of friendship and “fairness”. Note that students were asked to give two options for each problem. This is critical for creating an awareness of alternative possibilities. Note also that the intention is that students work on the task prior to any instruction on how to do the task from the teacher. Readers are invited to tackle these tasks before proceeding.

This lesson was taught by me and observed by three classroom teachers. The decision was made to use the classroom teacher and researcher’s names as characters in the task to allow role-play conversations about the options students might raise over the course of the lesson. This later proved pivotal to the pedagogy.

The first segment of the lesson was spent communicating the lesson aims, introducing the main task, and setting expectations. To help students to access the task, Carly asked the class, “Who can tell me what a dilemma is?” Several students raised their hand to help define the term, and their responses were noted on the whiteboard. Student contributions

included that a dilemma is a real-life situation, where you face several options, and there is not necessarily one right answer, but several possibilities to choose from. This approach helped to construct a shared understanding about the type of problem-solving students would be involved in during the lesson. It was emphasised to students that, throughout the lesson, they would be required to talk about and explain their social and mathematical thinking – including why they made one financial decision over another and why they considered that decision to be better or fairer. Setting this expectation underlined the important role that sharing, comparing, and respectfully critiquing thinking would play in the lesson. These activities are central to the pedagogy as they drive conversations that promote critical understandings of the factors that influence financial problem-solving and decision-making.

Students were presented with Task 1.1 and asked if they could recall a similar experience shopping for shoes. Many of the students raised their hand to indicate they could relate to the task, and one or two shared stories about shopping with their mothers. Students were then given time to work individually on Task 1.1. The adults present moved around the classroom monitoring students' work and answering questions before four students were selected to show their working to the class and explain their financial problem-solving and decision-making. Each of the four options was noted on the whiteboard under the heading "Carly should pay..." They are presented as Options A-D in Table 6.2, in the order they were presented to the class by individual students. The "Frequency" column indicates the number of times each Option was recorded by students on their worksheets, as discovered during later data analysis. Using the whiteboard enabled students to visualise the variance in the impact of students' choices on Carly's wallet. However, it is important to note that while students were asked to record their mathematical working on their worksheets and explain them verbally, mathematical workings were not noted on the whiteboard during the course of the lesson. On reflection, this was a weakness in the lesson. Mathematical workings need to be made explicit so as to emphasise the important role mathematics has to play in "real life" financial problem-solving and decision-making.

Table 6.2. Frequency of student financial decisions and mathematical working in response to "Shopping for shoes" (Task 1.1)

	Financial decision and mathematical working	Carly should pay...	Frequency
Option A	Share the cost equally $\$270 / 2 = 135$	\$135	22
Option B	Share the saving equally $\$110 + \$100 - \$50 = \160 $\$160 - \$50 = \$110$	\$110	2

Option C	Only Jenny should benefit from the discount \$110 + \$160 = \$270	\$160	7
Option D	Divide the total cost by the number of pairs of shoes \$270 / 3 = \$90	\$90	4
Option E	Share the saving in a ratio (estimated) Total cost = \$270 Carly pays \$120, Jenny pays \$150	\$120	3
Uncategorised	Indiscernible mathematical working	-	2

Total number of mathematical calculations recorded	38
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It was not long before the majority of students had written at least one option, the most popular being for Jenny and Carly to share the cost of the shoes equally (Option A). A student was invited to showcase and explain this option to the class first, since so many students were familiar with it. This seemed to build students' confidence in their work.

Next, the class was asked whether anybody could suggest a different way of thinking about how much Jenny and Carly should each pay. Another student volunteered and presented that Jenny and Carly should share the saving equally (Option B), as follows:

Since the last pair of shoes is \$100 and they get it for free, it should be split as a bit of a discount. So you take \$50 off. So in total Jenny had both her pairs, would be \$210, you take \$50 off that, so that becomes \$160 and you take \$50 off Carly's pair of shoes, which now becomes \$110.

A third student indicated that he had thought about the financial dilemma differently. He explained his belief that only Jenny should benefit from the discount (Option C), saying, "It's fair that the person who has the highest priced shoes should pay more." His explanation seemed to imply a values position that a person who would choose expensive shoes must be able to afford them, and therefore should be prepared to pay for them.

Another student presented to the class that she had divided the total cost by the number of pairs of shoes (Option D). She reasoned Jenny should then pay \$180 and Carly \$90 (see Figure 6.2).

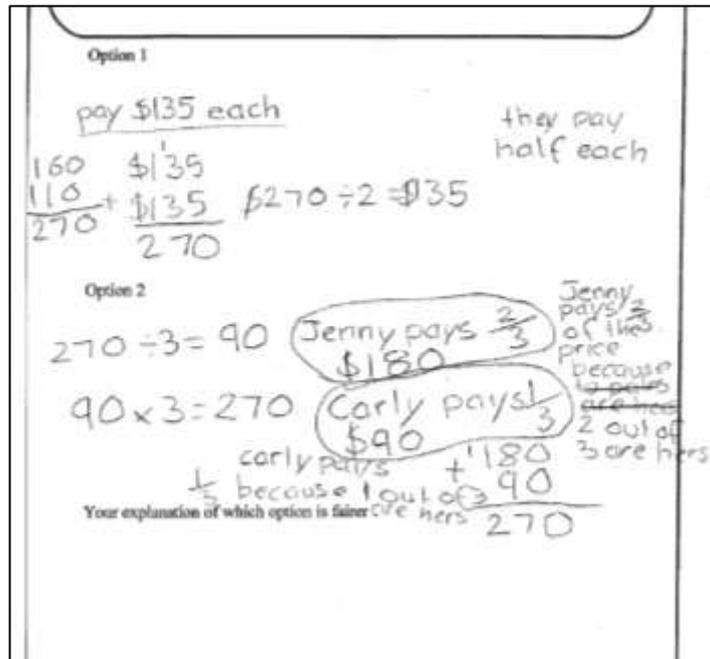


Figure 6.2. Student worksheet: Divide the total cost by the number of pairs of shoes (Task 1.1).

The suggestion that the saving could be shared in a ratio (Option E) was discovered when analysing students' worksheets. The working of a female student who took this approach is included in Figure 6.3. This student seems to have experimented with reducing the amount to be paid by Jenny and Carly so that both receive an unequal proportion of the \$100 discount.

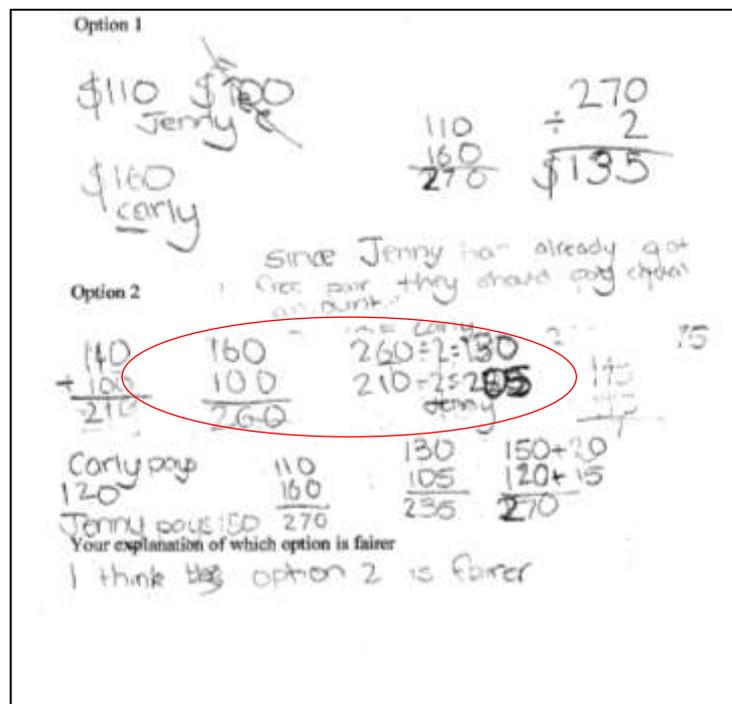


Figure 6.3. Student worksheet: Share the savings in a ratio (Task 1.1).

While I had anticipated some variation in students' social and mathematical thinking and solutions, the number and range of Options uncovered highlights that "Shopping for shoes" does in fact present a genuine financial dilemma.

Next, the lesson turned to Task 1.2. This gave students the opportunity to consolidate the mathematical approaches they had just used and discussed, and continue to explore the notion of fairness in relation to Jenny and Carly's financial dilemma. This time, students were more confident in tackling the problem, which was evidenced by their contributions to whole-class discussion and their worksheets. Three students were selected to show their working to the class, and explain their financial decision-making. Again, each of the options presented was noted on the whiteboard under the heading "Carly should pay..." so as to highlight the variance in the impact of students' choices on my finances. The three options are presented as Options F-H in Table 6.3, again in the order they were presented to the class by individual students. The "Frequency" column indicates the number of times each Option was recorded by students on their worksheets, as discovered during data analysis. This meant that the variance in the impact of students' choices on Carly's finances could be seen.

Table 6.3. Frequency of student financial decisions and mathematical working in response to "Shopping for shoes" (Task 1.2)

	Financial decision and mathematical working	Carly should pay...	Frequency
Option F	Share the cost equally $\$210 / 2 = \105	\$105	10
Option G	Share the saving equally $\$110 + \$100 - \$30 = \180 $\$60 - \$30 = \$30$	\$30	3
Option H	Divide the total cost by the number of pairs of shoes $\$210 / 3 = \70	\$70	6
Option I	Only Carly should benefit from the discount $\$110 + \$100 = \$210$	\$0	2
Option J	Only Jenny should benefit from the discount $\$210 - 60 = \150	\$60	8
Option K	Share the saving in a ratio (estimated) Total cost = \$210 Carly pays \$40, Jenny pays \$170	\$40	1
Uncategorised	Indiscernible mathematical working	-	8
Total number of mathematical calculations recorded			30

Tables 6.2 and 6.3 reveal that the students applied similar social and mathematical thinking to both financial dilemmas (Tasks 1.1 and 1.2). Many students repeated the approach that Jenny and Carly share the cost of the shoes equally. While the students worked individually, one student was quietly prompted to consider, "Is it fair for Carly to pay \$105 for a \$60 pair of shoes?" This simple question seemed to facilitate a discovery - the same mathematical approach applied to Tasks 1.1 and 1.2 did not necessarily lead to a fair outcome for both Jenny and Carly. Carly would be unlikely to agree to pay more than the retail value of her shoes while Jenny received a substantial discount on the purchase of two pairs. This student was not only willing to share his problem-solving experience with the class, he was immediately keen to explore alternative options. Many other students in the class were able to relate to his story, having initially pursued the same line of thinking. In fact, as Table 6.3 shows, 24 (80%) of the options recorded on students' worksheets involved Carly paying \$60 or more for her shoes, meaning Carly would not benefit from the sale offer at all.

Just as in Task 1.1, a student suggested that the saving be shared (Option G) - Jenny should pay \$180 and Carly should pay \$30. The student worksheet in Figure 4 is by the student who presented to the class that the saving should be shared when we were considering Task 1.1. This student used the same approach to the consolidating task, and recommended it as fair. In this example, the same mathematical approach applied to Tasks 1.1 and 1.2 resulted in a discount for both Jenny and Carly. In discussion, a number of students agreed that this seemed fair.

Option 1

\$110	Carly	Jenny
\$100	was \$60	\$210
\$210	now \$30	\$180

Because they will now share a \$60 discount (\$30 each)

Option 2

Carly	Jenny
\$60	\$150

Jenny is buying 2 pairs of shoes so should get the discount

Your explanation of which option is fairer

option 1 because they should share a deal that only both of them can get

Figure 6.4. Student worksheet, Share the saving (Task 1.2).

Toward the end of the lesson, as a way to introduce Option 1 to the class, I asked provocatively, “Why should I have to pay for my shoes at all? They’re the free pair!” The students’ usual classroom teacher interjected, “I don’t think that’s fair!” This is where the decision to use the classroom teacher and researcher’s names as characters in the task to allow role-play proved valuable to the pedagogy. Amused, the class erupted into heated discussion, with students throwing their hands in the air wanting to express an opinion. The students were keen to explain what they saw to be the fairest solution and why. They even argued with each other. Most (but not all) students agreed Carly should pay some money for her shoes, even though they were technically the free pair. One student capably explained that it was only by shopping together that the women had the opportunity to make a saving, so they should both benefit from it, saying:

It’s not fair to be saying [Carly pays] nothing, because if you’re both sharing, so you put all the pairs together, that makes three pairs, and that’s why you’re getting the discount in the first place. So if you make Jenny pay for two pairs, and [Carly pays] nothing, then it’s like, why then have a discount?

This explanation was insightful. The student seemed to understand that the social dimension to this financial dilemma was the reason a saving was able to be made. On her worksheet, however, this student had suggested that the total cost be divided by the number of pairs of shoes to figure out an average cost per pair of shoes (Figure 5).

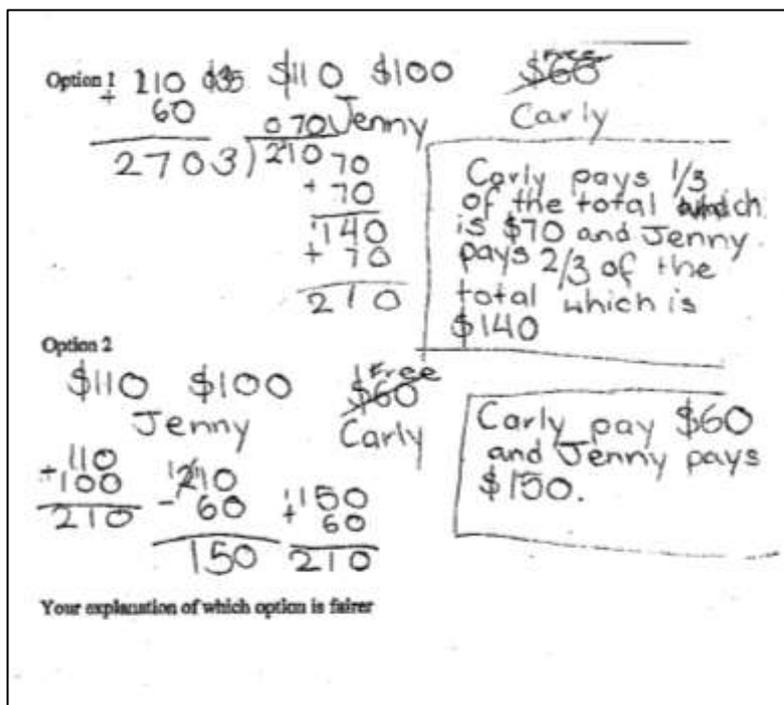


Figure 6.5. Student worksheet: Divide the total cost by the number of pairs of shoes (Task 1.2).

This mathematical approach would have Jenny pay \$140 for two pairs and Carly \$70 for one pair. Earlier, the idea that Carly pay more than the advertised price of her shoes was discussed as contentious. In this case, the student's contribution contradicts the mathematical working noted on her worksheet prior to the whole-class discussion. This speaks to the value of financial dilemmas for teaching and learning purposes – promoting critical understandings among students helps them to consider alternative options and even change their minds.

On both Tasks 1.1 and 1.2, students tended to recommend as fair sharing the cost or the saving equally, or dividing the total cost by the number of pairs of shoes (74% of student responses nominated these options on Task 1.1, and 63% on Task 1.2). Students were less likely to check their answer against the context for the second calculation. This resulted in 80% of student responses requiring Carly to pay \$60 or more for her shoes, and not benefit from the sale offer at all (something Carly would be unlikely to agree to as fair). Interestingly, on both Tasks 1.1 and 1.2, one boy indicated the best idea was for the women to forget the deal and buy their shoes separately. This is reminiscent of the mathematical avoidance I observed when interviewing students at School A (reported in Chapter 5).

In “Shopping for shoes,” making a decision impacts two people. In real-life, those two people would need to communicate and reach a decision about what is fair together. One student made an insightful comment that applying the same mathematical approach to Tasks 1.1 and 1.2 did not necessarily result in a fair financial decision for both Jenny and Carly, as follows:

In that one <refers to Option A on Task 1.1> you pay one hundred and thirty five dollars – it's fair. But in this one <refers to the equivalent mathematical approach, Option F on Task 1.2>, it's not fair, because the one hundred and five dollars each is <pause> It's like [on Task 1.1], Carly paid one hundred and sixty dollars - she was getting a discount. And Jenny's getting a discount because she would have paid two hundred and ten dollars. It's still a discount. But with that one <Task 1.2>, [Carly] wouldn't be getting any discount.

This student had not seemed to be particularly engaged in mathematics during the lesson. In fact, his worksheet featured only two sets of mathematical working (one for Task 1.1 and one for Task 1.2). But he had obviously engaged with the mathematical explanations his classmates had shared, and the whole-class discussion. This student demonstrated quality social and mathematical thinking, being able to synthesise what he had learned during the lesson (which was, in fact, an important intention of the lesson). This shows the power of Task 1.2 to consolidate and extend upon students' social and mathematical understandings.

Drawing on and critically discussing students' existing social and mathematical understandings helped to promote among the class different ways of viewing, thinking about, and solving "Shopping for shoes". The students engaged actively with the financial dilemma, and especially connected with the role play aspect of advising the teachers present. To the extent that a range of possible options for how much Jenny and Carly should each pay were suggested and evaluated, what real life financial problem-solving and decision-making looks like was openly modelled. As was anticipated, the consideration of multiple options gave students the opportunity to explain what they considered fair and to evaluate their solution against other possible alternatives. In this way, the task offered students a rationale for applying mathematics to everyday situations, and justifying their social and mathematical thinking.

Next, I discuss the use of a second challenging financial literacy task with a Year 5/6 class at another school.

6.3 LESSON TWO: MAKING CHOICES ABOUT SPENDING

"Making choices about spending" was designed to explore how students interpret value for money and make decisions when faced with price deals. The financial dilemmas included in this task stimulate thinking and discussion about whether it is desirable to receive a discount by paying upfront for services that are to be used at a future point in time, the relationship between quality and price, and perceptions regarding affordability. It was presented as shown in Figure 6.6.

Task 2.1:

Bob is considering a 10 swim pass at the pool which costs \$30 and is valid for 6 weeks. A single swim costs \$3.50. How would you advise Bob?

Task 2.2:

How would you advise these people?

- Thomas is thinking about gym membership, which costs \$50 to join and \$50 per month. A single visit costs \$15.
- Emma has three children at school: Andy, Allie and Amy. The school has their fete this weekend. Emma can order a 'ride wristband' online by tomorrow for \$30 for unlimited rides. If she waits until Saturday, wristbands will be \$40 each. Or, Emma can pay per ride on the day, with rides costing \$4 and \$5 each.
- Wendy is looking at a clothing shop which is advertising the following offer: spend \$100 and get 10% off the total; spend \$200 and get 20% off the total; spend \$300 and get 30% off the total.

Figure 6.6. Making choices about spending.

It was anticipated that students would be able to relate to one or more of the scenarios based on conversations, observations, and experiences at home or in their local community. Bundling the swim, gym, and rides tasks was intended to prompt students to practice applying mathematics to determine the point at which paying up-front for services becomes worthwhile. Service usage is the key and variable consideration. The scenario involving percentage discounts mirrors a popular sale promotion in clothing stores. The purpose of this task was to encourage students to perform calculations that enabled them to compare and contrast the amount spent and saved at each level of the sale promotion. I was interested to explore whether the perceived affordability of the deal distracted students from the mathematical dimension of the task, particularly given that it was anticipated that students would find the percentage calculations challenging. Readers are invited to tackle these tasks before proceeding.

This lesson was taught by an academic colleague (pseudonym Jane) and observed by the classroom teacher and I. Prior to the lesson, in consultation with the classroom teacher, the decision was made to allow students time to approach the financial dilemmas individually first, then form small discussion groups to facilitate sharing, comparing, and respectful critique of each other's thinking.

Jane explained that the purpose of the lesson was to trial a challenging financial literacy task, and get feedback from students what they thought about it. Task 2.1 was presented to the class, and they were given some time to consider it individually. The adults present moved around the classroom monitoring students' work and answering questions, before a whole-class discussion of the introductory task. The first student who was invited to contribute her ideas said, "Bob needs to shop around before he decides to buy a swim pass. He might find a better deal." This comment reflects the value this student places on being informed and confident about value for money before making a purchase decision. Another student drew on his mathematical working to explain, "Bob needs to swim more than 8 times for the swim pass to be worth it." Many students indicated their agreement with this statement, having reached a similar conclusion. The students seemed to understand that the number of visits to be made to the pool was an important consideration influencing value for money. Interestingly, another student pointed out, "But if you're not sure how often you'll go, paying per swim is a better idea." He seemed to be concerned that money might be wasted if circumstances prevented Bob from swimming more than 8 times in the 6 week period.

Next, the Task 2.2 was presented to students on a light purple worksheet with space to record their mathematical working. While students were asked to work on the three financial dilemmas individually, discussion was not strictly prohibited. A light yellow worksheet was provided to each student for him/her to record "first thoughts" such as questions what else they would like to know about each financial dilemma and advice for each of the characters concerned.

Probably because the first financial dilemma in the main task was similar to the introductory task, the students seemed confident in approaching it, and began working to figure out what number of visits makes a gym membership worthwhile. Students had not been working for long when one boy asked, "What is the quality of the gym? Like, if it's dirty, you might not want to pay \$50 per month to go there." This question seems to indicate the student appreciates the relationship between price and quality, and this is a factor that influences him in making purchase decisions.

Having had time to commit some of their own thoughts and mathematical working to paper, students were encouraged to share and compare their thinking in pairs or groups of four. This created small forums where ideas could be exchanged and challenged. At one table I observed, a student asked, "How many rides are there at the fete?" and went on to explain that knowing this would influence her assessment whether the ride wristband was "worth it." The student sitting beside her said, "I don't like scary rides. I'd rather spend the money shopping." At another table, one boy asked his classmates hypothetically, "What happens if

the kids get sick on the rides and have to stop?” These questions and comments seem to indicate students are interested in finding out about and evaluating value for money. They also revealed what the students value as being important when making purchase decisions. For example, while all three students were concerned about value for money, they viewed it differently. One was excited by unlimited rides, another wanted to purchase something tangible instead, and the third perceived there to be a risk in paying money upfront.

Wendy's percentage off dilemma also prompted fascinating questions and comments that revealed students' attitudes and values to money. One boy wanted to know, “How much was Wendy planning to spend before she saw these deals?” On the other side of the room, a female student said to her peers rather emphatically, “Wendy should buy what she needs and get the deal that suits.” Implicit in these students' contributions is the idea that purchase decisions should be planned and money should be spent satisfying needs, rather than pursuing wants.

The range and frequency of students' mathematical strategies and working, as recorded on their worksheets, is presented in Table 6.4.

Table 6.4. Frequency of student financial decisions and mathematical working in response to “Making choices about spending” (main task)

	Examples of mathematical strategies and working	Frequency
Thomas' gym membership	Price of single visit multiplied by number of visits	17
	$\$15 \times 4 = \60 (one visit a week for a month)	
	$\$15 + \$15 + \$15 = \45 (three visits)	
	$\$15 \times 31 = \465 (one visit a day for a month)	
	$\$15 \times 52 = \780 (one visit a week for a year)	
	$\$15 \times 365 = \5475 (one visit a day for a year)	
	Annual cost of gym membership	3
	$\$50 + 12 \times \$50 = \$650$	
	'Value' if you visit every day with a membership	2
	$\$50 / 31$ or 30	
Emma's ride wristbands	Price per wristband multiplied by number of children	7
	$\$30 \times 3 = \90 (order online)	
	$\$40 \times 3 = \120 (wait until Saturday)	
	Price of single ride multiplied by estimated number of rides	2
	$\$4 \times 20 = \80	
Wendy's % off deals	Correct calculation of % off deals.	5
Total number of mathematical calculations recorded in lesson		36

The summary phase of the lesson involved three students presenting their thinking and any mathematical working to the class (one student for each part of Task 2.2). The class was invited to ask questions and provide comments. This was an effective way to facilitate critical but respectful whole-class discussion about factors that influenced the students' financial decision-making. Jane probed explanations that drew on mathematical working with questions like, “Can you prove that to me?” and “Can you convince us about that?” But while students were required to explain and defend their contributions verbally, mathematical working was not noted on the whiteboard. As noted with regard to “Shopping for shoes,” it seems that recording and explicitly highlighting mathematical working during the summary phase of the lesson might reinforce the important role of mathematics in financial problem-solving and decision-making.

When discussing Thomas' gym membership, one student pointed out the total cost of one year's membership would be \$650, better value than paying \$15 per visit to visit the gym every day, for example. He explained it would cost \$5475 to visit the gym every day for a year if Thomas paid \$15 per visit. A classmate who seemed to not have thought about the total costs in these terms shook his head and said, "\$50 to join and \$50 per month is expensive. Where would he get that money from?" Perhaps implicit in this remark is the understanding that money is a limited resource that must be spent wisely. While one student focused on comparing prices, and making a decision in favour of the lower price, the other was concerned about affordability more than price.

Emma's ride wristbands dilemma elicited a conversation as to the 'hidden considerations' students wanted to know more about in order to make a decision in relation to the deal. One student wanted to know if one had to pay for delivery if you ordered the wristband/s online. A classmate replied to her directly saying, "No, I think you'd pick them up at the school." A third student joined in the conversation saying, "I think they'd email you a voucher." Another student agreed and justified his thinking by relating a previous experience purchasing entry to the Royal Melbourne Show, "We bought the passes online, and printed them out to take to the Show." Yet another student reiterated a concern that had been previously noted, "What if the kids don't like the rides? You've just wasted \$90." It is important to note that the students were talking with each other across and around the room, without any facilitation by the adults.

Wendy's percentage off deals also elicited interesting evaluative questions and comments. One student announced to the class, "You shouldn't spend \$300 just to get the deal. You might go broke." Another girl seemed to agree, saying, "People waste their money on things they don't need just to get a discount. It's not worth it." One student noted a similar value judgement on his worksheet, writing, "I think it is a rip off because \$300 is a lot of money to spend at once." Several students noted on their worksheets they would advise Wendy to shop around to find more affordable pricing or a better offer. In these ways, the perceived affordability of the deal seemed to distract students from the mathematical dimension of the task. This supported what was noted in the previous chapter – that students' values, attitudes, and subjective norms (expectations) regarding money sometimes interfere with their motivation to engage with the mathematical dimensions of a problem.

A classmate who had initially struggled with the task wanted to know, "Is Wendy shopping at a really expensive place? How many items will she buy to get the deal?" These questions resonated with yet another classmate, who explained, "The deal is good value if you get lots

of items.” This student seemed to imply that the percentage discounts were worthwhile if they meant Wendy is able to buy lots of items cheaply.

Four of the five students who recorded the correct solution to each of the percentage discounts being offered to Wendy seemed to use mental calculation to reach a solution. Only one student’s worksheet revealed a mathematical strategy for calculating percentage discounts (see Figure 6.7).

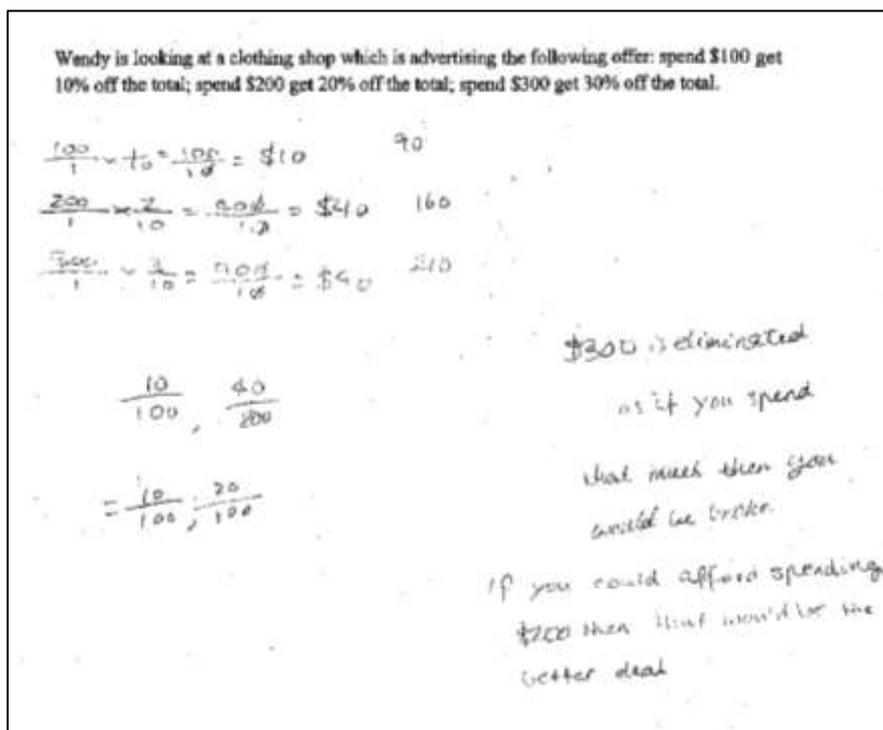


Figure 6.7. Student worksheet: Percentage calculation and values statement.

This student noted an important values statement about spending \$300 on her worksheet, and raised this during whole-class discussion “\$300 is eliminated as if you spend that much then you would be broke. If you could afford spending \$200 then that would be the better deal.” In response, another student capably explained, “If you’re prepared to spend \$200 to get 20% off, you might as well collect \$300 worth of items as you’ll only have to pay \$10 more.” Unfortunately, there was no evidence of mathematical working to support this particular line of thinking among the student worksheets submitted. This significant conversation is testament to the value of financial dilemmas for teaching and learning purposes – it seems that powerful insights can evolve by promoting critical understandings among students.

The questions and comments recorded over the course of the lesson reveal rather mature social understandings about earning, spending, saving, and sharing money. Some students’

contributions seemed to reflect attitudes and values to money most likely learned at home. Some students clearly related their thinking about the financial dilemmas to their own previous experiences as consumers. Some students made the distinction between needs and wants (a foundational economic understanding). The challenge would seem to be in modelling to students that mathematical thinking has an important role to play in financial decision-making. Analysis of the students' worksheets revealed most students either did not engage in mathematics or did not record their mathematical working. The student worksheets presented in Figures 6.8 and 6.9 are good cases in point. These students recorded values statements (i.e., for Wendy to spend \$300 is a rip off) along with mathematical arguments (i.e., related to the average cost of items being purchased). It is not known whether these students used mental calculation, or simply made a note of some of the verbal responses presented during the summary phase of the lesson.

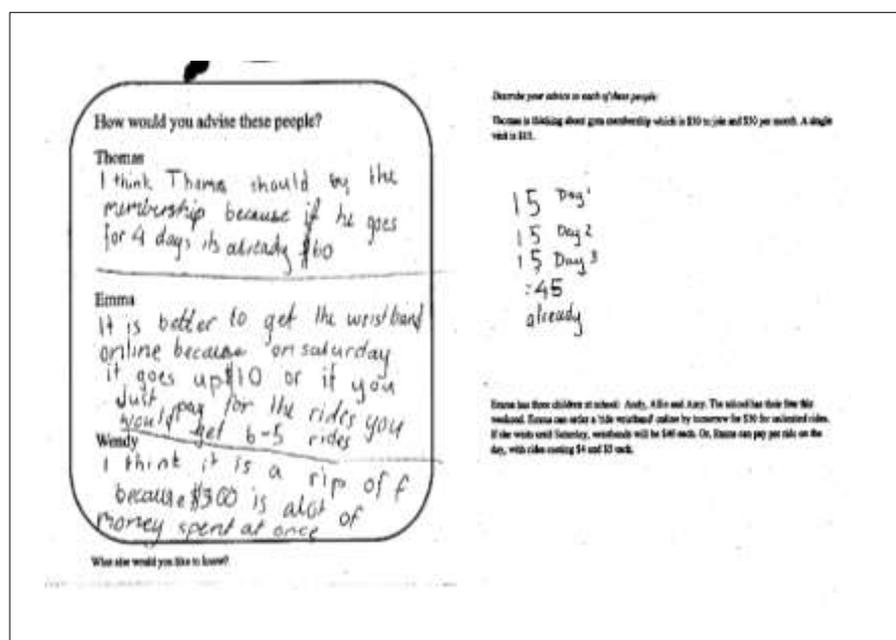


Figure 6.8. Student worksheet: Mathematical arguments and values statements, example 1.

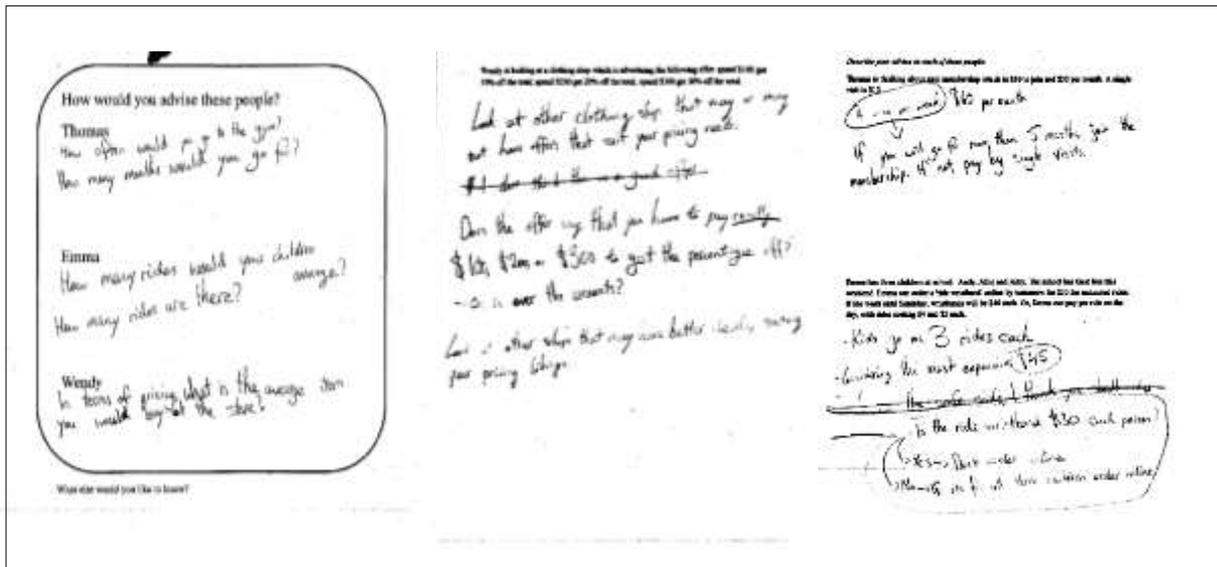


Figure 6.9. Student worksheet: Mathematical arguments and values statements, example 2.

A possible explanation for this finding is that Jane did not make a note of the mathematical working being discussed on the whiteboard. The classroom was cluttered, and while there were two whiteboards, they were already filled with notes (unrelated to the “Making choices about spending” lesson). Jane had taken a Powerpoint presentation and an iPad with the App “Share Me” so as to share students’ mathematical working, but was unable to use these visual aids as there was no Smartboard in the classroom. Even so, the same weakness in pedagogy was noted when I taught “Shopping for shoes” lesson at School B. This suggests it would be beneficial to students if teachers focused on explicitly connecting students’ social and mathematical thinking when using financial dilemmas so that students learn that financial problem-solving and decision-making involves drawing on these understandings simultaneously and in synergy.

In line with the intended purpose of the task, students were able to relate to the scenarios based on conversations, observations, and experiences at home or in their local community. Students asked questions and contributed to whole-class discussion in ways that revealed sophisticated understandings about value for money, the relationship between quality and price, and perceptions regarding affordability. Students seemed curious to find out more information about each scenario in order to make more informed financial decisions. It was particularly in relation to perceived affordability that students’ values, attitudes, and subjective norms (expectations) regarding money were revealed. Situating “Making choices about spending” during numeracy time encouraged students to apply mathematics in relation to everyday situations, and discuss their social and mathematical thinking. This lesson

highlighted the importance of recording the range of possible mathematical strategies and working used as part of whole-class discussion, and explicitly highlighting these during the summary phase of the lesson. This particular teaching strategy would seem to be essential to reinforcing the important role of mathematics in financial problem-solving and decision-making.

6.4 LESSON THREE: ANNA AND HER FRIENDS

“Anna and her friends” was designed to find out how students decide what is fair when faced with the opportunity to share a price deal with friends. This is perhaps the most relatable financial dilemma to Year 5/6 students, since children this age are likely to have visited the cinema and candy bar before, and may have been responsible for paying for their transactions upon doing so. However, the literacy and problem-solving demands of this financial dilemma are higher than “Shopping for shoes” and “Making choices about spending” as multiple steps are required to find a solution. The task was presented as shown in Figure 6.10.

Task 3.1:

Anna, Bernadette and Carol are going to the movies together. Tickets cost \$12 each, but there is a special offer for everyone who books and pays online - buy two tickets, get the third ticket free. Anna booked and paid for the tickets online.

When they arrived at the theatre, they noticed the pricelist at the shop. The price list reads as follows:

- Bottled Water \$4
- Icecream \$4
- Medium Popcorn \$8
- Bottled Water, icecream & popcorn combo \$12

Anna wants to buy a bottle of water, Bernadette wants the ice-cream and Carol wants the popcorn. Anna pays for the combo.

What might Anna say to Bernadette and Carol about how much they owe her?

Task 3.2:

Anna, Bernadette and Carol are going to the movies together. Tickets cost \$13.50 each, but there is a special offer for everyone who books and pays online – buy two tickets, get the third ticket free. Above this, there is an online processing fee of 30c for every ticket booked. Anna booked and paid for the tickets online.

When they arrived at the theatre, they noticed the pricelist at the shop. The pricelist reads as follows:

- Bottled Water \$3.50
- Icecream \$4.50
- Medium Popcorn \$5.20
- Bottled Water, icecream & popcorn combo \$10

Anna wants to buy a bottle of water, Bernadette wants the ice-cream and Carol wants the popcorn. Anna pays for the combo.

What should Anna say to Bernadette and Carol about how much they should pay?

Figure 6.10. Anna and her friends.

The purpose of the task is to link social and mathematical reasoning in the minds of students. In Task 3.1, the calculations required should be straightforward for Year 5 and 6 students, compared with Task 3.2 where students must work in dollars and cents, and consider an online processing fee of 30c per ticket purchased. In both scenarios, friendship and “fairness” are important considerations. There are multiple ways to approach this financial dilemma. Again, this is critical for creating an awareness of alternative possibilities, and fostering critical whole-class discussion and debate about financial problem-solving and decision-making. Readers are invited to tackle these tasks before proceeding.

6.4.1 YEAR 5 AT SCHOOL D – A FOCUS ON TASK 3.1

The Year 5 lesson at School D was a modelled lesson, taught by the school Mathematics Leader (Bette) and observed by myself, the classroom teacher, and a pre-service teacher. Bette was selected to teach the lesson as she is an experienced and highly regarded teacher in primary mathematics education. Given the class consisted of Year 5 students only, she made the decision to focus on Task 3.1. Bette believed that students needed practice reading for meaning, and that doing this with whole dollar amounts would be adequately challenging for this particular group of students.

Bette greeted the class and explained that the purpose of the lesson was to work on a challenging task, and we were interested in students’ mathematical thinking more than right or wrong answers. Bette spoke about three brothers arguing about the different ways six roast potatoes could be shared. The anecdote was shared as follows:

On the weekend our family was having a roast. My three boys, Jacob, Sam and Ned, love roast potatoes. When I went to the pantry, I realised I only had 6 potatoes. I roasted the 6 potatoes and then explained to my boys my dilemma. I then asked the boys how I should share the roast potatoes.

Jacob, my eldest child, who is a tall 16 year old said, “I think I should get 3 potatoes because I am much bigger than Sam and Ned. I obviously require more food than they do. They can both share the remaining three potatoes between them because although Sam is older than Ned, he is a similar size”

Sam, my second child, who is 13 years old said, “We should all get 2 each. If Jacob needs more food he can eat more of the other vegetables. But if you decide to give Jacob 3 potatoes, then I should at least get 2, because I am the next oldest and tallest. Ned can have 1 potato.”

Ned, my youngest boy, who is 10 years old said, “We should all get two potatoes. We all love potatoes and if Jacob or Sam still feel hungry, there are plenty of other vegetables they can eat.”

Bette explained that each argument was reasonable, as mathematics was used to support it. Towards the end of the anecdote, Bette asked the students to vote for the brother whose argument they most agreed with. The response was unanimous that the six roast potatoes should be shared evenly between the three brothers, so that each received two. In some ways, this was a critical event that set the scene for the lesson, as students signalled a strong shared belief that sharing resources evenly is fair, and a resistance to challenging this way of thinking.

Next, Bette introduced the financial dilemma by reading it aloud. She specified that the students would be given ten minutes to work individually. This was referred to as the usual procedure for mathematics lessons. Bette also explained that students would be required to justify why their solution was fair. After a short period of time working individually, students began approaching Bette with their worksheets to show her their mathematical working. Up to half a dozen students at a time would be gathered around her. This is something I had not experienced or observed in the other lessons reported in this chapter. The students seemed to be seeking verification or praise for a correct answer. Bette took this opportunity to skilfully redirect students back to the problem, as this sequence reveals:

Bette: Ok, explain to me what you've done.
Student 1: The cost of the combo was \$12.00.
Bette: Ok, forget the combo - have you read the first part first?
Student 1: Yep <nods>.
Bette: So you've worked that out too?
Student 1: Yep <nods>.
Bette: Where's that part?
Student 1: Oh! <walks away>

Bette: Okay, tell me.
Student 2: So Anna paid \$12.
Bette: What did Anna pay \$12.00 for?
Student 2: The combo.
Bette: What about the movie tickets?
Student 2: Oh...
Bette: Got to work that out. Movie tickets have to be included.
Student 2: Ahhh. <walks away>

Bette: <reads student's worksheet> Do you know how to argue your case?
Student 3: Yep.
Bette: Beautiful. Now, try a different method, another way of talking about this.
Student 3: Ok. <walks away>

Student 4: Can she pay \$20?

Bette: I don't know. I'm not working it out - you're working it out! How do I know? Read down read the first - read this bit. What did she pay for that? Right, and then what did she pay for this?

Student 4: <smiles and sits back down>

Student 5: <quietly explains her mathematical working to Bette>

Bette: <reads student's worksheet> So read to me the first line of the problem.

Student 5: Anna... Oh! <walks away>

It was apparent by this point in the lesson that some students were having difficulty reading the problem for meaning. On several occasions, Bette asked individual students to read the first two sentences of the problem aloud. Some students had pursued a particular line of thinking without referring back to the problem to check whether their way of thinking fit the context. Some had not finalised their working out so as to clearly specify how much Bernadette and Carol each owed Anna. Some had not justified their thinking. Some had found and appropriately justified one solution, and were extended by being encouraged to return to their desk to consider a different method and solution. Bette also encouraged students to consider the notion of fairness from each of the three characters' viewpoints, saying, "If you're Anna, would you be happy? If you're Bernadette, would you be happy? If you're Carol, would you be happy?"

Bette identified that one student was struggling to calculate the total cost of the movie tickets ($\$12 + \$12 = \$24$). She amended the price of the movie tickets to \$10 each for this student. While this enabled the student to calculate the total cost of the movie tickets more easily ($\$10 + \$10 = \$20$), it became virtually impossible for this student to execute the most popular line of thinking on this task: to divide the total cost by three. Since it was unexpected that any Year 5 student would struggle to undertake a simple double-digit addition, an enabling prompt (Sullivan, Mousley, & Jorgensen, 2009) had not been suggested. There are three important considerations. First, if an enabling prompt was to be used to assist weaker students to access the financial dilemma, the total cost should be easily divisible by three, the number of characters in the problem (i.e., $\$9 + \$9 = \$18$, $\$18/3 = \6). Alternatively, access to concrete materials (i.e., notes and coins) might assist weaker students without limiting them to only ever spend whole, single digit numbers. Students need practice working with money. Another possibility that is discussed later in the Chapter is the potential for students to learn to construct tables to organise the numerical data presented in worded mathematical problems.

The range and frequency of students' mathematical strategies and working, as recorded on their worksheets prior to whole class discussion, is presented in Table 6.5.

This table reveals some interesting insights. First, given that "Anna and her friends" demanded only whole number addition, subtraction, and division, the high incidence of mathematical error and/or mathematical working unable to be deciphered is concerning. Related to this is the diversity in mathematical ability among students in this class. Given more than ten minutes to work on the financial dilemma, several students recorded two different methods and solutions. However, three students solved only part of the problem in this time, by sharing the cost of the movie tickets (Option A) or the cost of the food combo (Option B) evenly. Also, of the mathematical strategies and working that were correct and decipherable (23), more than half (15) involved sharing the total cost of the movie tickets and/or food combo evenly (Options A, B, and C). Finally, eight students (more than one third) indicated that one person should not have to pay for their movie ticket – seven suggested Anna's movie ticket should be free (Options D, E, and F), and one suggested that Carol's movie ticket should be free (Option G). The number and range of options uncovered confirms that "Anna and her friends" is a genuine financial dilemma.

Table 6.5. Frequency of student financial decisions and mathematical working in response to “Anna and her friends”

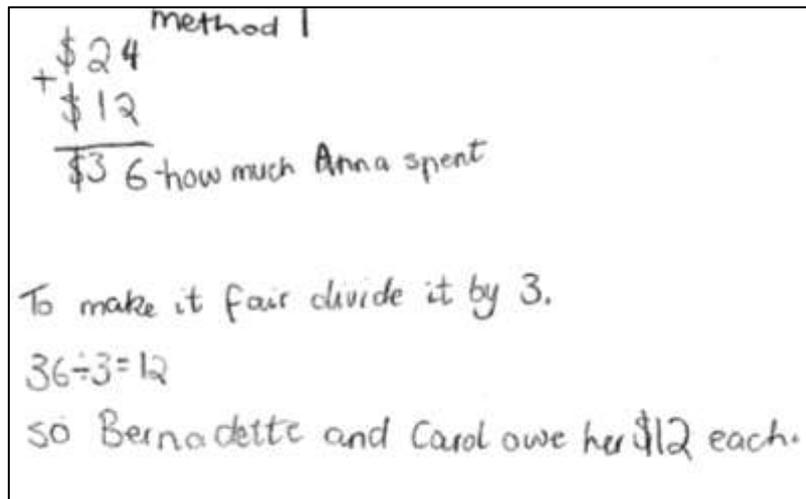
Examples of mathematical strategies and working						
Option	How to share the cost of the movie tickets (\$24)	How to share the cost of the food combo (\$12)	Anna pays	Bernadette pays	Carol pays	Frequency
A	Share the cost of the movie tickets evenly $\$24/3 = \8		-	-	-	2
B		Share the cost of the food combo evenly $\$12/3 = \4	-	-	-	1
C	Share the total cost of the movie tickets and food combo evenly between the three girls $\$24/3 + \$12/3 = \$12$ $\$12 + \$12 + \$12 = \36 $\$36/3 = \12		\$12	\$12	\$12	12
D	Share the total cost of the movie tickets and food combo evenly between Anna's two friends $\$36/2 = \18		\$0	\$18	\$18	1
E	Anna's ticket is free $\$24/2 = \12	Share the cost of the food combo evenly $\$12/3 = \4	$\$0 + \$4 = \$4$	$\$12 + \$4 = \$16$	$\$12 + \$4 = \$16$	3
F	Anna's ticket is free $\$12 + \$12 = \$24$	Bernadette pays \$4 Carol pays \$8 (original prices)	\$0	$\$12 + \$4 = \$16$	$\$12 + \$8 = \$20$	3
G	Carol's ticket is free	Bernadette pays \$4 Carol pays \$8 (original prices)	\$12	$\$12 + \$4 = \$16$	\$8	1
Mathematical error and/or mathematical working unable to be deciphered						9
Total number of mathematical calculations recorded in lesson						32

To initiate whole-class discussion, Bette gathered the students in front of the whiteboard. She began by asking a student who had raised his hand to participate to strip the mathematics out of the worded problem, while she noted their responses on the whiteboard as follows. As you can see from this extended conversation, this was not as straight-forward a process as one might anticipate when working with Year 5 students:

- Bette: We want to work out how much they've spent altogether. Who knows how much they spent altogether? The whole cost of going, how much we've spent?
- Student: \$12.00.
- Bette: \$12.00 that's how much the whole day cost them? Going to the movies and getting whatever they ate or drank? <wait time> How much did the movies cost? Read the first line, you're on the right track. Anna, Bernadette and Carol are going to the movies. What did the tickets cost...?
- Student: Tickets cost \$12.00 each but there is a special...
- Bette: Yes, there is a special offer everyone who books and pays online...
- Student: Pay on-line, buy two tickets...
- Bette: And get the?
- Student: Get the third ticket free.
- Bette: Buy two tickets get the third one free. So, how much do they pay for the tickets?
- Student: \$8.00.
- Bette: How many tickets did they have to buy?
- Student: Two.
- Bette: How much is that? How much did they spend on tickets?
- Student: \$12.00.
- Bette: No. Go back. They bought two tickets. How much did a ticket cost?
- Student: \$12.00.
- Bette: How many tickets did they have to buy?
- Student: Two. Three.
- Bette: They did have to buy three, you're right, but they could get three if they bought?
- Student: If they bought two.
- Bette: So how much would that cost?
- Student: \$24.00.
- Bette: Beautiful, good on you. So we've got the tickets cost \$24.00 <Bette writes \$24 on the whiteboard>. How much does the food cost?
- Student: \$12.00.
- Bette: \$12.00 if you get the combo <Bette writes + \$12 on the whiteboard>. So how much is this altogether?

Student: \$20.00.
Bette: \$36.00 <Bette writes = \$36 on the whiteboard>.

This made the total cost of the outing for Anna, Bernadette, and Carol clear to all students. Then, one by one, Bette asked six different students to write their mathematical working on the whiteboard, explain their thinking, and justify why they considered their solution to be fair. The first student did this well. She presented that the total cost of the movie tickets and food combo should be shared evenly (Option C; see figure 6.11).



method 1

$$\begin{array}{r} +\$24 \\ +\$12 \\ \hline \$36 \end{array}$$

how much Anna spent

To make it fair divide it by 3.

$$36 \div 3 = 12$$

so Bernadette and Carol owe her \$12 each.

Figure 6.11. Student worksheet: Share the total cost evenly.

Sharing the total cost of the movie tickets and/or food combo was a popular solution to this financial dilemma – it occurred most frequently on student worksheets (15 times) and students voted it the most “fair” solution at the end of the lesson (12 out of 23 votes).

This finding is consistent with the approach to “Shopping for shoes” at School B, where students preferred to share either the cost or the saving evenly, even when doing so would be to the financial detriment of one person. The consistency of this finding across financial dilemmas and contexts suggests that 10-12 year old students are most likely to equate fair with sharing evenly. There are two possible explanations. The first is that this approach to financial problem-solving and decision-making reflects the students’ stage of cognitive and moral development. Theorists like Piaget (1976) and Kohlberg (1971) propose that early adolescence is a critical time when children transition between stages of development: from Piaget’s concrete operational to formal operational stage; and from Kohlberg’s conventional to post-conventional stage. According to Piaget (1976), children in Year 5 are more likely to be functioning at the concrete operational stage, where inductive logic is used to solve problems. According to Kohlberg (1971), children in Year 5 are likely to be operating at the

conventional level, where adhering to the expectations of family or other social groups is valued more highly than any immediate or obvious consequences. The attitude is not only one of conformity to subjective norms and social order, but of loyalty to it, of actively maintaining, supporting, and justifying the order and identifying with others who do likewise. By contrast, in a Year 5/6 classroom, the students' ages and level of development and reasoning skills are likely to be more diverse – some students will be comfortable undertaking hypothetical, deductive, and abstract moral reasoning characteristic of the next stages of development. So, through the participation of Year 6 students who are generally more mature, more sophisticated reasoning can be exposed and modelled. If the class undertaking “Anna and her friends” had been a Year 5/6 composite, a broader range of perspectives may have been raised for discussion.

The second explanation why students might equate fair with sharing evenly relates to the way division is taught and learned at home and at school. When parents cut a birthday cake, for example, they tend to do so in equal segments. Children observe this from an early age. In fact, they learn to argue if a sibling receives a slice of cake that seems to be a more generous size. Similarly, when primary school teachers introduce division, they tend to use the term “fair share” to describe the mathematical process. This language is intended to get students thinking about dividing (or sharing) evenly. Perhaps this makes it difficult for students to perceive fairness as it relates to sharing any other way.

Next, Bette selected another student (pseudonym Axel) to present a different method and solution (Option E). Unfortunately, Axel required support from Bette to clarify his thinking and communicate it effectively. This was a prolonged process and the episode resulted in confusion around what was essentially a valuable idea contribution – that Anna keep the free movie ticket herself rather than share the discount it afforded with her two friends. Axel presented that the food combo should be shared evenly ($\$12 / 3 = \4) and the total cost of the movie tickets was $\$12 + \$12 = \$24$. However, he then concluded that Bernadette and Carol each owed Anna $\$16$, without explaining how he had arrived at this figure. The class sat silent, their expressions indicating they were confused. Bette used questioning to establish that Axel wanted Bernadette and Carol to each pay $\$12$ for their ticket and $\$4$ towards the food combo. Having clarified this, Bette asked Axel how much Anna had paid for the outing. He was unable to answer her correctly, saying Anna had paid $\$36$. When asked to think again, he replied that Anna had paid $\$36 + \$16 + \$16 = \78 . Worse, the more Axel spoke, the more apparent it became that he was struggling to understand two things: 1. the process by which money was changing hands between the three characters; and 2. the implications of his solution for all three characters. Significant time was spent trying to establish what Axel was and wasn't trying to say, helping him to see that subtraction was the

appropriate mathematics to apply ($\$36 - \$16 - \$16 = \4), and that his solution was highly advantageous to Anna. It was only upon analysis of students' worksheets that I found that Axel had written, "Anna got the free ticket." Axel never explicitly verbalised this to the class during the lesson, despite Bette giving the student the opportunity to do so several times and ways. According to students' worksheets, seven other students also thought that one person should not have to pay for their movie ticket (Options D, E, F, and G). No student made such a suggestion during whole class discussion. The closest we came to this idea being raised was when a classmate interrupted Axel by saying, "Yeah, that's what I did." She was not given the chance to elaborate. Figure 6.12 shows her worksheet.

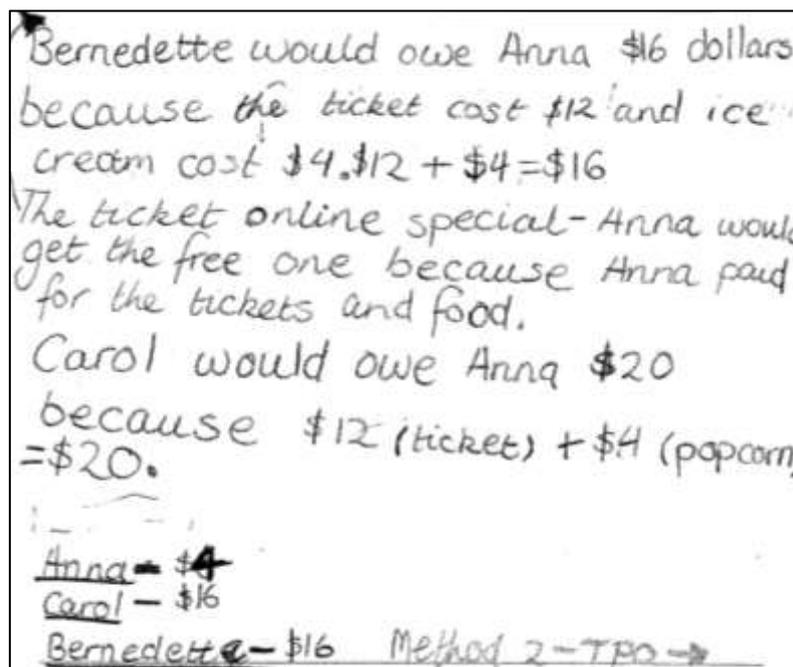


Figure 6.12. Student worksheet: Anna's movie ticket is free.

Aside from a mathematical error ($\$12 + \$4 = \$20$) which is not repeated in the final solution that the student has underlined, the second student's logic and reasoning are both clear and acceptable. While it is impossible to know, I believe that the lack of clarity and coherence to Axel's explanation and justification to the class not only limited the potential to critically explore students' ethical understandings of what's fair and why, but contributed to many members of the class not understanding and subsequently disregarding what was a plausible line of thinking. At the end of the lesson, Axel was the only student to vote for Option E. He had been deserted by his peers.

Another student raised her hand to suggest that the cost of the food combo should not be shared evenly, since the popcorn is more valuable than the other items. This seemed like a promising alternative argument, but when the student was invited to present her

mathematical working on the whiteboard, she simply wrote: Anna - \$12, Bernadette - \$12, Carol - \$16 = \$36. When a peer pointed out that the amounts did not add to \$36, the student quickly amended the amount to be paid by Carol to \$12, thus falling in line with the popular opinion that the cost be shared evenly. Bette asked the student why she had changed her mind from her initial argument. The student smiled, but did not reply. She was challenged by the requirement to explain her mathematical working and justify her argument, and from her facial expression it seemed she felt conflicted about bucking popular opinion. By this stage, students were willing to consider that the cost of the food combo might not be shared evenly, given the value of the popcorn. However, this acknowledgement resulted in students fiddling with the amounts to be paid by Anna, Bernadette, and Carol so that the total equalled \$36, rather than using mathematics to guide and inform their financial problem-solving and decision-making. It is interesting that these sorts of responses were not recorded on students' worksheets, which is why they are not noted in Table 6.5.

The next student to present wrote Anna - \$11, Bernadette - \$11, Carol - \$14. Whole-class discussion seemed to focus on which of the responses on the whiteboard was most correct, as though students were expecting that Bette might eventually affirm one solution over the others. This was a recurring theme in the lesson – students seemed motivated to be affirmed that their method and solution was correct, or at least more appropriate than their peers'. Bette reminded the class, "There's no right answer. What we're trying to do is work out what seems fair." The previous student, who was still standing at the whiteboard, suddenly changed her figures to Anna - \$10, Bernadette = \$11, Carol = \$15 (Option H). However, she still did not use mathematics to guide and inform her financial problem-solving and decision-making. The final student to present noted different figures again, Anna - \$10, Bernadette = \$12, Carol = \$14 (Option I). He explained that Anna was entitled to pay less because she had spent her time and money to pay for the movie tickets and food combo, and Carol should pay more given the value of the popcorn. While these arguments have merit, the student did not draw on his social and mathematical understandings simultaneously and in synergy. It would have enhanced students' financial literacy learning if the teacher had explicitly highlighted the different levels of mathematical engagement evident in the responses noted on the whiteboard (comparing Options C and E with Options H and I). The students that presented Options C and E used mathematics more explicitly than the students that presented Options H and I. It would have been beneficial for the teacher to insist that Options H and I be elaborated.

Bette concluded the lesson by asking students to vote for the alternative they felt was most fair – Option C, Option E, Option H, or Option I. The results were 12, 1, 3, and 7, respectively. This shows that while the majority of students maintained the view that the

fairest decision was to share the cost of the movie tickets and food combo evenly (Option C), new ways of thinking emerged through whole-class discussion (Options H and I) which resulted in students changing their mind from what they had initially committed to their worksheet.

The students selected to present to the class at School D were less confident explaining their mathematical strategies and working compared with the students at Schools B and C. Throughout the lesson, students seemed to be waiting for Bette to verify or praise one answer as more correct than others. This is probably due to a classroom culture where this is the norm, although it may also be due to the fact that Bette was a guest teacher whom the students were keen to impress.

Immediately after the lesson, I interviewed Bette to find out what she would consider doing differently when using this task in the future. Bette was keen to talk about Axel. She explained that Axel's number skills are good, which is why she selected him to present to the class. However, she went on to say that Axel often becomes confused when asked to explain his thinking, and this is a sophisticated but worthwhile demand associated with the use of financial dilemmas. Bette suggested that the use of role play and concrete materials (i.e., notes and coins) would have helped students relate to "Anna and her friends," particularly the process by which money was being exchanged between the three characters. Bette also believed that all mathematical working should have been explicitly recorded alongside the varying amounts to be paid by each of the three characters, perhaps in a table. She suggested that this would lead nicely into a follow-up lesson where students might work in small groups to focus on developing, strengthening, and presenting opposing arguments that weaved together both social (ethical) and mathematical understandings. Bette explained that because this task was different to the sorts of mathematical problems students were used to, she found herself facilitating arguments more than she would have liked. These valuable insights were closely aligned with my observations, reflections, and data analysis related to teaching and learning using "Shopping for shoes" and "Making choices about spending." Bette demonstrated the ability to critically evaluate and suggest appropriate modifications to the financial dilemma and the associated pedagogies.

6.4.2 YEAR 6 AT SCHOOL L – EXTENDING STUDENTS TO TASK 3.2

The Year 6 lesson at School L was conducted by two Year 6 teachers team-teaching in an open learning environment, both of whom have more than 25 years teaching experience. One of the teachers had recently completed a Masters in Leadership (Numeracy Teaching) which included a research project titled, "Using challenging maths tasks to move the middle

band of students". The lesson was observed by myself and a research colleague with expertise in mathematics education.

The teachers set the scene for the lesson carefully. Task 3.1 was projected to the interactive whiteboard and students were given a copy as a worksheet. One teacher read the task aloud before asking, "What are the main parts of the problem that you need to think about?" This question was intended to promote thinking, not discussion, and so was immediately followed by the instruction, "Highlight the pieces of information that are important." After a few minutes thinking time, during which students highlighted key words and numbers on their worksheets, another question, "What do we need to consider?" was posed to encourage students to share their thoughts. Several students raised their hand to contribute ideas such as "What's fair?" "What's good value?" "Who gets what?" "Who gets the free ticket?" "The different costs" and "How many people there are". These points were recorded on the whiteboard. The teachers' questioning techniques gave students a framework for contending with the literacy demands of the problem.

One of the teachers then explained to the class that "Anna and her friends" is based on a social situation and so would involve both social and mathematical thinking. To highlight this point, the teachers set up an impromptu role play involving three classmates in the roles of Anna, Bernadette and Carol. The students, in role as the characters, casually conversed about how much each person should pay towards the movie tickets and combo. This worked well to uncover two different approaches to sharing the cost. The student playing the role of Anna said, "Here are your tickets guys. I got my ticket for free. So if you pay me for your tickets, I'll pay for the combo." The student playing the role of Bernadette had another idea, "I think we should split the cost of the movie tickets - \$8 each - and then pay for our own share of the combo. Carol will have to pay \$2 more because the popcorn is worth a little more." Seeing the role play seemed to make the task immediately accessible to the class - every student had some idea how to make a start.

Students were given around 10 minutes to work on Task 3.1. They had the flexibility to work independently or in small groups. Most gathered with their friends at their tables or on the floor, and engaged in intermittent discussion about the financial dilemma and their social and mathematical thinking as they tackled the problem. It was immediately apparent that the students had good strategies for organising the information included in worded mathematical problems so as to understand it. Around two-thirds of student worksheets included tables that had been drawn to organise the numerical data in the financial dilemma. Figure 6.13 is one example. A number of students drew pictures to visually depict the information in the

financial dilemma (see Figure 6.14). These strategies seemed to give weaker students confidence to get started and persist in tackling the financial dilemma.

	ANNA	Bernadette	Carol	
Ticket	\$8	\$8	\$8	\$24
Combs	\$3	\$3	\$6	\$12
Total	\$11	\$11	\$14	\$36

Ticket - buy 2 get third free - \$12 share it between
 Combo - Med Popcorn is twice as much as bottled water and icecream so Carol pay twice as much as Anna and Bernadette. it needs to equal twelve.

Figure 6.13. Student worksheet: Drawing tables to understand information.

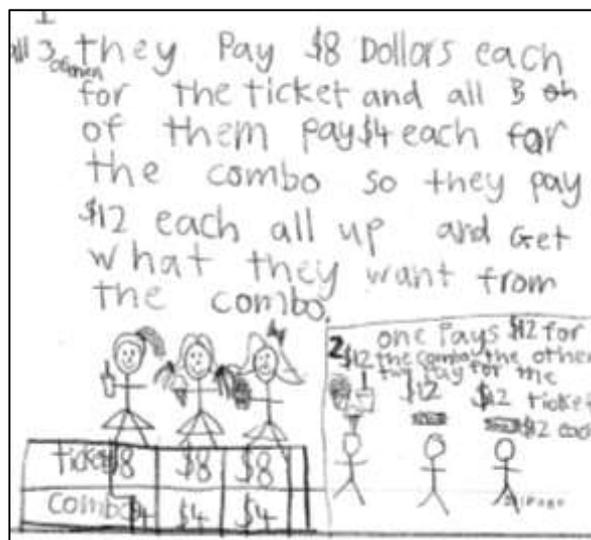


Figure 6.14. Student worksheet: Drawing pictures to understand information.

Three students were strategically selected to share their worksheets with the class and explain their social and mathematical thinking. The students in this combined class were comfortable presenting their worksheets to their peers, explaining their thinking, and conversing with each other about the notion of fairness. The teachers seemed to do very little to facilitate whole class discussion, but had obviously cultivated a supportive culture of open communication about thinking. These teachers operate a “No hands up” policy. This means students routinely ask and answer questions of one another, with participants joining in freely from around the classroom, as though engaging in dinner party conversation. From

time to time, the teachers interject to invite a quiet student to contribute. Critically, as had been introduced through the role play earlier, the idea that costs can be shared evenly or proportional to the value of items to be received was debated. Is sharing evenly always the fairest thing to do? Is it fair to split the cost of the combo evenly given that Carol will receive the most valuable item (popcorn)? These questions were addressed nicely by one student, who tabulated the difference between two solutions how much Bernadette and Carol owed Anna, as shown in Figure 6.15. One solution is described as "Equal," the other as "Fair".

Name:	Equal	fair
Carol	\$12	\$14
Anna	\$12	\$11
Bernadette	\$2	\$11

Equal- \$12 each because anna and bernadette pay \$12 for tickets and carol pays for combo.

Fair- Carol pays \$2 more because she wants the more expensive things. So there for she has to pay \$2 more

Figure 6.15. Student worksheet: The difference between equal and fair.

Next, the teachers introduced Task 3.2, which was essentially the same financial dilemma with two minor modifications - more challenging figures involving dollars and cents, and an online processing fee of 30c per ticket purchased. This enabled students to consolidate and extend upon what they had learned via Task 3.1. It is important to note that the teachers did not wait long before initiating this opportunity for students to be challenged further. This signals the teachers' level of comfort and proficiency using challenging tasks, and explains why students demonstrated good strategies for problem-solving (from making sense of worded problems to finding ways to represent their mathematical working, solutions, and explanations). Figure 6.16 shows how one student used a table to divide the costs between Anna, Bernadette and Carol.

The written explanation beneath the table develops an argument that while the cost of the online processing fee and movie tickets should be shared equally, each person should pay an amount towards the combo that reflects the value of the item they will receive. The student admits using trial and error to figure this out.

Anna	Bernadette	Carol
\$30 fee	30 fee	30 fee
\$9 ticket	\$9 ticket	\$9 ticket
\$3.10 food	\$3.70 food	\$3.50 food
<u>\$12.00 total</u>	<u>\$12.70 total</u>	<u>\$12.50 total</u>

each payed for the fee of the ticket.

split the ticket price in 3 to be even

trial and error for food. = divided 310 by 3 which = \$3.30 each (rounded down).

so I know that Anna had to pay less than \$3.30, Bernadette had to pay roughly 3.30 and Carol had to pay a little more than \$3.30.

Figure 6.16. Student worksheet: Task 3.2.

Figures 6.15 and 6.16 are impressive examples of Year 6 students' capacity to use mathematical thinking to support and explain an argument. Being able to construct tables to organise the numerical data presented in worded mathematical problems seems to be a foundational skill upon which students can base their financial problem-solving and decision-making.

The ideas students contributed to whole class discussion and recorded on their worksheets demonstrated sophisticated social and mathematical understandings about money. With regard to Task 3.2, Adam explained that Anna should receive the free ticket but pay for the online processing fee and combo. He justified his thinking that Anna should pay less than her friends (\$10.90 compared with \$13.50) by writing, "Paying this makes it fair in the sense that Anna did all the work." This idea had been raised at School D too – the notion that the person who takes responsibility for arranging an outing should benefit from a little discount if possible. Anna's role as the outing organiser was perceived differently by Emma, who said, "If Anna is the host/hostess, and she invited her friends, she could pay for the tickets. That is the polite thing to do." Other students also made reference to perceived social conventions given the context. For example, Violet wrote, "If they were really good friends and went to the movies often, then they could just take it in turns paying the total price." Ivy seemed to see the opportunity for Anna to conceal the free ticket from her friends, noting on her worksheet, "I think that it really depends on how good [a] friends they are because if Anna

booked the tickets online and paid for them she could have the free ticket and the two others would pay \$12 each because [Anna paid] for the tickets.”

The teachers concluded the lesson by conducting a strategies audit to identify the various ways and means by which students had approached the financial dilemma. They asked, “Who used a table?” “Who used “guess and check”?” “Who used pictures?” and “Who used real money?” While this line of questioning during the summary phase of the lesson served to highlight to students that there are a number of approaches students might use when problem-solving, it also explained why the students were not lost for ways to make a start with this challenging task. At School L, students seemed to understand the difference between social and mathematical thinking, and that both have important roles to play in financial problem-solving and decision-making. With reference to the lesson introduction, this valuable insight is something students have been explicitly taught by their teachers.

In both School D and School L, “Anna and her friends” engaged students in both social and mathematical thinking, as was the intention of the financial dilemma. The Year 5 students at School D did not progress to Task 3.2, whereas the Year 6 teachers at School L encouraged their more capable students to move on to this task early in the lesson. This meant that the task allowed for differentiated teaching and learning at School L. In both classes, friendship and “fairness” were important considerations for students, who focused their social and mathematical arguments around these concepts. The students’ contributions to whole-class discussion tended to reveal rather generous values, attitudes, and subjective norms (expectations) regarding money, friendship, and fairness.

6.5 LINKING THE FINDINGS TO THE RESEARCH QUESTIONS

The findings presented in this chapter support that using financial dilemmas for teaching and learning purposes has real merit. Being situated in familiar, meaningful “real life” contexts, “Shopping for shoes,” “Making choices about spending,” and “Anna and her friends,” were relatable and accessible to students. In this way, the tasks were effective in facilitating connections between students’ financial literacy learning at home and in the classroom.

Students readily drew on their social understandings when asking questions and explaining their thinking. Presenting these tasks during numeracy lessons encouraged students to engage in mathematical thinking as part of their problem-solving and decision-making. Critically discussing students’ social and mathematical understandings during whole-class discussion helped to promote different ways of viewing, thinking about, and solving the financial dilemmas. Students were active participants in the lessons, and willingly shared

their social and/or mathematical understandings with each other. While this allowed for balanced, student-led debate, it also enabled the teacher in each instance to highlight that a range of social and mathematical understandings exist among students, and both types of thinking have important roles to play in financial problem-solving and decision-making. The findings demonstrate that the more options that are suggested and evaluated each lesson, the greater the potential for the financial dilemmas to model “real life” financial problem-solving and decision-making. The extent to which the financial dilemmas can be effective would seem to rely on the teacher to identify, expose, and facilitate critical discussion of the alternative viewpoints that exist in the classroom.

The findings confirm that numeracy is critically important to financial literacy. On one hand, most students used appropriate mathematical calculations to find one or more answers to each financial dilemma and explained those answers well. On the other hand, many of their responses were arguable given the complexities of the problem that had been presented to them. For example, in relation to “Shopping for shoes,” students tended to recommend sharing the cost or the saving equally, or dividing the total cost by the number of pairs of shoes (74% of student responses nominated these options on the learning task, and 63% on the consolidating task). Students were less likely to check their answer against the context for the second calculation. This resulted in 80% of student responses requiring Carly to pay \$60 or more for her shoes, and not benefit from the sale offer at all (something Carly would be unlikely to agree to as fair).

While the three financial dilemmas were appropriately pitched to Year 5 and 6 students, using mathematics to guide and inform financial problem-solving and decision-making proved complex and challenging for students, as it necessitated the application of social and mathematical understandings simultaneously and in synergy towards articulating an argument. This is an important aim of the educational intervention which would need to be clearly communicated to teachers and students using financial dilemmas in the future.

Drawing on the research evidence presented in this chapter, the following strategies could be included as part of teacher professional learning into the use of financial dilemmas, as in each of the lessons described above they seemed to enhance, or had the potential to enhance, students’ experiences in the lessons:

- **Deliberately scaffolding the literacy demands of worded mathematical problems.** This was a notable strategy by the Year 6 teachers at School L, and is consistent with Draper’s (2002) argument that literacy strategies have an important role to play in mathematics lessons. After reading the problem aloud, it seemed productive for the teachers to pose questions that helped their students to identify

what information might be important for them to consider. This included asking students to highlight or underline key words, and find out what unknown words mean.

- **Teaching a range of problem-solving tools and strategies.** Again, this was a feature of the Year 6 lesson at School L. As suggested by Goos, Dole, and Geiger (2011), promoting a range of problem-solving tools and strategies seemed to help students make a start and persist. Notable tools and strategies included concrete materials (i.e., notes and coins), constructing tables, drawing pictures, and “guess and check”.
- **Role play and concrete materials.** The use of role play added a unique dimension to the Year 5/6 lesson at School B and Year 6 lesson at School L and seemed to contribute to students being able relate to and engage with the financial dilemma being posed. Using the teacher’s and/or student’s names can add to the drama and humour of this strategy. In the Year 5 lesson at School D, the potential to provide concrete materials (i.e., notes and coins) was noted as an improvement to the lesson that might help weaker students.
- **Small group collaboration.** After an initial period of time to work individually, the students in each of the lessons seemed to benefit from sharing and comparing their mathematical working, explaining their thinking, and justifying their argument in small groups. This is consistent with the findings of Sullivan et al. (2014a, 2014b).
- **The teacher as scout and provocateur.** In each of the lessons, the teachers worked hard to identify the range of social and mathematical understandings that existed in the classroom, and to ensure that each of these viewpoints was represented during whole-class discussion. This is arguably essential if students are to learn the importance of identifying and critically evaluating multiple alternative options as part of a problem-solving process that leads to informed financial decision-making. To demonstrate the importance of this strategy, in the Year 5 lesson at School D, Axel never explicitly verbalised “Anna got the free ticket” to the class, despite Bette giving him the opportunity to do so several times and ways. This meant that this option and the opportunity to discuss the ethical considerations associated with it were not emphasised in this lesson. By contrast, Adam raised this aspect in the Year 6 lesson at School L, and various social conventions were raised and debated by members of the class. Related to this, open and sometimes provocative questions posed by the teacher during whole-class discussion seemed to help students identify and evaluate viewpoints that might be contentious but plausible. It is important that the teacher does not appear to favour one option over others.
- **The importance of scribing.** The range of possible mathematical strategies and working used as part of whole-class discussion should be recorded and explicitly highlighted during the summary phase of the lesson so as to reinforce the important

role of mathematics in financial problem-solving and decision-making. Not doing this in the Year 5/6 lessons at Schools B and C detracted from the mathematical learning intentions.

- **The follow-up lesson.** It is possible that there is merit in stretching these tasks across two lessons, to give students more time to develop, strengthen, and articulate opposing arguments that weave together both social and mathematical understandings.

6.6 MOVING FORWARD WITH THE RESEARCH

In summary, it is argued that the advantages to using financial dilemmas included the potential to:

- engage a wider range of students in everyday applications of mathematics;
- orient students to seek out and consider multiple alternative options so as to inform their financial problem-solving and decision-making; and
- consolidate students' social and mathematical understandings by positioning both as having important roles to play in "real life" financial problem-solving and decision-making.

Of course, the educational intervention would need to be implemented on a larger scale to really evaluate its impact on financial literacy teaching and learning. The next chapter explores the findings of data collected from Year 5/6 teachers and students in 16 Victorian primary schools who participated in a larger study that involved them in trialling a range of challenging mathematics tasks, including five financial dilemmas.

STAGE 3 OF THE RESEARCH: EVALUATION OF IMPACT

CHAPTER 7: TEACHER AND STUDENT REACTIONS TO THE EDUCATIONAL INTERVENTION

Stage 3 of this research project involved broader implementation and evaluation of the educational intervention. It was important to explore teacher and student reactions to the educational intervention to understand the extent to which it enhanced financial literacy teaching and learning. This chapter presents the findings of research involving 35 Year 5 and 6 teachers and more than 850 Year 5 and 6 students in 16 Victorian primary schools. The teachers were surveyed and their students assessed before and after trialling the educational intervention (five financial dilemmas and associated pedagogies) as mathematics lessons. This chapter is presented in five sections. First, the research aims, questions, contexts, and data collection and analysis procedures are outlined. The next section focuses on teachers' reports about financial literacy teaching and learning pre- and post-intervention. The third section explores insights from teachers' experiences using the financial dilemmas, with a focus on the task "Catching a taxi". Next, the findings of pre- and post-intervention student assessment data are discussed to evaluate the effectiveness of the educational intervention. Finally, the findings presented in this chapter are linked to the research aims and questions.

7.1 RESEARCH AIMS, QUESTIONS, CONTEXTS AND DATA SOURCES

This chapter explores the following research aims and questions:

AIMS:	QUESTIONS:
a. To explore parents', teachers' and students' views about financial literacy teaching and learning.	2. What do teachers say is important to teach to 10-12 year olds in a "Money and financial mathematics" program? What explanations do they give?
c. To develop, trial, study, and refine an educational intervention designed to enhance financial literacy teaching and learning.	4. Can an educational intervention involving "real life" financial dilemmas and associated pedagogies enhance financial literacy teaching and learning? If so, in what ways?

This stage of the research was also situated within the Encouraging Persistence Maintaining Challenge project (EPMC), as described in Chapter 6.

Data were collected from 35 teachers and more than 850 Year 5 and 6 students in 16 Victorian primary schools. As explained in Chapter 4, the Index of Community Socio-educational Advantage (ICSEA), created by the Australian Curriculum, Assessment and Reporting Authority (ACARA), was used to describe the socioeconomic profile of the school communities. The schools included Government and Catholic schools located in metropolitan and regional areas (see Table 7.1).

Table 7.1. *myschool* Index of Socio-Educational Advantage (ICSEA) profile of Schools C-R (2012)

	Enrolments	ICSEA Value	Bottom quarter	Middle quarters		Top quarter
School C (Government)	233	1025	3%	26%	36%	21%
School D (Catholic)	547	1047	8%	37%	38%	17%
School E (Government)	509	949	41%	31%	25%	3%
School F (Government)	265	944	24%	48%	22%	5%
School G (Government)	561	1198	1%	3%	19%	77%
School H (Government)	720	1202	1%	5%	30%	64%
School I (Government)	593	1162	1%	5%	28%	67%
School J (Government)	158	914	45%	33%	17%	5%
School K (Catholic)	343	1050	5%	26%	47%	21%
School L (Government)	583	1027	12%	29%	31%	28%
School M (Government)	175	892	-	-	-	-
School N (Government)	2143	916	54%	34%	10%	2%
School O (Government)	177	1035	7%	40%	34%	19%
School P (Government)	300	1040	11%	30%	35%	24%
School Q (Catholic)	658	1096	3%	20%	37%	41%
School R (Government)	441	954	27%	37%	24%	12%
Australian distribution	-	1000	25%	25%	25%	25%

As you can see, the participants represented a diverse range of socioeconomic backgrounds. Government and Catholic, metropolitan and regional schools were included. Each school has students from each of the ICSEA quarters. This signals that student socioeconomic background can vary even within local contexts. Some schools are over-represented in the top quartile (i.e., School G), while others are represented in the bottom quartile (i.e., School N). These factors create some confidence that the sample represents the range and diversity of schools and students across Victoria.

7.1.1 TEACHER DATA SOURCES

More than 30 teachers were surveyed twice: once before and once after the educational intervention focusing on a unique approach to financial literacy teaching and learning. The

teachers were participants who attended two professional learning days led by Monash University and Australian Catholic University academics with expertise in mathematics education. The first professional learning day in June 2013 was intended to collect preliminary (pre-intervention) data and prepare the teachers to teach ten challenging mathematics tasks (five financial dilemmas plus five other mathematics tasks) to their own students in the coming months. On arrival, 35 teachers completed a survey which included items about financial literacy teaching and learning. The survey is presented in Appendix K. The morning and afternoon sessions of the program involved members of the academic team modelling the teaching of each of the ten tasks, using the teacher participants as students. Critical aspects of the associated pedagogies were explicitly highlighted. This enabled the teachers to both observe and experience first-hand expert teaching of the financial dilemmas in preparation for using these tasks with their own classes.

The second professional learning day in November 2013 collected follow-up (post-intervention) data, and explored with the teacher participants the ways and means by which the findings might inform and enhance mathematics and financial literacy teaching and learning. On arrival, 31 teachers completed a survey which included items about the teachers' experiences with the five financial dilemmas in their own classrooms (Appendix L). The program for the day included two 15-minute sessions about financial literacy teaching and learning that I facilitated:

1. An overview and analysis of student responses to "Anna and her friends"; and
2. An explanation of insights into financial literacy teaching and learning gained through the EPMC project.

These sessions were audio-recorded and professionally transcribed. This meant that teachers' verbal contributions to whole-group discussions could be considered and analysed alongside the teacher and student survey data. Similarities and differences between these data sets were compared and contrasted to seek rich, deep insights into financial literacy teaching and learning.

7.1.2 STUDENT DATA SOURCES

The Year 5 and 6 students belonging to classes taught by the teachers from the participating primary schools completed two online assessments – one before and one after the ten challenging mathematics tasks were implemented in their classes. Items designed to reveal students' financial values, attitudes, knowledge, and skills were included in both online assessments. The items and the students' results are presented and discussed later in this chapter. The pre- and post-intervention assessments were essentially the same, except Items 4b and 5 on the post-intervention assessment were amended to explore whether particular variables (the amount of incorrect change in given in question 4b and the

character Zac's socioeconomic background in question 5) influenced students' financial decision-making. Eight hundred and fifty-seven Year 5 and 6 students completed the pre-intervention assessment, and 643 Year 5 and 6 students completed the post-intervention assessment. The lower response rate to the post-intervention student assessment is attributed to Term 4 being a busy time of year for teachers and students, and participation in the project asking teachers to engage in an unusual form of teaching.

It is stressed that the financial literacy items that were included as part of the teacher surveys and student assessments were created by me as part of this doctoral study, and data were interpreted using the elaboration of the theory of planned behaviour – a theoretical framework that was unique to the doctorate.

7.2 INSIGHTS INTO TEACHERS' PERCEPTIONS OF FINANCIAL LITERACY TEACHING AND LEARNING

This section explores teachers' perceptions of financial literacy teaching and learning before and after they used the financial dilemmas and associated pedagogies. Two findings emerged. First, the teachers varied in their views of what financial literacy teaching might involve and their self-rating of their capacity to teach financial literacy. Second, similarities and differences in parents and teachers' views of what financial literacy teaching might involve became apparent. Each of these findings is elaborated below.

7.2.1 TEACHERS' VIEWS OF WHAT FINANCIAL LITERACY TEACHING MIGHT INVOLVE TEND TO VARY

The pre-intervention teacher survey defined financial literacy teaching and learning for participants as follows:

When we ask about financial literacy teaching and learning, we're referring to values, attitudes, knowledge and skills about earning, spending, saving and sharing money.

Following this definition, the teacher participants were asked to respond to seven brief statements by indicating the extent to which they agreed on a 5-point Likert scale (strongly disagree, disagree, unsure, agree, strongly agree). The statements were designed to align with the findings of previous research related to financial literacy at school and the role of the teacher discussed in the literature review. These items and participants' responses are presented in Table 7.2. For each statement, the number of teachers who responded at each of the five Likert levels is presented.

Table 7.2. Teachers' responses to statements about financial literacy: Pre-intervention survey

Statement	SD 1	D 2	U 3	A 4	SA 5	Total
a. Financial literacy is a specialised topic that should be taught for around four weeks each year.	2	12	11	8	1	34
b. Financial literacy is best taught using purpose designed published programs.	1	13	14	6	0	34
c. Financial literacy teaching and learning should involve external organizations or guest speakers.	0	10	11	12	1	34
d. I have a good idea about what parents are teaching students about money at home.	6	12	6	8	2	34
e. I am financially literate.	0	2	5	22	4	33
f. I am confident about teaching financial literacy.	0	7	9	12	4	32
g. I would like further PD about financial literacy.	0	2	3	19	9	33

The teachers' responses to the above statements reveal a diversity of views. The first three statements (statements a.-c.) were related to how financial literacy might be represented and taught as part of the school curriculum. The teachers' responses revealed a real uncertainty about how financial literacy might be taught. This is possibly reasonable considering "Money and financial mathematics" is a rebranded feature of what is a new *Australian Curriculum*. More than 40% of the teacher participants did not think that financial literacy is a specialised topic deserving of its own time (around four weeks each year) in the school curriculum. A further 30% were unsure. While these findings suggest that teachers would benefit from guidance in reading, interpreting, and making decisions about the positioning of financial literacy in the *Australian Curriculum*, further research is needed to understand teacher decision-making and practice related to financial literacy.

Despite their uncertainty about the topic, the majority of the teacher participants did not like the idea of purpose designed published programs. Various financial literacy education programs have been created and published by educational consultants and stakeholder organisations such as the Australian Securities and Investments Commission (ASIC) and financial institutions. MoneySmart Teaching, for example, was designed specifically for the *Australian Curriculum*. Some stakeholder organisations provide guest speaker services to schools (i.e., Commbank School Banking and StartSmart). These are marketed to schools as quality, ready-to-use 'solutions' for financial literacy teaching and learning, including online tools. While more than 80% of the teacher participants were unsure, disagreed, or strongly disagreed that financial literacy is best taught using purpose designed published programs, 38% agreed or strongly agreed that external organisations or guest speakers

have a role to play in financial literacy teaching and learning. This suggests that while the teacher participants were either unaware or sceptical about the availability or usefulness of published teaching and learning programs, they are slightly more willing to invite perceived “experts” in financial literacy to speak with students. This may reflect familiarity or positive experiences with guest speakers local to their schools such as representatives from local banks and/or parents who work in finance.

While more than 75% of the teacher participants agreed or strongly agreed that they were financially literate (statement e.), only around half indicated being confident about teaching financial literacy (statement f.). This suggests that teachers saw being financially literate and having a pedagogical toolkit to teach financial literacy to students as different types of knowledge and skills. Consistent with this, 85% of the teachers indicated they would like further professional development about teaching financial literacy (statement g.).

In line with the findings of the teacher interview data presented in Chapter 4, 70% of teacher participants were unsure, disagreed, or strongly disagreed that they have a good idea about what parents are teaching students about money at home (statement d.). Given the findings presented in Chapters 4, 5, and 6 that indicate social understandings learned at home play an integral role in students’ financial problem-solving and decision-making, to find out what students already know and understand about money would seem to be an important professional learning need for teachers if they are to meaningfully tailor financial literacy teaching and learning to students’ backgrounds, characteristics and interests.

The pre-intervention teacher survey asked participants to suggest three things students should know and understand about money by the time they leave primary school. When this question was posed to the Acting Principal and teachers interviewed in Stage 1 of the project, the participants varied in their responses. Posing the question to a larger sample of teachers was intended to gain a clearer understanding how teachers perceive financial literacy learning outcomes in the upper primary years. The teacher participants’ qualitative responses were dissected, categorised and sub-categorised. The process by which this data analysis was undertaken is described below. Two colleagues were enlisted to check and discuss the appropriateness of the categories and sub-categories: one being a social educator, the other a mathematics educator.

A small number of suggestions were worded in such a way as to suggest more than one idea, and were assigned to multiple categories accordingly. Some teacher participants made only two suggestions. This meant that, together, the 35 teachers made a total of 107 suggestions. The first level of categorisation related to whether the suggestion constituted a

social or a mathematical understanding. Social understandings were suggested on 63 occasions. Mathematical understandings were suggested on 44 occasions. Sub-categorising proved challenging, and reinforced that the social understandings related to financial literacy teaching and learning involve values, attitudes, knowledge, and skills. Initially, four social sub-categories were selected in line with the “big ideas” usually associated with financial literacy teaching and learning: “Earning money,” “Spending money,” “Saving money,” and “Sharing money”.

However, some suggestions did not fit neatly into any of these four social sub-categories. Furthermore, the idea that students might learn about sharing or donating money was not raised by the teacher participants. Four of the 107 suggestions were aligned with the types of understandings included as part of the *Australian Curriculum: Economics and Business* – namely, “money is a limited resource,” “the purpose of money,” “the difference between needs and wants,” and “factors that influence consumer spending and prices.” As such, these suggestions were sub-categorised as “Other economic understandings”. Various suggestions reflecting attitudes and/or values to money were made, including “how others view and experience money,” “positive attitudes and values to money,” “the relationship between money and opportunity,” and “gambling”. Hence, a final social sub-category titled “Socio-ethical understandings” was created. By contrast, the mathematical understandings suggested seemed to imply the view that money is simply a practical example or context to which mathematical knowledge and skills can be applied. Three sub-categories were readily identified: “*Adding, subtracting, multiplying, and dividing quantities of money*,” “*Percentage discounts, also expressed as fractions*,” and “*Interest calculations*”. “*Adding, subtracting, multiplying, and dividing quantities of money*,” regularly involved reference to calculating change (16 times). The frequency of teacher participant suggestions by category and sub-category is presented in Table 7.3.

Table 7.3. *Categorised and sub-categorised suggestions what teacher participants thought students should know and understand about money by the time they leave primary school: Pre-intervention survey*

Social understandings		Mathematical understandings	
Earning money	4	Adding, subtracting, multiplying, and dividing quantities of money	28
Spending money	39	Percentage discounts, also expressed as fractions	4
Saving money	8	Interest calculations	12
Other economic understandings	8		
Socio-ethical understandings	5		
Total	63	Total	44

Note that social understandings were suggested more frequently than mathematical understandings. Almost two-thirds of the social understandings suggested related to spending money. This suggests that the teachers viewed financial literacy as more likely to involve social understandings related to expenditure. When one takes into consideration that 39 suggestions related to “Spending money” and 28 suggestions related to “Adding, subtracting, multiplying, and dividing quantities of money,” more than 60% of suggestions related to students being able to accurately carry out operations with money (i.e., simple everyday financial transactions) by the end of primary school. It seems there may be opportunities for further discussions with teachers to explore the extent to which they plan to teach interrelated social and mathematical understandings about money in holistic ways.

7.2.2 PARENTS’ AND TEACHERS’ VIEWS OF WHAT FINANCIAL LITERACY TEACHING MIGHT INVOLVE

Interesting trends that were consistent with, but also disparate from, what teacher and parent participants in Stage 1 of this study emphasised (reported in Chapter 4) were also identified. In particular, in Stage 1, it was found that the importance of living within one’s means was a shared value that was being taught by parents and learned by students using different strategies - from engaging in explicit conversations about money to money being given to children for them to decide and practice how to spend and/or save it. Consistent with this, in Stage 3, it was suggested 12 times that primary students learn the value of and for money, including the cost of living. It was also suggested 12 times that primary students learn to budget to live within particular means and to keep track of money. This suggests that these learning outcomes are valued by teachers and parents regardless of context.

Interestingly, in Stage 1 of this study, working to earn an income and saving for the future were also described by parents as being important. By contrast, in Stage 3, suggestions related to “Earning money” were made only 4 times and suggestions related to “Saving money” were made only 8 times. This indicates that there is a discrepancy in the extent to which these learning outcomes are valued as important by parents compared with teachers. And while these particular learning outcomes are not stipulated in the *Australian Curriculum: Mathematics*, they are a feature of *AusVELS Economics* at Years 5 and 6, which stipulates students will “investigate the importance of personal money management and the role of banking, budgeting and saving”. So it seems teachers are not taking an interdisciplinary view of financial literacy teaching and learning. Note that this comment is not intended as a criticism of teachers. In Victoria, responding to curriculum reform has been an integral part of teachers’ professional work for several years, with development and implementation of the *Victorian Essential Learning Standards (VELS)* from 2003-2006 taking place just prior to the announcement that there would be a new national curriculum. Phase 1 learning areas of the *Australian Curriculum* – English, Mathematics, Science, and History – were implemented in

2014, marking the start of a period of curriculum transition in Victoria known as *AusVELS*. *AusVELS* is the Victorian Curriculum and Assessment Authority's (VCAA) solution to manage phased implementation of the *Australian Curriculum* together with the *VELS* in a way that provides a single coherent curriculum framework for Years F-10. *AusVELS* is intended to ensure that teachers are not required to manage two different curriculum and reporting frameworks. Despite this theoretically thoughtful and neat packaging, curriculum reform is not easy for teachers to navigate, and teacher professional learning that focuses on what's new and what might be done differently is needed.

Additionally, in Stage 1 of this study, the teachers and parents interviewed expressed the view that schools should be teaching primary aged children about interest, a topic that is not currently included in the primary school curriculum. The *Australian Curriculum: Mathematics* includes a designated substrand titled "Money and financial mathematics" which stipulates that at Year 5, students will learn to create simple financial plans, and at Year 6, they will investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies. In Chapter 4, the potential to situate the teaching of interest rates as a "real life" example of percentage was discussed. Consistent with this, in Stage 3, it was suggested 12 times that primary students be able to calculate interest paid on debts or earned on savings and investments by the end of primary school. Currently, "to solve problems involving simple interest" does not feature in the *Australian Curriculum: Mathematics* until Year 9. There may be the potential to introduce conceptual understandings about interest earlier than this – for example, by introducing and discussing interest as both an incentive to save and a cost associated with borrowing, and exploring students' social understandings related to these financial practices.

Given these teachers' statements about what students should know and understand about money by the time they leave primary school, an interesting anomaly was discovered at the post-intervention professional learning day. I was facilitating a debrief session titled, "Student responses to some of the tasks: Anna and her friends," and asked the group, "How many of you implemented the version of the task with prices in whole dollar amounts?" All the teacher participants raised their hands. I then asked the group, "Keep your hand up if you moved on to the version of the task with prices in dollars and cents and an online processing fee?" Only a few hands remained raised. This is problematic. The *Australian Curriculum: Mathematics* stipulates that at Year 4, students will learn to solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies. In this regard, the introductory version of "Anna and her friends" was pitched to Year 4 students. The question is, given what is written in the *Australian Curriculum* and that the teacher participants' responses to the pre-intervention teacher survey indicate they

believe students should be able to accurately carry out operations with money (i.e., simple everyday financial transactions) by the end of primary school, why are they not challenging Year 5 and 6 students to work in both dollars and cents? In this example, the teachers' reports of their practice appear to be contradictory to their beliefs and the achievement of student learning outcomes stipulated in the *Australian Curriculum*. While much research highlights the congruence between teacher beliefs and practice (Fang (1996) produced an excellent review of the literature), it has been acknowledged that there can be conflict and contradictions between the two because "beliefs are prioritised according to their connections or relationship to other cognitive and affective structures" (Pajares, 1992, p.325). Furthermore, the complexities of teachers' work and classroom life can constrain teachers' abilities to attend to their beliefs and provide instruction which aligns with them (Duffy & Anderson, 1984). There may be merit in encouraging teachers to critically reflect upon the alignment between their beliefs and practice, particularly the extent to which they are preparing students to work in both dollars and cents.

7.3 INSIGHTS FROM TEACHERS' REPORTS OF THEIR EXPERIENCES USING THE FINANCIAL DILEMMAS

The teacher participants were asked to trial the educational intervention in their classrooms prior to the second professional learning day in November 2013. The educational intervention consisted of five financial dilemmas and associated pedagogies. The financial dilemmas were essentially open-ended mathematical problems involving financial contexts drawn from "real life" situations that 10-12 year old children might be familiar with and/or interested in and/or able to imagine. Each financial dilemma would form the basis of a single mathematics lesson. The order in which they might be used was not stipulated – this decision would be at the teacher participants' discretion. The financial dilemmas required students to draw on both social and mathematical understandings simultaneously and in synergy, involved multiple solutions, and invited students to share and explain their reasoning. An important goal of the educational intervention was to strengthen students' disposition to connect social and mathematical thinking as part of their financial problem-solving, the assumption being that doing so will likely contribute to informed financial decision-making.

The financial dilemmas were to be used together with researched pedagogies and practices that have been argued to enhance mathematics learning. These included:

- Providing a **rationale** for the lessons (Mandell & Klein, 2007) by defining financial literacy, explaining the difference between social and mathematical thinking, and

emphasising the importance of both to informed financial problem-solving and decision-making.

- Building a strong **introduction** to the lesson through literacy and other strategies that give students confidence to begin problem-solving (Draper, 2002). Literacy strategies include: ensuring the problem is read aloud to the class; asking students to underline or highlight the information that they think is important to the problem; and asking students to identify any words they don't know or understand so that these can be defined as a class. Other strategies that seem to help students make sense of financial dilemmas include the use of role play and concrete materials (i.e., notes and coins).
- Emphasising problem-solving **tools and strategies** that might help students, including creating tables to organise information and/or drawing pictures (Goos, Dole, & Geiger, 2011).
- Providing time for **individual thinking** and problem-solving, followed by **small group collaboration** where students can share and discuss their problem solving approaches and solution/s (Smith & Stein, 2011).
- Facilitating **critical whole-class discussions**, including: ensuring that a range of options (mathematical workings and explanations) are recorded, and asking open, sometimes provocative questions to stimulate different ways of thinking (Lappan & Phillips, 2009; Cheeseman, 2009; Sullivan, 2009; Walker, 2014).

The post-intervention teacher survey posed a number of items to elicit feedback from the teachers about their experiences using the financial dilemmas. Overall, the teacher participants' responses revealed three insights: that the financial dilemmas and associated pedagogies benefitted both the teachers and their students; that there were particular considerations for an effective financial literacy lesson; and that the teachers were willing to learn about and experiment with new tasks and pedagogies through research-based professional learning. These are discussed below.

7.3.1 BENEFITS OF THE EDUCATIONAL INTERVENTION

The teacher participants were asked to respond to four brief statements by indicating the extent to which they agreed on a 5-point likert scale (strongly disagree, disagree, unsure, agree, strongly agree). These items and participants' responses are presented in Table 7.5.

Table 7.4. *Teachers' responses to statements about the financial dilemmas: Post-intervention survey*

Statement	SD 1	D 2	U 3	A 4	SA 5	Total
o. The financial dilemmas helped my students see that both social and mathematical thinking play important roles in financial problem solving.	1	0	0	20	10	31
p. My students seemed to know more about using money than I had realised.	2	8	6	9	6	31
q. These tasks helped me to feel more confident about teaching financial literacy.	1	0	1	16	13	31
r. I will use these tasks again.	1	0	0	6	22	29

The teacher participants' feedback on the five financial dilemmas was very positive. All but one strongly agreed or agreed that the financial dilemmas helped their students to see that both social and mathematical thinking play important roles in financial problem-solving. Around half the teacher participants strongly agreed or agreed that the students seemed to know more about using money than they had realised, suggesting that the financial dilemmas provided a means for teachers to learn about their students' existing financial values, attitudes, knowledge and skills. On the other hand, other teachers did not learn more about their students' financial understandings' through these tasks. This might reflect differences in teachers' use of the associated pedagogies, particularly the extent to which social thinking was discussed and debated.

More than 90% of the teacher participants strongly agreed or agreed that the tasks helped them to feel more confident about teaching financial literacy, and that they would use the tasks again in the future. Recalling the pre-intervention teacher survey where only half of the teacher participants indicated being confident about teaching financial literacy (Table 7.2, p.162), it seems that being involved in the EPMC project and trialling the financial dilemmas helped the teacher participants to become more confident about teaching financial literacy. This finding is particularly significant in light of the pre-intervention teacher survey results that more than 80% of teacher participants were unsure, disagreed, or strongly disagreed that financial literacy is best taught using purpose designed published programs and 38% agreed or strongly agreed that external organisations or guest speakers have a role to play in financial literacy teaching and learning. It seems that teachers are discerning consumers of teaching and learning materials, and would prefer to be empowered to learn through experimentation how they might refine their practice. Providing teacher professional learning where quality tasks and associated pedagogies are modeled by "experts", and giving teachers time to implement, reflect on and provide feedback about those tasks and pedagogies were effective ways to engage teachers in researching and learning about their practice.

7.3.2 CONSIDERATIONS FOR AN EFFECTIVE FINANCIAL LITERACY LESSON

Having taught the five lessons, the post-intervention teacher survey asked participants to vote for the three best financial literacy tasks with respect to: a. mathematics learning; and b. student engagement. They used 1 for the best financial dilemma, 2 for the second best, and 3 for the third best. Thirty one teachers completed this item. Table 7.5 presents the number of times each financial dilemma was voted first, second, and third with respect to mathematics learning and student engagement. The totals provide a way to compare the effectiveness of the five tasks.

Table 7.5. Tally of teachers' votes for the three best financial literacy tasks

Vote	With respect to <i>mathematics learning</i>				With respect to <i>student engagement</i>			
	1	2	3	Total	1	2	3	Total
Shopping for shoes	8	8	6	22	3	11	5	19
Making choices about spending	1	11	5	17	1	9	3	13
Anna and her friends	9	8	6	23	15	6	6	27
Catching a taxi	11	4	9	24	10	5	12	27
The price of meal deals around the world	2	0	4	6	2	0	4	6

The financial dilemma with the highest number of votes for mathematics learning was “Catching a taxi” (24 votes). “Catching a taxi” and “Anna and her friends” received the equal highest number of votes for student engagement (27 votes).

Related to this, the post-intervention teacher survey included a short response question, “Is there a particular story you would like to share with us? Please tick the task your story relates to, and briefly tell us about your experience.” The purpose of this item was to seek insights from teachers about particular teaching episodes or experiences they found relevant with the expectation this would reveal strengths and weaknesses in the financial dilemmas and associated pedagogies. Twenty-five teachers completed this item. The points raised by the teacher participants’ in their responses were similar for all five financial dilemmas. However, most chose to discuss “Catching a taxi” and “Anna and her friends” indicating these tasks were perceived by the teacher participants to be particularly effective. Verbal feedback at the post-intervention teacher professional learning day confirmed this. Since “Anna and her friends” was discussed extensively in the previous chapter, this section analyses the teacher participants’ feedback about “Catching a taxi.”

“Catching a taxi” was designed to explore how students decide to divide costs when two people share a taxi ride to two different destinations. In this financial dilemma, “flagfall” is

introduced to students as an example of an upfront cost. The fact that the characters Mike and Matt are travelling different distances in the taxi means that sharing the cost of the trip evenly may not be the fairest solution. The task also represents linear relationships. It was presented as shown in Figure 7.1.

Task 4.1:
The taxi fare is \$3 flagfall (what you pay when you get into the taxi) and then \$1.50 per km after that. It does not matter how many people are in the taxi.

Mike and Matt decide to share a taxi because they are going in the same direction but to different houses. The journey to Mike's house is 20 km, then a further 30 km to Matt's house.

How much should each of them pay for the taxi? Explain why your suggestion is fair for both people.

Figure 7.1. Catching a taxi.

The task meets the criteria of: representing a “real life” context that 10-12 year old children might be familiar with and/or interested in; requiring both social and mathematical thinking towards a solution; there being multiple solutions that might be presented and argued; and students being asked to share and explain their reasoning. Three critical aspects emerged. First, the importance of establishing the context, including the effectiveness of role play to do this was identified. Second, the dilemma of task relevance to students was raised. Third, the teacher participants wrote about the power of prompting and building connections between social and mathematical argument and debate in consideration of multiple options. Each of these aspects is elaborated below.

7.3.2.1 THE IMPORTANCE OF ESTABLISHING THE CONTEXT, INCLUDING THE EFFECTIVENESS OF ROLE PLAY

One of the issues identified in the EPMC project is the tension between providing enough information for students to engage with a task and offering so much guidance that the challenge of the task is removed (see Sullivan & Mornane, 2013). It seems that selecting “real life” contexts that are familiar to students, or that might be effectively represented through role play, enhances how tasks are posed to and interpreted by students. At the teacher professional learning day in June 2013, “Catching a taxi” was modelled to the teachers, and role play was used as part of the process. The academics and teacher participants being involved in role play together was entertaining to watch, and this appears

to have made a lasting impression in relation to this particular task. A number of comments made about “Catching a taxi” on the post-intervention teacher survey related to the use of role play for student engagement. The teachers who chose to comment on this particular aspect mentioned how students were able to relate to the task based on their own previous experiences catching a taxi and/or that using role play enhanced students’ understanding of the context. The feedback from teachers suggested that the use of role play with their own classes set the scene for social thinking, while situating the lesson during numeracy time set the expectation that mathematical thinking would also take place. In these ways, “Catching a taxi” encouraged students to draw on social and mathematical understandings simultaneously and in synergy – a skill that is essential to financial problem-solving and decision-making. For example, one teacher commented:

We used role play to introduce the problem. The students were instantly engaged and involved. The three students that acted out the situation were fantastic - way better than we expected! Two grades that did not use the role play did not show as good results as the two grades that used it.

The importance of the use of role play to the success of this particular financial dilemma was also mentioned by this teacher, who wrote about the need to identify and discuss a range of options, as follows:

Many of my students had experience with catching a taxi. In the [lesson] introduction we shared these stories and developed a role play of the scenario. Interestingly a couple of my very strong boys couldn't see past the idea of Mike paying for 20 km and Matt paying for full 50 km, giving the driver a \$30 tip. I had to check in with the class several times to discuss an option, let the students work, then share another option. By the end we had about 5 options to decide between.

This comment highlights the teacher’s diligence in weaving the financial dilemma and associated pedagogies to encourage students to discover mathematics by doing it and by sharing and explaining their problem-solving experiences and insights with each other. This is research-based teaching and learning.

7.3.2.2 THE IMPORTANCE OF SELECTING MEANINGFUL “REAL LIFE” CONTEXTS

Choosing meaningful “real life” contexts in which to situate mathematical problems is complex and challenging. As the previous section highlights, “Catching a taxi” was appropriately socially constructed and situated for financial literacy teaching and learning in some schools. However, when invited to comment on the financial dilemmas on the post-intervention teacher professional learning day, the teacher participants’ views on whether the financial dilemmas were meaningful to their students varied. One participant said:

In the financial literacy lessons, [students] seemed to be a lot more passionate about the discussion because they could relate to the tasks more – they'd been to the movies, they'd caught a taxi, or things like that.

A teacher from another school concurred on behalf of her colleagues, saying, "We absolutely agree. You could see that the students were so much more positive and actually enthralled with the maths tasks bringing in the social [thinking]." This teacher went on to speak about the importance of "real life" examples of mathematics, and how the financial dilemmas were successful in engaging and involving "students that you wouldn't usually expect to put their hand up and answer." In other words, the context was meaningful for students at this school.

However, it seems that not all contexts are meaningful to all students. A teacher from School M, who described her students as disadvantaged, reported a different experience:

We found that students couldn't move past the social [thinking] to do the maths. They'd say "We don't go to the movies. We don't pay for films - we download." "We don't pay for taxis." "Why would I pay to go to the gym?" So they couldn't even be objective about answering the maths questions. They were stuck on the social.

This comment highlights the importance of selecting or developing financial literacy tasks that take into consideration students' local context, family backgrounds, and interests. There are two points to be made. On one hand, students may be disengaged by tasks they see as irrelevant to their lives. Financial literacy discourses suggest that financial literacy is a type of knowledge those without resources do not possess. As this teacher's comment suggests, it seems likely that individuals develop to a level of financial literacy that is appropriate to their personal socioeconomic circumstances, and may not be motivated to even attempt what they perceive to be somewhat middle class, unrealistic teaching and learning tasks. With some encouragement and prompting, this teacher and her colleagues were able to brainstorm ideas for financial literacy tasks more appropriate to their local context that might better engage their students. They suggested that tasks related to budgeting expenses within a limited means might work effectively. On the other hand, one purpose of financial literacy teaching and learning is to redress the apparent disparity in financial literacy levels associated with socioeconomic background. Hence, there is merit in posing contexts that are at least imaginable and might expand students' experiences – for example, through role play. Either way, the choice of context and the strategies used to introduce the task are critical. This issue is discussed further in Chapter 8.

7.3.2.3 THE IMPORTANCE OF BUILDING CONNECTIONS BETWEEN SOCIAL AND MATHEMATICAL THINKING

The ways that the financial dilemmas require students to draw on social and mathematical thinking simultaneously and in synergy as they consider multiple options was an important feature of the tasks and associated pedagogies reported by the teacher participants. For example, one teacher commented specifically on encouraging students to connect social and mathematical thinking, writing on his/her survey:

["Catching a taxi"] created the most discussion about fairness. Students worked out half the cost each, or one pays the first part of trip and other pays the last. This showed kids the social aspect of mathematics. This was one of the first times students passionately debated mathematics.

This teacher's comment illustrates his/her use of an important pedagogy associated with the financial dilemmas – to find and take opportunities to share students' social and mathematical thinking "on the run" through the lesson. As this teacher implies, this particular strategy can help students to overcome misconceptions (i.e., that each character should pay for the total distance he travels) and see multiple views. A comment by another teacher echoed this sentiment:

...Students explored a range of strategies. It was great to see students sharing strategies and prompting others to think differently and [look] for more than one option.

Showcasing a range of options over the course of a lesson provides a strong foundation to promote critical understandings along the way. These critical understandings can be further reinforced during the summary phase of the lesson. As discussed in Chapter 6, this particular approach seems to be pivotal to students changing their minds over the course of a lesson. One teacher reported creative use of pedagogy to bring the lesson to life and facilitate development and sharing of different strategies. The teacher wrote:

The students loved this task. I introduced it, we focused on the key terms, they went away and explored the question. I then put them in groups of 3. Their task was to agree on a strategy and create a role play. They all enjoyed sharing [their answers] and were excited to see how groups shared the costs.

The above insights by the teacher participants show that financial dilemmas and associated pedagogies are interdependent, but teachers have the flexibility to craft them according to their own local context, teaching style and students' needs and interests. . The importance of establishing the context, including the effectiveness of role play to do this; the dilemma of task relevance to students; and the power of prompting and building connections between social and mathematical argument and debate in consideration of multiple options are clearly important considerations in financial literacy education. It seems that the more purposefully

the curriculum, tasks, and pedagogy, the social and mathematical are woven together, the more effective financial literacy teaching and learning can be.

7.3.3 TEACHER PROFESSIONAL LEARNING THROUGH PARTICIPATING IN DESIGN-BASED RESEARCH

The opportunity to participate in this research project seemed to expand the teachers' understanding and practice related to financial literacy teaching and learning. The teachers were given a list of pedagogies they may have used in teaching the financial dilemmas, and asked to indicate three things: what they did; what they did not do but would do next time; and what they did not do and would not do in the future. These responses are presented in Table 7.6 in the order of frequency what teachers reported they did. They were also asked, "What did you find most difficult about teaching the financial literacy tasks?" and were given a list of eight options among which to choose three. These responses are presented in Table 7.6. Tables 7.6 and 7.7 are best read and interpreted together.

Table 7.6. *Insights into the teachers' pedagogies and inclinations (n=31)*

Question	I did this	I did not do this but would use it next time	I did not do this and don't intend to do this in the future	Total Responses
I deliberately scouted the room to identify students to share their mathematical workings and explanations	31	0	0	31
I encouraged students to collaborate in small groups to discuss their problem solving approaches and solution/s	30	1	0	31
I read the problem aloud	30	0	1	31
I ensured a range of options (mathematical workings and explanations) were recorded during whole-class discussion	29	2	0	31
I asked open, sometimes provocative questions to stimulate different ways of thinking	27	3	0	30
I encouraged students to create tables	27	3	1	31
I asked students to identify any words they didn't know or understand so we could define key terms as a class	26	4	1	31
I involved the students in role play	22	6	2	30
I encouraged students to draw pictures	22	8	0	30
I explained the difference between social and mathematical thinking	21	10	0	31
I used concrete materials (i.e., notes and coins)	17	13	1	31
I asked students to underline / highlight the information that they thought was important to the problem	15	12	4	31
I created follow-up lessons	10	21	0	31

Table 7.7. *What teachers found difficult about teaching the financial literacy tasks: Post-intervention survey (n=31)*

Answer	Bar chart	Number of responses	% of teacher participants
Encouraging students to find more than one option		26	84%
Encouraging students to compare and contrast different options in order to make a decision		16	52%
Getting students to develop an argument based on both social and mathematical thinking		16	52%
Helping the students relate to the scenarios		11	35%
The literacy demands of the tasks		7	23%
Getting students to explain their social thinking		5	16%
Getting students to explain their mathematical thinking		5	16%
Helping students to understand how money was changing hands		5	16%

The results presented in Table 7.7 suggest that three of the skills that seem to be important to financial problem-solving and decision-making – finding multiple options; comparing and contrasting different options in order to make a decision; and developing an argument based on both social and mathematical thinking – are challenging for teachers to teach and, by association, students to learn. However, as Table 7.6 shows, pedagogies intended to cultivate these skills were used by almost all of the teacher participants. These included: encouraging students to collaborate in small groups to discuss their problem solving approaches and solution/s; deliberately scouting the room to identify students to share their mathematical workings and explanations; ensuring a range of options (mathematical workings and explanations) were presented during whole-class discussion; and asking open, sometimes provocative questions to stimulate different ways of thinking. This is encouraging as it would seem to indicate the teacher participants were committed to implementing the pedagogies outlined as central to the research project at the professional learning day in June 2013 and in the EPMC project handbook. Since these skills are central to financial literacy, further research into strategies to overcome the difficulties reported by teachers may be the focus of future research and teacher professional learning. For example, if students were presented with a financial dilemma and multiple possible solutions to it, could they problem-solve to discover the mathematics behind the solutions, and develop social and mathematical arguments for and against each one? Would this help students to see and evaluate different ways of thinking?

That 35% of teachers reported finding it difficult helping students relate to the scenarios is a complex finding to unpack. As discussed, some teachers commented that the financial dilemmas were meaningful and engaging. However, local context seems to be an important consideration, as those teaching disadvantaged students disagreed and indicated a willingness to try (or even develop their own) similar tasks designed for students from low socioeconomic backgrounds. Related to this finding, it is possible that teachers would benefit

from further ideas about what pedagogies might “unlock” access to the scenarios for students and how to use these effectively. For example, the use of role play and concrete materials (i.e., notes and coins) were reported by most of the teacher participants and the majority of the remainder indicated they would use these strategies next time. These pedagogies are particularly useful to bring the financial dilemmas to life by physically modelling unfamiliar contexts and helping students to see how money can change hands. Modern-day use of credit and debit cards to pay for transactions tends to make money invisible to students. Not all students will have had the same opportunities to practice using money in real contexts. For this reason, students might benefit from more practice using concrete materials in classrooms throughout primary school.

Being financially literate means being able to read and critically engage with often complex financial information that is presented in both words and numbers. The data suggest that there is room for improvement in the use of pedagogies that can help students tackle worded problems. Interestingly, the number of teacher participants reporting difficulties related to the literacy demands of the task was relatively low (23%). However, other data suggests there are ways to increase the level of support available to students to help them read worded mathematical problems for meaning. For example, while almost all the teacher participants reported reading the financial dilemmas aloud, fewer (84%) asked students to identify any words they did not know or understand so that key terms could be defined, and fewer again (around half) asked students to underline / highlight the information that they thought was important to the problem. These literacy-related strategies may provide necessary support to students approaching worded mathematical problems and tend to be most effective when used in conjunction with each other. Students cannot relate to problems they cannot comprehend – teaching students to read for meaning is an ongoing pursuit and should be routinely embedded in mathematics lessons.

It seems that the majority of teacher participants used teaching strategies intended to help students organise the information presented in the financial dilemmas, including encouraging students to create tables (87%) and/or draw pictures (73%).

It is encouraging to note the trend that each pedagogy not used in the first instance was more likely to be used next time. Only a small minority of participants indicated they did not use some of the suggested pedagogies and would continue not to do so next time. This suggests that the teacher participants left the professional learning day in June 2013 with a range of pedagogies that they proceeded to use with their classes, and were open to suggestions what pedagogies they might use next time in order to enhance financial literacy teaching and learning.

While only one-third of the teacher participants reported creating follow-up lessons to the five financial dilemmas, those who did not indicated they would do so next time. The importance of follow-up lessons was emphasised by multiple members of the EPMC project team following data collection at the post-intervention teacher professional learning day. Helping teachers to develop effective follow-up lessons may form the basis of future teacher professional learning.

7.4 INSIGHTS INTO STUDENTS' FINANCIAL DECISION-MAKING

In order to evaluate the impact of the educational intervention on students' financial literacy learning, the pre- and post-intervention student assessments posed a series of five items designed to assess students' mathematical knowledge and skills applied to financial transactions. These items were closely connected to the five financial dilemmas so as to assess the extent to which the financial dilemmas and associated pedagogies (educational intervention) may have contributed to students' financial literacy learning. While general improvements in the accuracy of students' mathematical calculations were noted on most items post-intervention, and these improvements may be attributable to the financial dilemmas and associated pedagogies, the results also reveal that Year 5 and 6 students tend to:

- have difficulties accounting for up-front or hidden costs;
- have difficulties applying mathematics to calculate and interpret value for money;
- perform better on items where the contexts involve experiences common to 10-12 year olds (i.e., purchasing food);
- need practice working in both dollars and cents; and
- be honest, ethical consumers.

So, while explicit financial literacy teaching and learning is productive, there remain areas for improvement. Additionally, while financial literacy has been found to be associated with socioeconomic characteristics (ANZ, 2003, 2005, 2008, 2011), socioeconomic background does not seem to be a strong influence in student financial decision-making. Each of these issues is discussed below, drawing together the assessment items, student results, and implications for teachers.

7.4.1 IT IS IMPORTANT TO TEACH STUDENTS TO ACCOUNT FOR UP-FRONT OR HIDDEN COSTS

Item 1 on the student assessment was similar to "Catching a taxi" in that the initial \$4 cost of a MYKI card is comparable to a taxi flagfall (both are examples of upfront costs). It was presented as shown in Table 7.8.

Table 7.8. Item 1 on the student assessment

<p>You need a MYKI card before you can travel on public transport in Melbourne. It costs \$4 to buy a MYKI card, and you need to put extra cash on the card to travel. If each journey costs \$2.50, what is the total cost of 6 journeys?</p>		
	Response (pre-intervention, n=857)	Response (post-intervention, n=643)
a. \$15	57%	47%
b. \$6.50	7%	5%
c. \$19	33%	45%
d. \$10	3%	4%

Pre-intervention, only 33% of students answered Question 1 correctly. It would seem that the 57% of students who answered a. \$15 did not take the initial cost of a MYKI card into consideration – rather, they multiplied the journey cost by the total number of journeys (\$2.50 x 6). A further 10% of students were unable to execute this calculation. While there was a significant increase in the number of students who answered Question 1 correctly post-intervention, more than half were still unsuccessful at accounting for the initial cost of the Myki card. This either indicates a weakness in the wording of the question, or that upper primary students do not fully understand what is a simple everyday financial transaction they might carry out as young adolescents travelling independently on public transport. The suggestion to talk with students about upfront and hidden costs may need to be included as part of the advice to teachers for the “Catching a taxi” task.

7.4.2 IT IS IMPORTANT TO TEACH STUDENTS TO APPLY MATHEMATICS TO CALCULATE AND INTERPRET VALUE FOR MONEY

Item 2 on the student assessment was similar to “Making choices about spending” in that it required students to interpret value for money when faced with price deals and think about whether it is attractive to pay upfront for entertainment services that are to be used at a future point in time, where value for money depends on usage (i.e., the number of visits to a museum, swimming pool, or gym). It was presented as shown in Table 7.9.

Table 7.9. Item 2 on the student assessment

<p>A “6 month pass” to the museum costs \$20 which then lets you enter without paying any more for six months. Individual visits cost \$7. How many times do you need to visit the museum in the six months for the “6 month pass” to start being good value?</p>		
	Response (pre-intervention, n=857)	Response (post-intervention, n=643)
a. 5	18%	13%
b. 4	24%	24%
c. 3	53%	59%
d. 2	5%	4%

Pre-intervention, 53% of students successfully calculated that the “6 month pass” becomes good value at 3 visits ($3 \times \$7 = \$21 > \$20$). However, almost as many students (47%) answered this question incorrectly. Post-intervention, 59% of students identified the correct response – a small improvement. While the parents and teachers involved in this research reported wanting students to learn about value of and for money, around 40% of the student participants did not apply mathematics appropriately to this scenario. Given the importance of context, it would be interesting to explore whether a similar scenario involving a context more familiar to 10-12 year olds (i.e., passes to an indoor roller-skating rink or skate park) would yield better results.

7.4.3 STUDENTS TEND TO PERFORM BETTER ON ITEMS WHERE THE CONTEXTS INVOLVE EXPERIENCES COMMON TO 10-12 YEAR OLDS

Item 3 on the student assessment was similar to “Anna and her friends” in that a discount was available if friends shared a price deal. It was presented as shown in Table 7.10.

Table 7.10. Item 3 on the student assessment

<p>Bill wants a burger which costs \$8. Ben wants a drink that costs \$4. They can get a meal deal that includes both the burger and the drink for \$9. If they get the meal deal, how much cheaper is the deal than the individual items combined?</p>		
	Response (pre-intervention, n=857)	Response (post-intervention, n=643)
a. \$4	9%	5%
b. \$3	84%	90%
c. \$2	4%	4%
d. \$1	3%	2%

While this item was answered correctly by the majority of students pre-intervention (84%), an improvement was also noted post-intervention (90%). There are two possible reasons for students' success on this item. First, the item was straight-forward in that it involved only whole number addition ($\$8 + \$4 = \$12$) and subtraction ($\$12 - \$9 = \3). Second, 10-12 year olds are likely to have experienced making purchases of this nature at the school canteen if not elsewhere - meaning the context (purchasing food) was probably familiar. This reinforces the importance of selecting meaningful "real life" contexts that students have either observed, experienced, or can imagine.

7.4.4 IT IS IMPORTANT TO PROVIDE STUDENT WITH OPPORTUNITIES TO PRACTICE WORKING IN BOTH DOLLARS AND CENTS

Item 4a involved subtracting dollars and cents to calculate change. This question proved more challenging for students. It was presented as shown in Table 7.11.

Table 7.11. *Item 4a on the student assessment*

Jennifer spends \$6.85 on her lunch. She gives the sales assistant \$10. How much change should she expect?		
	Response (pre-intervention, n=857)	Response (post-intervention, n=643)
a. \$3.15	66%	65%
b. \$3.25	11%	11%
c. \$4.15	14%	15%
d. \$4.25	9%	9%

Pre-intervention, more than one-third of students (34%) answered Item 4a incorrectly, signalling an inability to work in both dollars and cents (an application of decimals). Post-intervention, there was no improvement. The results for Items 3 and 4a need to be interpreted together. While the vast majority of students surveyed were able to work in whole dollar amounts, this is neither difficult, nor realistic in the context of simple everyday financial transactions. As discussed earlier, only a handful of the teacher participants that attended the post-intervention professional learning day reported using the version of “Anna and her friends” with prices in dollars and cents and an online processing fee. Teachers deciding not to challenge students to work in both dollars and cents may be the reason why there was no improvement in students’ responses to this question. Students are unlikely to improve in their ability to execute money calculations in both dollars and cents if they are not given the opportunity to practice doing so.

7.4.5 STUDENTS ARE HONEST, ETHICAL CONSUMERS

Item 4b was designed to indicate the value students place on being honest, and their emerging ethical understandings when a financial decision will impact another person. Item 4b on the student assessment was similar to “Oops... incorrect change,” which was presented during the Stage 1 student interviews (see p.91). In Chapter 5, I reported that only one student interviewed indicated that they would keep the additional \$10 change if the sales person made an error in calculation. The inclusion of a similar item on the student assessment was intended to gauge a response from a larger, more representative sample of Year 5 and 6 students. The problem being depersonalised and the fact that students were given the opportunity to answer it anonymously was intended to reduce the likelihood that students would answer what they thought they might be expected to say. The item was presented as shown in Table 7.12.

Table 7.12. Item 4b on the student assessment

After buying her lunch, the sales assistant gives Jennifer \$X too much change. What should Jennifer do with the extra change?		
	Response (pre-intervention, n=857) X=\$10	Response (post-intervention, n=643) X=\$20
a. Jennifer should say nothing and keep that extra change.	7%	9%
b. Jennifer should tell her parent or caregiver, and give them the extra change. It's best to let an adult decide what to do.	12%	19%
c. Jennifer should tell the sales assistant a mistake has been made, and give back the \$10.	81%	72%

Pre-intervention (where X=\$10), the majority (81%) indicated that Jennifer should tell the sales assistant a mistake has been made, and give back the \$10. Only 12% indicated Jennifer should defer to an adult to make a decision. Post-intervention, where an error in change given would result in a higher potential windfall for Jennifer (where X=\$20), fewer students indicated Jennifer should tell the sales assistant a mistake has been made, and give back the \$20. In this case, it seems that students were more likely to defer to an adult to decide what to do. This suggests students might be tempted by a larger windfall, but are unprepared to accept responsibility for a decision to keep the money. Pre-intervention, 7% responded that Jennifer should say nothing and keep the extra change. Post-intervention, this figure rose slightly to 9%. These findings show there are different ethical views and understandings present in every classroom. The challenge for teachers is how to expose and critically explore diverse and/or competing views while not imposing his/her own values or marginalising those whose ideas are contentious. For example, the results of Item 4b might constitute a financial dilemma for discussion. Alternatively, teachers might encourage students to use an online tool (i.e., Survey Monkey or Socrative) to vote anonymously what they think Jennifer should do.

7.4.6 SOCIOECONOMIC BACKGROUND AND FINANCIAL DECISION-MAKING

The final financial literacy item on the student surveys was based on the “Three jars” dilemma which was presented during the Stage 1 student interviews (see p.118). The purpose of “Three jars” was to explore the extent to which the parents interviewed had set and clearly communicated their expectations about earning, spending, saving and sharing money to their children, and also the extent to which children’s financial decision-making aligned with these norms. In Stage 1 of this study, all the students interviewed made decisions that were closely aligned with their family values when faced with a windfall of \$100. While the two teachers interviewed predicted their students would be unlikely to save or share their money, each student was willing to save between \$25 and \$60. No student was prepared to spend more than half of the money in the first instance. Additionally, the students were willing to share between \$20 and \$40, either with a charity of their choice, or a family member or friend. Interestingly, students from lower socioeconomic backgrounds interpreted that the beneficiary of the sharing jar might be a family member or friend in need, rather than a social or environmental cause.

The inclusion of a similar item on the pre-intervention student survey was intended to explore how a larger, more representative sample of Year 5 and 6 students would respond when given the opportunity to do so anonymously. Unlike “Three jars,” the problem was depersonalised, requiring students to advise a fictitious character. Pre-intervention, the character, Zac, was depicted as having rich parents. Post-intervention, Zac was depicted as having parents who do not have a lot of money. The rationale was to see whether students’ recommendations varied depending on the Zac’s socioeconomic status. Students were asked to choose from a drop-down list of options, with dollar amounts listed from \$0 to \$100 in \$10 increments. The problem was presented as shown in Table 7.13.

Table 7.13. Item 5 on the student assessment

<p>Pre-intervention, Zac's parents are rich, n=857</p> <p>Zac receives \$100 for his birthday because his parents are rich. What should he do with the money? Please select your answer from the drop-down list.</p> <p>Zac should save this much: \$__</p> <p>Zac should spend this much on something he needs or wants: \$__</p> <p>Zac should give this much away to family or friends: \$__</p> <p>Zac should donate this much to charity: \$__</p> <p>Post-intervention, Zac's parents do not have a lot of money, n=643</p> <p>Zac's parents do not have a lot of money. He receives \$100 from friends and relatives for his birthday. What should he do with the money? Please select your answer from the drop-down list.</p> <p>Zac should save this much: \$__</p> <p>Zac should spend this much on something he needs or wants: \$__</p> <p>Zac should give this much away to family or friends: \$__</p> <p>Zac should donate this much to charity: \$__</p>

Table 7.14 presents three sets of pre- and post-intervention student data for each of the four options:

- One for the total sample of Year 5 and 6 students surveyed (grey);
- One for students at School G (blue), a sample of around 100 higher socioeconomic students; and
- One for students at Schools J, M and N (purple), a sample of around 100 lower socioeconomic students.

School G, J, M and N were selected for comparison against the total sample based on the socioeconomic profiles presented in Table 7.1. School G has the most students in the top quarter (its students tend to be from high socioeconomic backgrounds), while Schools J and N have the most students in the bottom quarter (its students tend to be from low socioeconomic backgrounds). School M was selected because it has the lowest ICSEA value of all participating schools. It is important to note that while School H has the highest ICSEA value of all participating schools, it was not included in this analysis as the students did not complete the post-intervention survey.

Four box & whisker plots were prepared using the data presented in Table 7.14 (Figures 7.2, 7.3, 7.4 and 7.5). Box & whisker plots are a simple way of representing the distribution of statistical data. Each rectangle represents the second and third quartiles, with the vertical

line inside indicating the median value. In Figures 7.3, 7.4 and 7.5, the vertical line is not always present, as one of the quartiles and median figures are the same. The lower and upper quartiles are shown as horizontal lines either side of the rectangle. Each box & whisker chart allows for comparisons to be made based on the impact of the following two different variables on student financial decision-making:

1. The socioeconomic background of Zac, the character in the problem – rich parents (pre-intervention) or parents who do not have a lot of money (post-intervention); and
2. The socioeconomic background (Socio-educational Advantage (SEA)) of the student answering the question.

Table 7.14. Students' responses what Zac should do with \$100 received for his birthday

Options			\$0	\$10 - \$30	\$40 - \$60	\$70 - \$90	\$100	Total Responses	Mean \$	SD \$	Median \$	Min \$	Q1 \$	Q3 \$	Max \$					
Zac should save this much	Zac's parents are rich	Total sample	33	4%	263	33%	355	44%	60	7%	54	7%	806	42.30	24	40.00	0.00	30.00	60.00	100.00
		High SEA	3	3%	53	46%	50	44%	7	6%	1	1%	114	37.50	19	40.00	0.00	20.00	50.00	100.00
		Low SEA	4	3%	45	39%	43	37%	10	9%	13	11%	115	44.70	27	40.00	0.00	30.00	50.00	100.00
	Zac's parents do not have a lot of money	Total sample	13	2%	220	37%	283	48%	50	8%	27	5%	593	42.20	22	40.00	0.00	20.00	50.00	100.00
		High SEA	1	1%	49	41%	58	48%	11	9%	1	1%	120	40.00	19	40.00	0.00	20.00	50.00	100.00
		Low SEA	2	2%	36	35%	51	50%	6	6%	8	8%	103	43.80	24	40.00	0.00	30.00	50.00	100.00
Zac should spend this much on something he needs or wants	Zac's parents are rich	Total sample	45	6%	490	63%	199	26%	19	2%	23	3%	776	30.40	21	20.00	0.00	20.00	30.00	100.00
		High SEA	4	4%	75	67%	28	25%	3	3%	2	2%	112	30.50	18	30.00	0.00	20.00	40.00	100.00
		Low SEA	6	6%	70	64%	30	28%	1	1%	2	2%	109	29.00	19	25.00	0.00	20.00	40.00	100.00
	Zac's parents do not have a lot of money	Total sample	16	3%	430	73%	109	19%	23	4%	10	2%	588	28.30	18	20.00	0.00	20.00	30.00	100.00
		High SEA	3	3%	84	71%	26	22%	5	4%	1	1%	119	29.30	19	20.00	0.00	20.00	40.00	100.00
		Low SEA	5	5%	75	73%	18	17%	4	4%	1	1%	103	27.70	18	20.00	0.00	20.00	30.00	100.00
Zac should give this much away to family or friends	Zac's parents are rich	Total sample	236	32%	472	63%	30	4%	7	1%	3	0%	748	13.00	15	10.00	0.00	0.00	20.00	100.00
		High SEA	37	35%	67	64%	1	1%	0	0%	0	0%	105	9.90	10	10.00	0.00	0.00	20.00	40.00
		Low SEA	23	21%	70	64%	11	10%	4	4%	1	1%	109	19.10	20	10.00	0.00	10.00	20.00	100.00
	Zac's parents do not have a lot of money	Total sample	121	21%	359	62%	81	14%	12	2%	5	1%	578	20.40	19	20.00	0.00	10.00	30.00	100.00
		High SEA	28	25%	68	61%	12	11%	4	4%	0	0%	112	18.10	17	10.00	0.00	0.00	30.00	80.00
		Low SEA	16	16%	64	62%	16	16%	4	4%	3	3%	103	24.50	23	20.00	0.00	10.00	30.00	100.00
Zac should donate this much to a charity	Zac's parents are rich	Total sample	74	9%	524	66%	147	19%	29	4%	19	2%	793	26.30	21	20.00	0.00	10.00	30.00	100.00
		High SEA	7	6%	88	79%	14	13%	2	2%	1	1%	112	22.60	16	20.00	0.00	10.00	30.00	100.00
		Low SEA	7	6%	60	53%	31	27%	8	7%	7	6%	113	33.90	27	30.00	0.00	10.00	50.00	100.00
	Zac's parents do not have a lot of money	Total sample	86	15%	414	72%	60	10%	10	2%	9	2%	579	20.20	18	20.00	0.00	10.00	30.00	100.00
		High SEA	20	18%	82	73%	10	9%	0	0%	0	0%	112	15.60	12	10.00	0.00	10.00	20.00	50.00
		Low SEA	13	13%	64	62%	17	16%	4	4%	6	6%	104	27.10	26	20.00	0.00	10.00	40.00	100.00

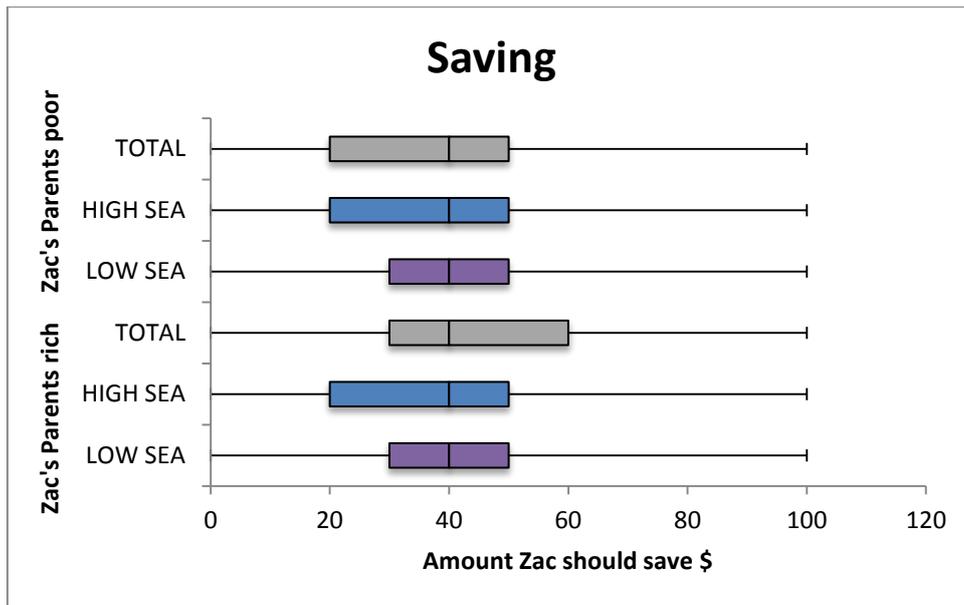


Figure 7.2. Zac should save this much.

Students' responses suggest they think it is important to save money. Regardless whether Zac's parents were presented as being rich or poor, the median value students recommended Zac should save was \$40. When Zac's parents were presented as being rich, students were generally inclined to recommend Zac save a little more, with the range of the third quartile increasing from \$40-\$50 to \$40-\$60. However, recommendations how much Zac should save by high and low SEA samples were consistent regardless of Zac's socioeconomic background. As shown in Figure 7.3, students' responses also suggested they are conservative spenders.

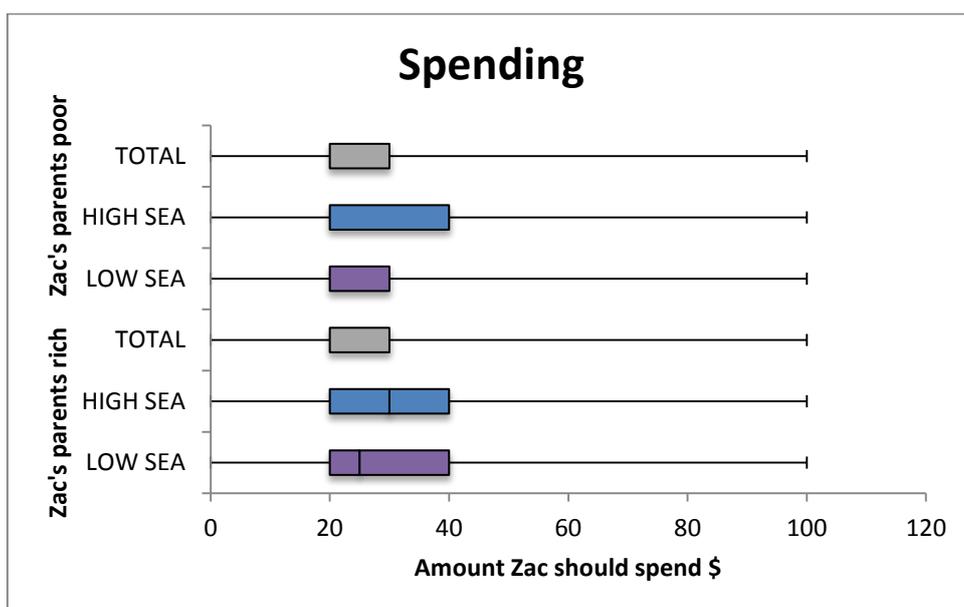


Figure 7.3. Zac should spend this much on something he needs or wants.

When Zac's parents were presented as being poor, the median value students recommended Zac should spend was \$20. When Zac's parents were presented as being rich, the median value students recommended Zac should spend increased slightly among high and low SEA samples. Otherwise, the distributions remained the same.

The findings presented in Figures 7.2 and 7.3 show that the financial decisions Year 5 and 6 students make in relation to saving and spending money do not vary by socioeconomic status – neither Zac's socioeconomic background nor the socioeconomic background of the student answering the question seemed to impact the amounts students recommended Zac should save or spend.

By contrast, students' inclination to share money seemed to vary depending on Zac's socioeconomic background and the socioeconomic background of the student answering the question – but not necessarily in the way one might predict.

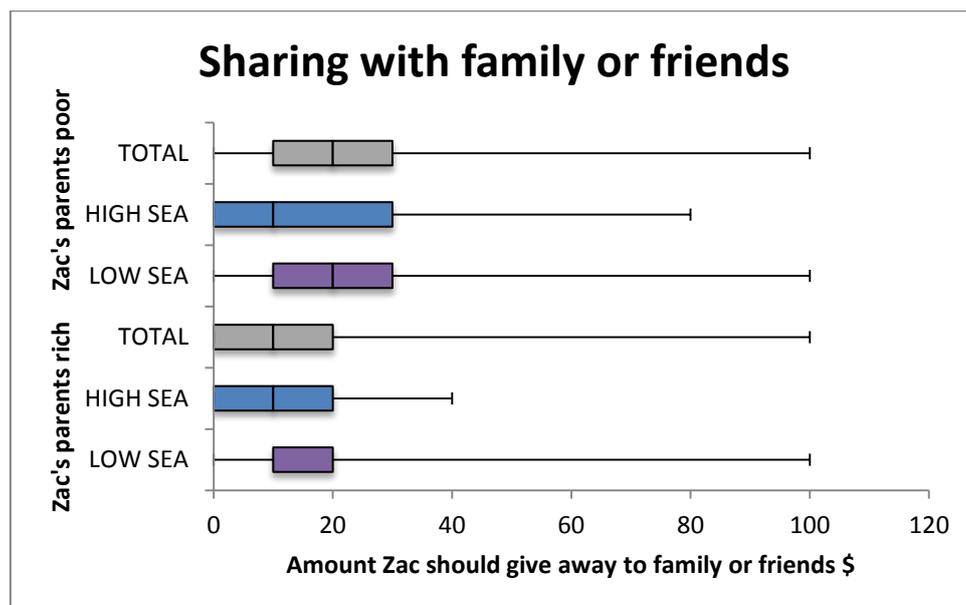


Figure 7.4. Zac should give this much away to family or friends.

When Zac's parents were presented as being poor, students generally recommended sharing more money with family or friends. However, the high SEA sample tended to be less generous (median \$10 compared with median \$20 for total and low SEA samples). This suggests Year 5 and 6 students perceive money as a resource to be shared within-family on an as-needs basis, depending on the family's socioeconomic background.

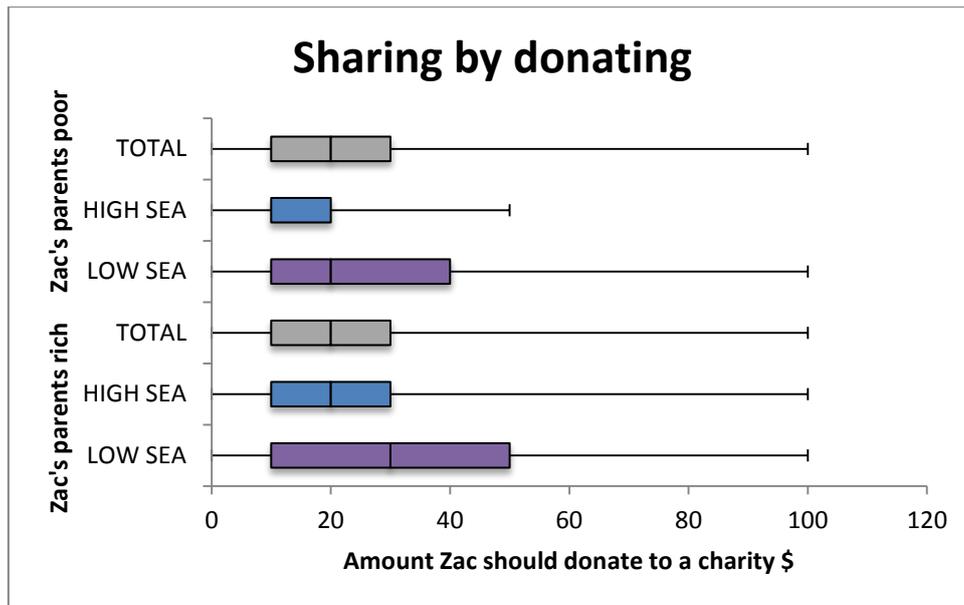


Figure 7.5. Zac should donate this much to a charity.

Interestingly, low SEA students generally recommended donating more money to charity than their high SEA peers. When Zac's parents were presented as being rich, the median value low SEA students recommended Zac donate increased from \$20 to \$30. These findings show that while Year 5 and 6 students are generally willing to donate to charity, the amount to be donated varies slightly depending on the socioeconomic status of the donator and low SEA students tend to be prepared to give more money away.

Overall, student financial decision-making seemed to be more similar than different when considering whether socioeconomic background influences spending, saving, and sharing behaviour. These results are significant given the findings of previous research outlined in the literature review that show low financial literacy in adulthood is strongly associated with low socioeconomic background (ANZ, 2003, 2005, 2008, 2011) and related suggestions that parents are unequally equipped to teach their children about money (MCEECDYA, 2005; CBF, 2010; ASIC, 2011a,b; OECD, 2013). It seems socioeconomic status is not such a discriminating factor in childhood – except to the extent that low socioeconomic students were generally more generous in sharing money. This suggests factors associated with socioeconomic background (i.e., social context) warrant further exploration in relation to financial literacy teaching and learning. For example, socioeconomic background influences what social experiences are affordable, but knowing what contexts students are familiar with, interested in, or able to imagine may be more important.

7.5 LINKING THE FINDINGS TO THE RESEARCH AIMS AND QUESTIONS

There were interesting insights what teachers reported 10-12 year olds should be learning about money at school. There seemed to be a shared view that students should be able to accurately carry out operations with money (i.e., simple everyday financial transactions) by the end of primary school. That students also be able to calculate interest paid on debts or earned on savings and investments was a notable response that is beyond the scope of Years 5 and 6 in the *Australian Curriculum: Mathematics*.

The educational intervention seemed to enhance financial literacy teaching and learning in the following three ways:

1. **By building students' capacity to make informed financial decisions.** An important aim of the financial dilemmas and associated pedagogies was to encourage students to draw on social and mathematical understandings simultaneously and in synergy so as to build students' capacity to make informed financial decisions. There are a number of skills that are central to problem-solving and informed financial decision-making but challenging for teachers to teach and, by association, students to learn. These include finding multiple options; comparing and contrasting different options in order to make a decision; and developing an argument based on both social and mathematical thinking. Almost all of the teacher participants reported using pedagogies intended to cultivate these skills - encouraging students to collaborate in small groups to discuss their problem solving approaches and solution/s; deliberately scouting the room to identify students to share their mathematical workings and explanations; ensuring a range of options (mathematical workings and explanations) were recorded during whole-class discussion; and asking open, sometimes provocative questions to stimulate different ways of thinking. Post-intervention, all but one of the teacher participants strongly agreed or agreed that the financial dilemmas helped their students to see that both social and mathematical thinking play important roles in financial problem-solving.
2. **By helping teachers to learn about their students' existing financial values, attitudes, knowledge and skills.** Prior to using the financial dilemmas and associated pedagogies, 70% of the teacher participants were unsure, disagreed, or strongly disagreed that they have a good idea about what parents are teaching students about money at home. Post-intervention, around half of the teacher participants strongly agreed or agreed that the students seemed to know more about using money than they had realised.

3. **By building teachers' confidence in their ability to teach financial literacy.**

Being involved in this research project helped the teacher participants to feel more confident about teaching financial literacy. Prior to using the financial dilemmas and associated pedagogies, only half the teacher participants indicated being confident about teaching financial literacy, and 85% indicated they would like further professional development about teaching financial literacy. Post-intervention, more than 90% of the teacher participants strongly agreed or agreed that the tasks helped them to feel more confident about teaching financial literacy, and that they would use the tasks again in the future.

7.6 MOVING FORWARD WITH THE RESEARCH

Barab and Squire (2004, p.4) suggest that one challenge of “doing educational research on design-based interventions is to characterize the complexity, fragility, messiness, and eventual solidity of the design and doing so in a way that will be valuable to others.” While Chapters 4-7 have contributed to this purpose, the next and final chapter of this thesis evaluates the broader impact of this research project. Key insights outside the parameters of the research aims and questions are identified and discussed, as are recommendations to improve financial literacy teaching and learning in schools.

STAGE 4 OF THE RESEARCH: EVALUATION OF BROADER IMPACT

CHAPTER EIGHT: REVIEW, INSIGHTS, AND RECOMMENDATIONS

Stage 4 of this research involved a broader review and evaluation of the project, including future directions in financial literacy teaching and learning that may result from it. This chapter briefly reviews the thesis, exploring findings from the parent, teacher, and student participants. Next, complex insights and implications arising from this research project are identified and discussed. Third, the importance of linking educational theory and practice is explained, with reference to the elaboration of the theory of planned behaviour, and constructivist and sociocultural perspectives to this research project. Recommendations to improve financial literacy teaching and learning in schools are then made. Finally, the limitations of this research project and the need for further research are outlined.

8.1 REVIEW OF THE THESIS

This design-based research project was conducted in a number of stages, with data collection and analysis at each stage being used to guide and inform the subsequent stage of design and inquiry. This process took place over a 12-month period.

Stage 1 involved informed exploration into financial literacy teaching and learning through interviews with a small sample of parents, teachers, and their Year 6 students. An elaboration of the theory of planned behaviour was the theoretical framework for this work. The parents interviewed described thoughtful decisions about what and how they teach their children about earning, spending, saving and sharing money. While the families were from different family and socioeconomic backgrounds, there were consistencies in the values being emphasised at home. The importance of working to earn an income, living within one's means, and saving for the future seemed prominent. Even so, while these values were shared, the parents interviewed reported a range of strategies for teaching them to their children. Strategies reported included engaging in explicit conversations and modelling particular behaviours related to earning, spending, saving, and sharing money. While pocket money is popularised in financial literacy discourses and the media, it was only reported as being used by one family. Most of the parents reported that their children receive money as gifts on special occasions and/or small amounts from time to time, and this facilitates opportunities for their children to practice making financial decisions, particularly about

spending and saving. In these ways, the children were learning about money through socialisation processes - in series of conversations, observations, and experiences.

The parents' responses highlighted their significant role as their children's first financial literacy educators. The decisions and strategies they reported reflected:

- the parents' values and attitudes regarding money – both of which seemed closely aligned with the subjective norms (expectations) they reported communicating to their children.
- the resources and opportunities available to the families, and the parents' perceived behavioural control (self-efficacy) in relation to these.
- the parents' own financial upbringing. There seemed to be intergenerational patterns in the ways and means by which the parents were teaching their children about money. While most indicated emulating their own parents' approaches, some had reflected on their own financial upbringing and made deliberate decisions to do things differently.

The parents reported a range of values, attitudes, knowledge, and skills as being important to teach to 10-12 year olds as part of financial literacy education at school. The parents interviewed wanted teachers to better understand their children's family background and to create connections between students' financial literacy learning at home, at school, and in the broader community. Most of the parents reported wanting their children to learn insights associated with their own personal financial values - for example, that it takes hard work to earn money, and the value of money. The parents also reported wanting their children to learn knowledge and skills associated with banking (i.e., about interest).

While the parent participants had clear ideas what they wanted their children to be learning about money, the educators interviewed in Stage 1 gave diverse responses what schools should be teaching primary aged children as part of financial literacy education at school. While the Acting Principal at School A seemed to see financial literacy as an opportunity to apply mathematical understandings to money, Teachers A and B spoke about values and the importance of teaching students through "real life" contexts. However, when asked what their students seemed to already know and understand about earning, spending, saving and sharing money, the teachers did not situate their responses in terms of their teaching and learning programs. Rather, they spoke about observations they had made of student financial behaviour at the school canteen and on excursions. Some of these observations and judgments proved to be misconceived in light of the students' interview responses. Additionally, the educators did not fully describe what financial literacy teaching and learning

at school might involve. When asked if there were ways they had tried to explore students' understandings about earning, spending, saving and sharing money in their lessons in the past, or if they could suggest ways they might do so in the future, their responses revealed an uncertainty. Essentially, there seemed to be a gap in the teachers' knowledge and understanding about students' financial understandings - a gap which would inevitably compromise their ability to effectively plan financial literacy teaching and learning in line with students' backgrounds, characteristics, and interests. These findings signal a need for teacher professional learning designed to address these issues.

The Year 6 students interviewed in Stage 1 were presented with a series of seven open-ended mathematical problems involving financial contexts drawn from "real life" situations they might be familiar with and/or interested in and/or able to imagine. These financial dilemmas focused on earning, spending, saving, and sharing money. The students' responses to these problems showed mature social understandings about money that were closely aligned with what their parents reported teaching them. Values, attitudes, and subjective norms (expectations) seemed to be influential in students' financial problem-solving and decision-making.

The findings presented in Chapters 4 and 5 confirmed the contribution of sociocultural and psychological factors in financial problem-solving and decision-making. These factors can be described as social understandings. These understandings were so powerful that the students tended to rely on them when tackling the financial dilemmas posed. Some students avoided doing any mathematics, while others used mathematics but did not draw on their social and mathematical understandings simultaneously or in synergy when tackling the financial dilemmas. This is consistent with the findings of Yackel and Cobb's (1996) design-based research in mathematics classrooms. They too found that students initially gave explanations with social rather than mathematical bases when asked to explain their thinking. Figure 8.1 was first presented at the end of Chapter 5 as providing a focus for the development the educational intervention.

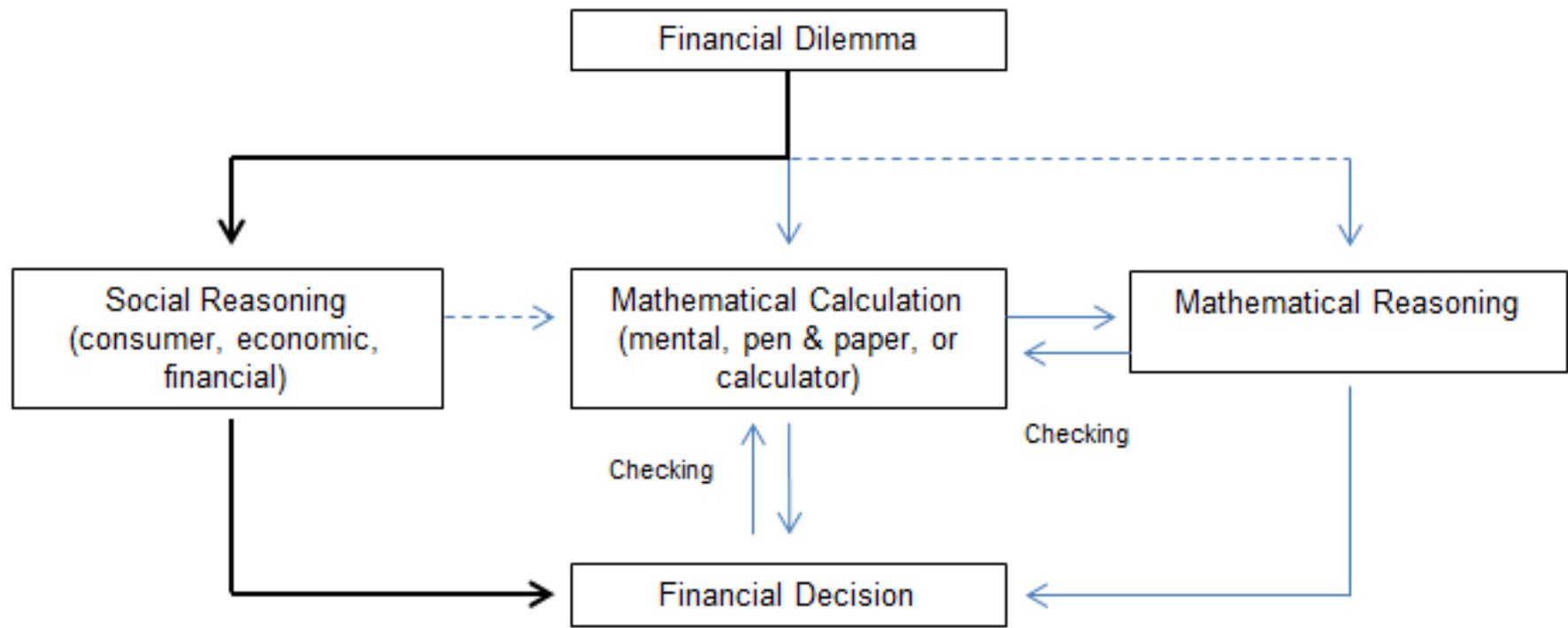


Figure 8.1. The social and mathematical pathways to students' financial decision-making.

Given the important role mathematics plays in “real life” financial problem-solving and decision-making, a reluctance or inability to apply mathematics when the situation calls for it would seem to be counterproductive to making informed financial decisions. It therefore seemed reasonable that such a problem-solving orientation might be developed through regular exposure to open-ended mathematical problems involving financial contexts (financial dilemmas) drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in and/or able to imagine. This was an important juncture in the research project – improving financial literacy teaching and learning at school seemed to require a greater focus on the important role mathematics has to play in everyday financial problem-solving and decision-making. While it may be possible to make financial decisions without drawing on mathematical knowledge and skills, doing so enables more informed financial decisions to be made.

The data and findings reported in Chapters 4 and 5 shaped the development of an educational intervention which became the focus of Stages 2 & 3 of this research project. The educational intervention was designed to enable teachers and students to identify and critically explore the various values, attitudes, observations, and experiences regarding money that exist among a class. It consisted of five financial dilemmas and associated pedagogies. The financial dilemmas were essentially open-ended mathematical problems involving financial contexts drawn from “real life” situations that 10-12 year old children might be familiar with and/or interested in. Each financial dilemma would form the basis of a single mathematics lesson. The financial dilemmas required students to draw on both social and mathematical understandings simultaneously and in synergy, involved multiple solutions, and invited students to share and explain their reasoning. An important goal of the educational intervention was to strengthen students’ disposition to connect social and mathematical thinking as part of their financial problem-solving and decision-making.

In Stages 2 and 3, the financial dilemmas were implemented together with researched pedagogies and practices that have been found to enhance mathematics education. In Stage 2, the educational intervention was trialled, studied, and refined as part of the EPMC project. This involved classroom trials of three financial dilemmas in four Year 5 and 6 classrooms in four different schools. Data included audio and video recordings of the instructional and summary phases of lessons, hand-written observational and reflective notes made by me, and students’ completed worksheets. The students involved in the classroom trials also revealed mature social understandings about money. While they too tended to draw on their social understandings in the first instance, presenting the financial dilemmas during numeracy lessons seemed to encourage students to engage in

mathematical thinking as part of their problem-solving and decision-making. The students were active participants in the lessons, and willingly shared their social and/or mathematical understandings with each other. Critically discussing students' social and mathematical understandings helped to promote different ways of viewing, thinking about, and solving the financial dilemmas. This approach also guided students to check the appropriateness of their solution and argument against the problem. Still, using mathematics to guide and inform financial problem-solving and decision-making proved complex and challenging.

Stage 3 involved more than 30 teachers in trialling and reporting on five financial dilemmas and the associated pedagogies. The teachers were surveyed before and after the educational intervention. The teachers' students were also participants in this research project. Eight hundred and fifty-seven Year 5 and 6 students completed the pre-intervention assessment, and 643 completed the post-intervention assessment.

Two important consistencies in the findings of Stages 1 and 3 of the research project were noted. First, both groups of teacher participants revealed a diversity of views about how financial literacy might be represented and taught as part of the school curriculum. Second, neither had a clear idea about what parents are teaching students about money at home. Given that social understandings learned at home play an integral role in students' financial problem-solving and decision-making, to find out what students already know and understand about money would seem to be an important professional learning need for teachers if they are to meaningfully tailor financial literacy teaching and learning to students' backgrounds, characteristics, and interests.

The student assessments included items that were closely connected to the five financial dilemmas so as to assess the extent to which the educational intervention may have contributed to students' financial literacy learning. While general improvements in the accuracy of students' mathematical calculations were noted on most items post-intervention, and these improvements may be attributable to the financial dilemmas and associated pedagogies, the results also revealed that Year 5 and 6 students tend to:

- have difficulties accounting for up-front or hidden costs;
- have difficulties applying mathematics to calculate and interpret value for money;
- perform better on items where the contexts involve experiences common to 10-12 year olds (i.e., purchasing food);
- have difficulties working in both dollars and cents; and
- be honest, ethical consumers.

So, while explicit financial literacy teaching and learning is productive, there remain areas for improvement. These difficulties can be seen as learning opportunities to be addressed through financial dilemmas to be developed in the future.

8.2 COMPLEX INSIGHTS AND IMPLICATIONS

There are two complex insights arising from the current research project that warrant further discussion, since they have implications for the way financial literacy is conceptualised, taught, and learned at school.

The first relates to the role socioeconomic background plays in financial literacy. Previous research has emphasised that adult financial literacy is associated with socioeconomic characteristics (ANZ, 2003, 2005, 2008, 2011). However, the findings of this research project suggest that the relationship between socioeconomic background and financial literacy warrants the kind of critical debate initiated by Gates and Jorgensen (2009), Jorgensen and Sullivan (2010), Pinto and Coulson (2011), and Pinto (2012). In Stage 1, the more disadvantaged students interviewed made insightful comments that revealed mature social understandings about money. Furthermore, these students seemed as capable mathematically as their higher socioeconomic peers. Socioeconomic background seemed to bear little impact on the decisions the eight students interviewed made about how to spend, save, and share \$100 (the “Three Jars” financial dilemma, p.118). Each student reported being willing to save between \$25 and \$60. No student reported being prepared to spend more than half of the money in the first instance. Additionally, the students reported being willing to share between \$20 and \$40, either with a charity of their choice, or a family member or friend. Socioeconomic background only seemed to impact the students’ interpretation and behaviour in relation to sharing money. The higher socioeconomic parents reported donating to charity, and their children were more likely to nominate a charity they would donate to. However, the students from lower socioeconomic backgrounds interpreted that the beneficiary of the sharing jar might be a family member or friend in need, rather than a social or environmental cause. The children of single mothers each reported wanting to share some of their \$100 with their mothers. The alignment between reported and actual actions in such situations would be an interesting issue for further study.

Similar nuances in student financial decision-making were noted in Stage 3, where students were asked what a boy named Zac should do with \$100 received for his birthday. Students’ responses showed that the financial decisions Year 5 and 6 students are likely to make in relation to saving and spending money do not vary by socioeconomic status – neither Zac’s

socioeconomic background nor the socioeconomic background of the students answering the question seemed to impact the amounts students recommended Zac should save or spend. On the other hand, consistent with the Stage 1 findings, students' inclination to recommend sharing money seemed to vary depending on Zac's socioeconomic background and the socioeconomic background of the student answering the question. When Zac's parents were presented as being poor, students generally recommended he share more money with family or friends. However, the high SEA sample tended to be less generous (median \$10 compared with median \$20 for total and low SEA samples). Interestingly, low SEA students generally recommended donating more money to charity than their high SEA peers. When Zac's parents were presented as being rich, the median value low SEA students recommended Zac donate increased from \$20 to \$30. These findings show that while the Year 5 and 6 students involved in this research project were generally willing to recommend donating to charity, the amount they recommended donating varied slightly depending on the socioeconomic status of the donator. Furthermore, the low SEA students tended to recommend donating more money than their high SEA counterparts.

A second insight relates to the critical role context plays in financial literacy teaching and learning. Open-ended mathematical problems involving financial contexts (financial dilemmas) drawn from "real life" situations 10-12 year old children might be familiar with and/or interested in provided a strong, engaging foundation for financial literacy teaching and learning. However, getting the context "right" is complex and challenging. In Stage 3, some of the financial dilemmas were described as highly engaging by most teachers, but not so engaging by those who described themselves as working with disadvantaged students. These teachers reported that tasks involving activities that were probably not affordable for disadvantaged families (i.e., going to the movies, catching taxis, and going to the gym) seemed to lead students to switch off from the lesson. The differences in student engagement were attributed to whether the task context seemed to be meaningful to students.

One might think that because taxi fares can be expensive, "Catching a taxi" will not be relevant to students from low socioeconomic backgrounds. This is not necessarily so. To illustrate the complexity of context, consider this story. A colleague used "Catching a taxi" with a Year 6 class at a school in a low socioeconomic area where the majority of students were from non-English speaking backgrounds. She reported that the students, despite being from low socioeconomic backgrounds, were highly engaged by both the social and mathematical dimensions of the task. The students' parents could not drive, and so generally relied on public transport. However, the families also routinely caught taxis to destinations

not well-serviced by public transport, and for safety reasons of an evening. Socioeconomic background aside, because the financial dilemma connected with the students' social experiences in this particular context, the task made for a successful lesson.

So the old adage “know your students” is critical. Socioeconomic background varies even within a local context. It is not so much a case of knowing what students can afford as knowing what they are interested in and do outside school. If students download movies rather than visiting the cinemas, then a task relating to the costs associated with online movie streaming services will be more engaging to them. Then again, one purpose of financial literacy teaching and learning is to redress the apparent disparity in financial literacy levels associated with socioeconomic background. Hence, there is merit in posing financial contexts that expand students' experiences – for example, through role play. Either way, the choice of context and the strategies used to introduce the task are critical. The implications for task designers and teachers are discussed later in this chapter.

8.3 THE IMPORTANCE OF LINKING EDUCATIONAL THEORY AND PRACTICE: AN EVALUATION OF THE EDUCATIONAL INTERVENTION

The findings of the current research project confirm the potential of and merit in the educational intervention to enhance financial literacy teaching and learning. Using open-ended mathematical problems involving financial contexts (financial dilemmas) drawn from “real life” situations 10-12 year old children might be familiar with and/or interested in and/or able to imagine effectively facilitated connections between students' financial literacy learning at home, at school, and in the broader community. However, the power of the financial dilemmas lies in the associated pedagogies.

This research project highlighted the importance of educational theory to quality teaching and learning. The elaboration of the theory of planned behaviour, together with constructivist and socioculturalist perspectives on teaching and learning, contributed positively to the development of the educational intervention, and its success.

There are two important points to be made in relation to the elaboration of the theory of planned behaviour presented in Chapter 3. First, it provided a useful framework for conceptualising the sociocultural and psychological factors that influence various understandings about money students bring to school from home. These factors included values, attitudes, subjective norms (expectations), and perceived behavioural control (self-efficacy), and can be described as social understandings. In particular, the findings of this

research project confirm the strong relationship between values and attitudes noted by other researchers (Homer & Kahle, 1988; Shim & Eastlick, 1998; Shim, et al., 2009). Values played a role in influencing:

- the decisions parents made about what to teach their children about earning, spending, saving and sharing money;
- the strategies parents used to teach their children about money; and
- students' financial problem-solving and decision-making, as evidenced by their responses to the financial dilemmas.

Second, the elaboration of the theory of planned behaviour provided a useful framework for thinking about teaching and learning where students must consolidate understandings across settings (i.e., home, school, and broader community) and disciplines (i.e., social and mathematical understandings). Drawing on the elaboration of the theory of planned behaviour helped to clarify what to research in Stage 1, and subsequently, what features would be fundamental to the development and success of the educational intervention. However, constructivist and socioculturalist perspectives were also important. For example, the educational intervention needed to:

- take into consideration the social understandings about money students might bring to school from home;
- orient students that both social and mathematical understandings are important to financial problem-solving and decision-making;
- teach students to connect social and mathematical thinking when faced with problems and decisions involving money; and
- give students opportunities to work in small groups and participate in critical whole-class discussion so that they might learn from each other and 'think again' about the factors that had influenced their preferred solution and argument.

Figure 8.2 presents the elaboration of the theory of planned behaviour first presented in Chapter 3, and how the educational intervention aligns with it.

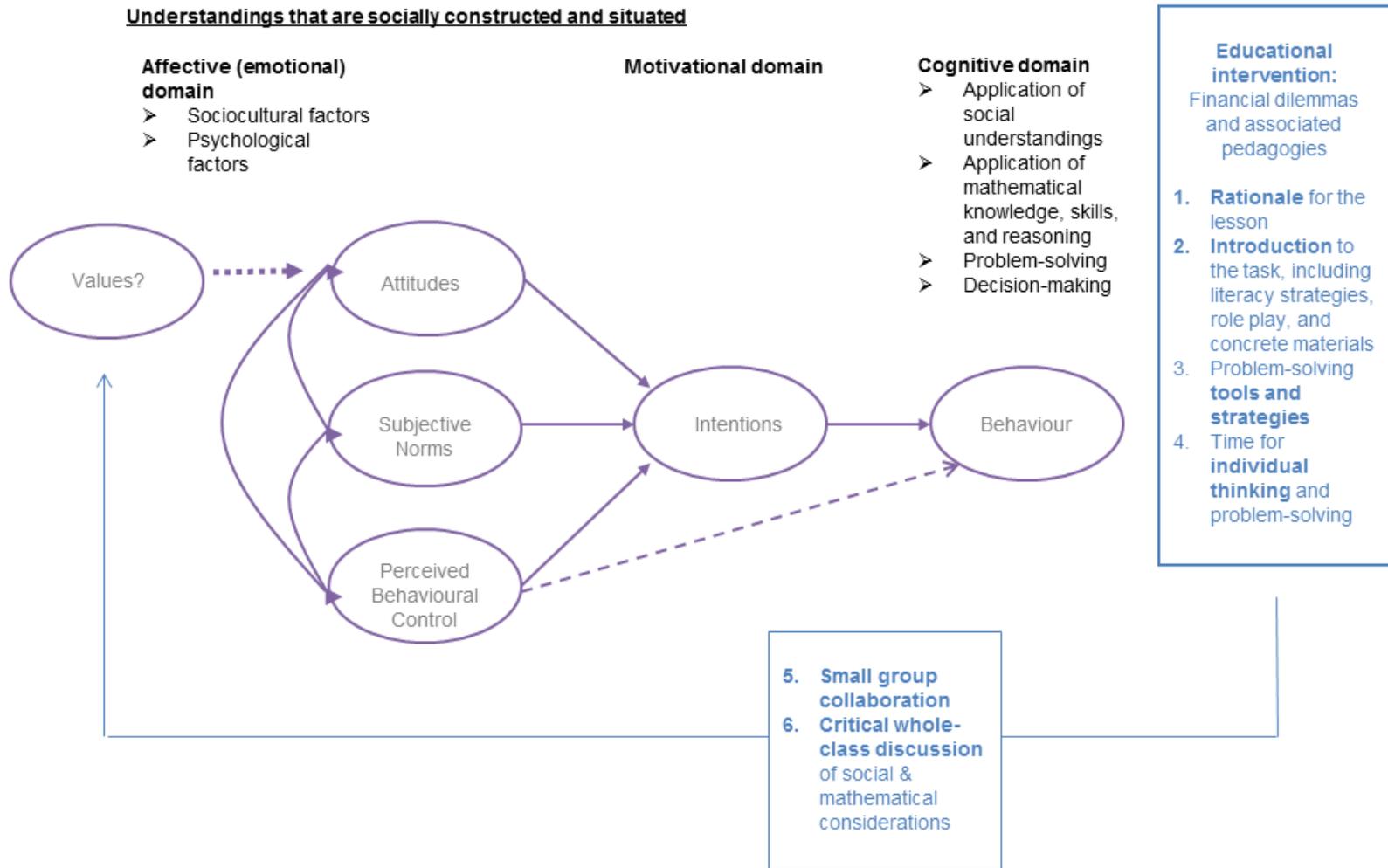


Figure 8.2. The elaboration of the theory of planned behaviour and the educational intervention as a catalyst for ‘thinking again’.

Since the more complex financial problems and decisions in life tend to involve researching and evaluating multiple options, teaching and learning that involves critical exploration of the factors that have been found to influence financial behaviour is important. Essentially, Figure 8.2 depicts how the financial dilemmas and associated pedagogies established a problem-solving process consisting of individual thinking and problem-solving prior to small group collaboration and critical whole-class discussion geared towards students learning from each other. This model aligns constructivist and sociocultural perspectives to understand how teaching and learning take place, and applies these views in such a way as to cultivate among students a critical problem-solving orientation. All the while, the intention is to motivate students to consider both social and mathematical understandings of equal importance when engaging in financial problem-solving and decision-making. This is not only distinct from more traditional approaches to financial literacy teaching and that emphasise the transmission of knowledge and skills, but is also fundamental to preparing students to be active and critical problem-solvers who make informed financial decisions in the future.

Based on the teachers' reports about the educational intervention (Stage 3, Chapter 7), it is argued that the financial dilemmas and associated pedagogies enhanced financial literacy *teaching* by:

- building students' capacity to draw on both social and mathematical understandings simultaneously and in synergy to make informed financial decisions;
- helping teachers to learn about their students' existing values, attitudes, knowledge and skills regarding money; and
- building teachers' confidence in their ability to teach financial literacy.

Based on the classroom trials of the educational intervention (Stage 2, Chapter 6), it is argued that the financial dilemmas and associated pedagogies enhanced financial literacy *learning* by:

- engaging a wider range of students in everyday applications of mathematics;
- orienting students to seek out and consider multiple alternative options so as to inform their financial problem-solving and decision-making; and
- helping to consolidate students' social and mathematical understandings by positioning both as having important roles to play in "real life" financial problem-solving and decision-making.

These are important and desirable outcomes that signal the merit in continuing this research work beyond the doctoral study.

8.4 RECOMMENDATIONS TO IMPROVE FINANCIAL LITERACY TEACHING AND LEARNING IN SCHOOLS

The final research aim and question to be addressed as part of this research project are:

AIM:	QUESTION:
e. To formulate recommendations to improve financial literacy teaching and learning in schools.	5. What can be done to improve financial literacy teaching and learning in schools?

This section reflects on the findings of this research project in order to make two recommendations that might improve financial literacy teaching and learning in schools.

The first recommendation is that financial literacy educational programs should align with and extend upon what children are learning about money at home. This calls for tasks and pedagogies that enable teachers and their students to identify and critically explore the various values, attitudes, observations, and experiences regarding money that exist among a class. Since financial literacy, numeracy, and mathematics education are closely related, effective financial literacy teaching and learning also relies on creating and/or selecting meaningful “real life” financial contexts in which mathematical concepts are situated so as to build students’ capacity to draw on social and mathematical understandings simultaneously and in synergy. The implication for teachers is that they need to carefully consider students’ local context, family backgrounds, characteristics, and interests when creating and/or selecting tasks.

The second recommendation is that teachers need quality, research-based professional learning opportunities to guide and inform their approach to financial literacy education. While the findings of this research project confirm that parents are significant financial literacy educators, this presents several challenges for teachers. In Stage 1, some of the teachers’ observations and judgements about students’ understandings regarding money were misconceived. There are some important implications to be considered. First, teachers have the difficult task of finding out the diverse range of family backgrounds and social understandings about money that exist in their classrooms – without prying. Second, this

knowledge needs to be used to guide and inform the process of creating and/or selecting meaningful “real life” financial contexts that are familiar and interesting to students. Third, teachers need to create and strengthen the view that while social understandings are important, mathematics is equally fundamental to financial problem-solving and decision-making. Furthermore, it is important to think critically if informed financial decisions are to be made.

Presently, purpose designed published programs or “off the shelf solutions” to financial literacy teaching and learning tend to be prescriptive and require students to disseminate information and answer set questions rather than engage in financial problem-solving and decision-making activities situated in meaningful “real life” financial contexts. The effectiveness of these programs will be limited unless they are accompanied by teacher professional learning that includes a rationale to support teachers in creating, selecting, and modifying tasks in line with their students’ backgrounds, characteristics, and interests. To really improve financial literacy teaching and learning, it seems an investment in teacher-research as professional learning is needed. This means:

- helping teachers to investigate the ways and means by which financial literacy is socially constructed and situated in their school community;
- helping teachers to consider the diverse range of family backgrounds and social understandings about money that might exist in their classrooms, and the implications of these for financial literacy teaching and learning;
- providing a framework to guide and inform teachers in selecting or developing “real life” financial dilemmas that are meaningful to students; and
- promoting pedagogies that create and strengthen the view that while social understandings are important, mathematics is equally fundamental to financial problem-solving and decision-making. Informed financial decision-making means thinking critically both socially and mathematically.

It is no surprise that the above recommendations relate to the key strengths of the educational intervention: the financial dilemmas and associated pedagogies facilitated teacher and student learning about the diverse range of social understandings about money that exist within any given class; the five financial dilemmas were based on meaningful “real life” financial contexts that were familiar and/or interesting and/or imaginable to most students; and they provided a means for demonstrating that mathematics can be useful – even fun on occasions.

8.5 LIMITATIONS OF THIS RESEARCH PROJECT

While this was a substantial research project with data collection taking place over a 12-month period, it was nonetheless limited in a number of ways. For example:

- Convenience or opportunity sampling was used to recruit families (one Year 6 student and one of their parents) to participate in Stage 1 of this research project. Some families who were invited to participate did not agree. This may have created an over representation of parents who were willing to be interviewed about money matters and/or to allow their children to participate in an interview involving money and financial mathematics. This may have resulted in more financially confident parents and students being recruited. This is an important consideration for future researchers.
- This research project involved self-reported data about financial decisions students would make when faced with “real life” financial dilemmas. While this data gives some indication of student financial behaviour, it is speculative and cannot be fully relied upon.
- The five schools involved in Stages 1 and 2 of this research project have been described as serving diverse middle class school populations based on the available Index of Community Socio-educational Advantage (ICSEA) data. It is important to note that care was taken to involve schools that were geographically and culturally different, and that included enrolments from families belonging to the bottom ICSEA quarter. It is impossible to know whether these students were members of the classes studied. Hence, the findings reported in Chapters 4, 5, and 6 might best describe and explain the social and mathematical understandings of middle class, rather than disadvantaged, children. Acknowledging this limitation, a follow-up study designed to explore potential of the educational intervention in low socio-economic communities, including Indigenous, rural and remote communities is planned.
- In respect of the parent, student, and teacher participants’ time, involvement in Stages 1 and 2 of this research project was limited to one interview or lesson. The number of classroom trials was limited to three financial dilemmas implemented in four different upper primary schools and classrooms. This created the need to be clear, precise, and efficient in creating data collection protocols, but also limited the potential to collect follow-up or time-series data.
- While Stage 3 of this research project involved time-series data (pre- and post-teacher surveys and student assessments), a number of the teacher assessments. This led to a rate of attrition in student participation of 25%. This highlights that recruiting and maintaining participants in design-based research can be challenging.

8.6 THE NEED FOR FURTHER RESEARCH

This research project underlined the need to reconceptualise financial literacy education to ensure that it pays respectful consideration to both the social and the mathematical dimensions that can guide and inform financial problem-solving and decision-making, and put students at the centre of these activities. The findings of this research project have highlighted the need for further educational research into ways that financial literacy teaching and learning might be improved. This might include:

- Research involving a larger, more representative sample of parents to further investigate the range of financial values, attitudes, knowledge, and skills 10-12 year olds bring to school from home, and what parents are doing to cultivate these understandings. The findings of this research could form the basis of teacher professional learning that builds teacher capacity to plan, design, and implement financial literacy education programs tailored to individual contexts.
- Further design-based research into the use of financial dilemmas and associated pedagogies. For example, given the success of the educational intervention, there is merit in developing, trialling, studying, and refining a range of new financial dilemmas for use with different age groups. There is also merit in further exploring the tensions that exist for teachers in creating, selecting, and modifying meaningful “real life” mathematical problems that take into consideration students’ local context, family backgrounds, and interests.
- A comparative study to further explore similarities and differences in financial literacy teaching and learning in advantaged versus disadvantaged school communities. This would not only enable the finding that lower socioeconomic students are generally more generous in sharing money to be explored further, but it would serve to generate a greater understanding of the role socioeconomic background really plays in shaping financial literacy, particularly in childhood and adolescence.
- Interviewing recognised financial experts (i.e., David Koch and Scott Pape in Australia), financial counsellors, and educators involved in the development of purpose designed published programs or “off the shelf solutions” to financial literacy education to explore how they conceptualise this field, and what values about social class and money are reflected in the discourses they have developed.
- Interviewing adults who use “financial solutions” like *MyBudget* (mybudget.com.au) to explore the origins and nature of their self-identity regarding money.
- Interviewing pre-service and/or beginning teachers to explore their perceptions of and readiness teach financial literacy, drawing on reflections of their education degree.

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APPENDICES

APPENDIX A: STAGE 1 PRINCIPAL EXPLANATORY STATEMENT



Principal Explanatory Statement

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

This information sheet is for you to keep

My name is Carly Sawatzki and I am conducting a PhD research project with Peter Sullivan, a Professor of Science, Mathematics and Technology Education in the Faculty of Education at Monash University. This means that I will be writing a thesis which is the equivalent of a 300 page book. My research involves investigating the role of attitudes and values in financial literacy teaching and learning.

About this research project

Financial literacy education is of interest to economists, politicians, policymakers, researchers and educators around the world. In Australia, financial literacy education is the responsibility of teachers in diverse discipline areas - Mathematics, Business, Economics, and Civics and Citizenship. Mathematical literacy is part of and contributes to financial literacy. For example, students who can apply number sense, are familiar with various representations of numbers, can undertake strategies for computation, and use mathematical reasoning to solve problems are likely to be more financially literate. The strong connection between mathematical literacy and financial literacy is evident in *The Australian Curriculum*, where there is a designated strand titled "Money and financial mathematics" each year from Year 1 to Year 10. Then again, financial literacy can sometimes be demonstrated without even basic arithmetic.

Various studies have examined the important role that parents play in teaching their children about money management at home and in the community. Attitudes and values towards money have also been found to influence financial behaviour. The rationale for this study is the need to explore what financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from home, how teachers can find out about these prior understandings, and how they might promote critical understandings of financial attitudes and values while teaching financial knowledge and skills.

Your school community is invited to take part in this research project. Please read this Explanatory Statement in full before making a decision.

The aim/purpose of this research project is to:

- a. Explore parents', teachers' and students' financial attitudes and values, and the impact these have on financial literacy teaching and learning;
- b. Encourage and explore communication between parents and teachers about the financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from

- home, and find out what parents may have done to cultivate these understandings.
- c. Explore what strategies parents and teachers can successfully use to create connections between students' financial literacy learning at home, in the classroom, and in the broader community.
 - d. Develop, implement, and research an educational intervention (pedagogical approach) to promote critical understandings of financial attitudes and values (subjective norms) and provide students with the resources, opportunities and confidence to exercise these (actual and perceived behavioural control);
 - e. Formulate recommendations to improve financial literacy education in schools.

What does this research project involve for you and members of your school community?:

- One audio-recorded 30-45 minute interview with you, the Principal;
- Up to two individual, audio-recorded 30-45 minute interviews with a small sample of Year 5 and/or 6 teachers, parents and students;
- Follow up discussions with participating Year 5 and/or 6 teachers, parents and students;
- Classroom observations during the participating teachers' financial literacy lessons, with notes recorded by the researcher on her laptop.

Participation is voluntary, and you have the right to withdraw

Being in this study is voluntary and you, your staff, parents, and students are under no obligation to consent to participation. Each person that does consent to participate may withdraw from further participation at any stage. Participants also have the right to withdraw data up until the publication of the written thesis that reports the findings of the research project.

Your confidentiality and privacy will be maintained at all times

Any reports from the interviews will be synthesised to ensure that you, your school, staff, parents, or students cannot be identified. Reports on the research project may be published in professional journals and other publications, but no publications will identify you, the school, staff, parents, or students involved in this study. Pseudonyms will be used. Data collected will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years. A report of the research project may be submitted for publication, but individual participants will not be identifiable in such a report.

Results of this research project

If you would like to be informed of the aggregate research findings, please contact Carly Sawatzki on [REDACTED]. The findings are accessible for 5 years.

<p>If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:</p>	<p>If you have a complaint concerning the manner in which this research, MUHREC Project Number CF12/2207 – 2012001183, is being conducted, please contact:</p>
<p>Peter Sullivan Professor of Science, Mathematics and Technology Education Monash University, Clayton, Victoria 3800 [REDACTED] [REDACTED]</p>	<p>Executive Officer Monash University Human Research Ethics Committee (MUHREC) Building 3e Room 111 Research Office Monash University VIC 3800 [REDACTED] [REDACTED] [REDACTED]</p>

Thank you

Carly Sawatzki

APPENDIX B: STAGE 1 TEACHER EXPLANATORY STATEMENT



Teacher Explanatory Statement

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

This information sheet is for you to keep

My name is Carly Sawatzki and I am conducting a PhD research project with Peter Sullivan, a Professor of Science, Mathematics and Technology Education in the Faculty of Education at Monash University. This means that I will be writing a thesis which is the equivalent of a 300 page book. My research involves investigating the role of attitudes and values in financial literacy teaching and learning.

About this research project

Financial literacy education is of interest to economists, politicians, policymakers, researchers and educators around the world. In Australia, financial literacy education is the responsibility of teachers in diverse discipline areas - Mathematics, Business, Economics, and Civics and Citizenship. Mathematical literacy is part of and contributes to financial literacy. For example, students who can apply number sense, are familiar with various representations of numbers, can undertake strategies for computation, and use mathematical reasoning to solve problems are likely to be more financially literate. The strong connection between mathematical literacy and financial literacy is evident in *The Australian Curriculum*, where there is a designated substrand titled "Money and financial mathematics" each year from Year 1 to Year 10. Then again, financial literacy can sometimes be demonstrated without even basic arithmetic.

Various studies have examined the important role that parents play in teaching their children about money management at home and in the community. Attitudes and values towards money have also been found to influence financial behaviour. The rationale for this study is the need to explore what financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from home, how teachers can find out about these prior understandings, and how they might promote critical understandings of financial attitudes and values while teaching financial knowledge and skills.

You are invited to take part in this research project as an educator. Please read this Explanatory Statement in full before making a decision.

The aim/purpose of this research project is to:

- a. Explore parents', teachers' and students' financial attitudes and values, and the impact these have on financial literacy teaching and learning;
- b. Encourage and explore communication between parents and teachers about the financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.

- c. Explore what strategies parents and teachers can successfully use to create connections between students' financial literacy learning at home, in the classroom, and in the broader community.
- d. Develop, implement, and research an educational intervention (pedagogical approach) to promote critical understandings of financial attitudes and values (subjective norms) and provide students with the resources, opportunities and confidence to exercise these (actual and perceived behavioural control);
- e. Formulate recommendations to improve financial literacy education in schools.

What does participation in this research project involve for you and your class?

- Up to two individual, audio-recorded 30-45 minute interviews with you, the teacher;
- Up to two individual, audio-recorded 30-45 minute interviews with a small sample of Year 5 and/or 6 parents and students from your class. The student interviews will involve the children solving some money-related mathematical problems (these are not tests);
- Follow up discussions;
- Classroom observations during your financial literacy lessons, with notes recorded by the researcher on her laptop.

Participation is voluntary, and you have the right to withdraw

Being in this study is voluntary and you, parents, and students are under no obligation to consent to participation. Each person that does consent to participate may withdraw from further participation at any stage. Participants also have the right to withdraw data up until the publication of the written thesis that reports the findings of the research project.

Your confidentiality and privacy will be maintained at all times

Any reports from the interviews will be synthesised to ensure that you, your school, your colleagues, parents and students cannot be identified. Reports on the research project may be published in professional journals and other publications, but no publications will identify the school, staff, parents or students involved in this research project. Pseudonyms will be used. Data collected will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Results of this research project

If you would like to be informed of the aggregate research findings, please contact Carly Sawatzki on [REDACTED] The findings are accessible for 5 years.

If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:	If you have a complaint concerning the manner in which this research, MUHREC Project Number CF12/2207 – 2012001183, is being conducted, please contact:
Peter Sullivan Professor of Science, Mathematics and Technology Education Monash University, Clayton, Victoria 3800 [REDACTED] [REDACTED]	Executive Officer Monash University Human Research Ethics Committee (MUHREC) Building 3e Room 111 Research Office Monash University VIC 3800 [REDACTED] [REDACTED] [REDACTED]

Thank you

Carly Sawatzki

APPENDIX C: STAGE 1 PARENT EXPLANATORY STATEMENT INCLUDING CONSENT FORM



Parent Explanatory Statement

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

This information sheet is for you to keep

My name is Carly Sawatzki and I am conducting a PhD research project with Peter Sullivan, a Professor of Science, Mathematics and Technology Education in the Faculty of Education at Monash University. This means that I will be writing a thesis which is the equivalent of a 300 page book. My research involves investigating the role of attitudes and values in financial literacy teaching and learning.

About this research project

Financial literacy education is of interest to economists, politicians, policymakers, researchers and educators around the world. In Australia, financial literacy education is the responsibility of teachers in diverse discipline areas - Mathematics, Business, Economics, and Civics and Citizenship. Mathematical literacy is part of and contributes to financial literacy. For example, students who can apply number sense, are familiar with various representations of numbers, can undertake strategies for computation, and use mathematical reasoning to solve problems are likely to be more financially literate. The strong connection between mathematical literacy and financial literacy is evident in *The Australian Curriculum*, where there is a designated substrand titled "Money and financial mathematics" each year from Year 1 to Year 10. Then again, financial literacy can sometimes be demonstrated without even basic arithmetic.

Various studies have examined the important role that parents play in teaching their children about money management at home and in the community. Attitudes and values towards money have also been found to influence financial behaviour. The rationale for this study is the need to explore what financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from home, how teachers can find out about these prior understandings, and how they might promote critical understandings of financial attitudes and values while teaching financial knowledge and skills.

You and your child are invited to take part in this research project, and we ask that you give permission for your child to participate as a student. Please read this Explanatory Statement in full before making a decision.

The aim/purpose of this research project is to:

- a. Explore parents', teachers' and students' financial attitudes and values, and the impact these have on financial literacy teaching and learning;
- b. Encourage and explore communication between parents and teachers about the financial attitudes, values, knowledge, and skills 10-12 year olds bring to school from home, and find out what parents may have done to cultivate these understandings.
- c. Explore what strategies parents and teachers can successfully use to create connections between students' financial literacy learning at home, in the classroom, and in the broader community.
- d. Develop, implement, and research an educational intervention (pedagogical approach) to promote critical understandings of financial attitudes and values (subjective norms) and provide students with the resources, opportunities and confidence to exercise these (actual and perceived behavioural control);
- e. Formulate recommendations to improve financial literacy education in schools.

What does participation in this research project involve for you?

- Up to two individual, audio-recorded 30-45 minute phone interviews;
- Follow up discussions.

What does participation in this research project involve for your child?

- Up to two individual, audio-recorded 30-45 minute interviews with your child at school, during class time. These interviews will involve your child solving some money-related mathematical problems (these are not tests);
- Your child being observed during financial literacy lessons, with notes recorded by the researcher on her laptop.

Participation is voluntary, and you have the right to withdraw

Being in this study is voluntary and you and your child are under no obligation to consent to participation. If you do consent for you and your child to participate, you and your child may withdraw from further participation at any stage. Participants also have the right to withdraw data up until the publication of the written thesis that reports the findings of the research project.

Your confidentiality and privacy will be maintained at all times

Any reports from the interviews will be synthesised to ensure that your school, its teachers, you, your partner and your child cannot be identified. Reports on the project may be published in professional journals and other publications, but no publications will identify the school, staff, parents or students involved in this study. Pseudonyms will be used. Data collected will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Results of this research project

If you would like to be informed of the aggregate research findings, please contact Carly Sawatzki [REDACTED] The findings are accessible for 5 years.

If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:	If you have a complaint concerning the manner in which this research, MUHREC Project Number CF12/2207 – 2012001183, is being conducted, please contact:
Peter Sullivan Professor of Science, Mathematics and Technology Education Monash University, Clayton, Victoria 3800 [REDACTED] [REDACTED]	Executive Officer Monash University Human Research Ethics Committee (MUHREC) Building 3e Room 111 Research Office Monash University VIC 3800 [REDACTED] [REDACTED] [REDACTED]

Thank you,

Carly Sawatzki

Consent Form - Parents

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

NOTE: This consent form will remain with the Monash University researcher for their records.

I understand that my child and I have been asked to take part in the PhD research project specified above. I have had the project explained to me, and I have read the Explanatory Statement, which I keep for my records.

I understand that:	YES	NO
▪ I will be asked to be interviewed by the researcher.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Unless I otherwise inform the researcher before the interview, I agree to allow my interviews to be audio-taped.	<input type="checkbox"/>	<input type="checkbox"/>
▪ My child will be asked to be interviewed by the researcher.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Unless I otherwise inform the researcher before the interview, I agree to allow my child's interviews to be audio-taped.	<input type="checkbox"/>	<input type="checkbox"/>
▪ Observations of my child's financial literacy learning in class will take place and written notes will be recorded by the researcher, on her laptop.	<input type="checkbox"/>	<input type="checkbox"/>

I understand that my child's and my participation is voluntary, that my child and I can choose not to participate in part or all of the project, and that we can withdraw from further participation at any stage of the project without being penalised or disadvantaged in any way. I understand that any data that the researcher extracts from the interview or focus group for use in reports or published findings will not, under any circumstances, contain names or identifying characteristics without my signed consent below. I understand that my child and I can withdraw data up until the publication of the written thesis that reports the findings of the research project. I understand that no information I have provided that could lead to the identification of any other individual will be disclosed in any reports on the project, or to any other party. I understand that data from the interview will be kept in secure storage and accessible to the research team. I also understand that the data will be destroyed after a 5 year period unless I consent to it being used in future research. I give permission to be identified by a pseudonym and understand I will remain anonymous at all times in any reports or publications from the project.

Name of School: _____

Name of Parent: _____

Parent phone numbers: (h) _____ (m) _____

Name of Student: _____

Signature: _____

Date: _____ / _____ / 2012

APPENDIX D: DEECD'S STUDENT FAMILY OCCUPATION (SFO) CATEGORIES AND WEIGHTINGS

Retrieved from <http://www.education.vic.gov.au/school/principals/finance/pages/srpref011.aspx>

SFO Index Calculation

The occupational categories and their weightings used in the calculation of SFO funding are shown in the table below. Data regarding occupational categories is collected each year as part of the August census.

Occupation Group	Occupation Category Description	Weighting
A	Senior management in large business organisation, government administration and defence, and qualified professionals	0.00
B	Other business managers, arts/media/sports persons and associate professionals	0.25
C	Tradesmen/women, skilled office, sales and service staff	0.50
D	Machine operators, hospitality staff, assistants, labourers and related workers	0.75
N	Unemployed & pensioners (for 12 months or longer)	1.00

Data recorded in the August census as unknown is counted in the SFO density as Occupation Group A and attracts a zero weighting.

To be eligible for SFO funding a school's SFO density must be greater than the statewide median SFO density.

Calculation

Each school's SFO density is calculated as:

The sum of (Number of students x Weighting for each occupational category) / Total number of students

The SFO entitlement is then calculated as:

(School SFO density - statewide median SFO density) x Enrolment x Per student rate

APPENDIX E: STAGE 1 PRINCIPAL INTERVIEW PROTOCOL

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

Principal Interview Protocols

Interview:

1. Please tell me a bit about your teaching career? What Year level/s do you prefer to teach? How long have you been teaching at this school?
2. As Principal, what do you think are the key features and strengths of this school?

Financial literacy education...

When I talk about financial literacy teaching and learning, I'm referring to attitudes, values, knowledge and skills about earning, spending, saving and sharing money.

1. What is the most important thing about money you learned from your parents? Maybe it's something they said or did, maybe it's something they didn't say or do. Tell me how/why this lesson has stayed with you.
2. In what ways do you think your family's financial situation during your childhood and adolescence, together with your upbringing have impacted your current approach to money management?
3. What is the most important thing about money you remember learning at school? Tell me how/why this lesson has stayed with you.
4. Do you recall learning about financial literacy education as part of your initial teacher education?
5. Have you undertaken any professional development into financial literacy education? Please tell me about it.

Financial literacy teaching...

6. What prompted you to be interested in a research project into financial literacy teaching and learning?
7. In what ways is financial literacy taught and learned here?
8. How important is it to you that students learn about earning, spending, saving and sharing money as part of the school Curriculum? Why / why not?
9. What do you think students should understand about money by the time they leave Primary school?
10. Is there anything else you'd like to tell me about financial literacy teaching and learning?

As you know, I'm interested in studying how children develop and consolidate their learning about money at home, at school, and in the community. For this reason, I would like to find out about financial behaviour in this school community, looking at the school as example of a mini-economy. The following questions relate to this interest...

11. I am interested in the DEECD's distinction between essential educational, optional educational and voluntary financial fees in Government schools. Can you tell me, what is the uptake of optional educational services like in this school? And is the voluntary financial contribution something that parents ask about before they pay? How well-supported is the voluntary financial contribution in this school?
12. It would be helpful to know about your students' parents' work commitments. Could you please tell me the Student Family Occupation (SFO) Index, and the number of families receiving Education Maintenance Allowance?
13. On a related note, I am interested in the use of before, after, and school holiday care programs in this school community. Can you tell me who provides the service (i.e., the school, or is it out-sourced?). And how many families use the service?
14. Is there a school banking program in place? Can you tell me how students and parents find out about school banking? And how would you describe the level of interest in school banking?
15. Many schools are now outsourcing their school canteen. Can you tell me about your school canteen or catering service? Why did the school choose this particular service? What does it cost for a child to buy his/her lunch? How popular is this service?
16. What other sales initiatives are there at this school (i.e., book club, Stephanie Alexander market garden, etc.)? Can you tell me how involved parents and students are in these initiatives?
17. How about recycled / second-hand sales initiatives (i.e., book and uniform shops, etc.)? Can you tell me how involved parents and students are in these initiatives?
18. Do you find it challenging to raise money for the school? How about social and environmental causes? Does the school have a particular cause that students get behind?

APPENDIX F: STAGE 1 TEACHER INTERVIEW PROTOCOL

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

Year 6 Teacher Interview Protocol

Interview:

General / warm-up...

1. Please tell me a bit about your teaching career? How long have you been teaching at this school? What Year levels do you prefer to teach?
2. What do you think are the highlights of the Year 5/6 teaching and learning program here?

Financial literacy education...

When I talk about financial literacy teaching and learning, I'm referring to attitudes, values, knowledge and skills about earning, spending, saving and sharing money.

3. What is the most important thing about money you learned from your parents? Maybe it's something they said or did, maybe it's something they didn't say or do. Tell me how/why this lesson has stayed with you.
4. In what ways do you think your family's financial situation during your childhood and adolescence, together with your upbringing have impacted your current approach to money management?
5. What is the most important thing about money you remember learning at school? Tell me how/why this lesson has stayed with you.
6. Do you recall learning about financial literacy education as part of your initial teacher education?
7. Have you undertaken any professional development into financial literacy education? Please tell me about it.

Finding out about students' understandings...

8. What do your students seem to know and understand about earning, spending, saving and sharing money? How do you know?
9. What do you know about the types of activities students are involved in at home and in the community where they are learning about money – for example, receiving pocket money?
10. Attitudes refer to how students feel, while values refer to what they think is important. Are there ways that you have tried to explore students' attitudes and values about earning, spending, saving and sharing money in your lessons in the past? Can you suggest ways that you might do this in the future?

Financial literacy teaching...

11. In what ways is financial literacy taught and learned here?
12. How important is it to you that students learn about earning, spending, saving and sharing money as part of the school Curriculum? Why / why not?
13. What do you think students should understand about money by the time they leave Primary school? How might you plan to teach them this?
14. *The Australian Curriculum: Mathematics v3.0* includes a designated substrand titled "Money and financial mathematics" each year from Year 1 to Year 10 (show Content Descriptions). It stipulates that at Year 5, students will learn to create simple financial plans. At Year 6, they will investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies.

In your view, what would be the 3 most important learning outcomes of a 'Money and financial mathematics' program at Year 5? And Year 6?
15. Is there a program, resource or teaching and learning activity that you know about that you would like to use when teaching students about earning, spending, saving and sharing money? What is it about this particular resource or teaching and learning activity that appeals to you?

Show teachers a sample of three open-ended financial dilemmas (show selected dilemmas from the student interview protocol).

16. How do you think students would respond to this type of task as a teaching and learning activity? How likely do you think students would be to engage in conversation explaining the reasoning behind their responses?
17. Financial dilemma: If I offered your students \$100, and asked them how they would split the money between 3 jars (one for saving, one for spending, one for sharing), what would you want them to say? Why? What sorts of responses do you think they would give? Why?

One aim of this study is to facilitate communication between parents and teachers about the financial values, attitudes, knowledge, and skills 10-12 year olds bring to school from home, and what parents may have done to cultivate these understandings.

18. Is there anything that you would like to find out from parents about their child's financial literacy learning at home and in the community?
19. Is there anything else you'd like to tell me about financial literacy teaching and learning?

APPENDIX G: STAGE 1 PARENT INTERVIEW PROTOCOL

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

Year 6 Parent Interview Protocols

First ask:

I'd like to start with some general questions about your family, if that's ok...

1. Could you please tell me about your education background - what is your highest qualification? And X's mother/father?
2. Could you please tell me your current (or last) occupation? And X's mother/father?
3. Postcode where family lives
4. How old is your child that will participate in this study?
5. Does he/she have any brothers or sisters? How old are they?
6. Who does he/she live with most of the time?

Interview:

When I talk about financial literacy teaching and learning, I'm referring to attitudes, values, knowledge and skills about earning, spending, saving and sharing money. The next few questions relate to your own financial literacy learning in childhood and adolescence...

7. What is the most important lesson about money you learned from your parents? Maybe it's something they said or did, maybe it's something they didn't say or do. Tell me how/why this lesson has stayed with you.
8. In what ways do you think your family's financial situation during your childhood and adolescence, together with your upbringing have impacted your current approach to money management?
9. What is the most important lesson about money you remember learning at school? Tell me how/why this lesson has stayed with you.
10. So, how important is it to you that financial literacy is included in your child's school Curriculum?
11. What do you think children should learn about money at school before they leave Primary school?

Kids learn about money through things they observe and experience in their home and local community. A good example is pocket money.

12. Do you use pocket money to teach your kids about money management? How? Do they have a bank account?

13. Can you think of other activities your kids engage in where they learn about money? What, specifically, are they learning that is important?

I'm interested in what you want your kids to know and understand about money, and what you are doing or saying to teach them these things. The next few questions relate to this interest...

14. Confucius said, "Choose a job you love, and you will never have to work a day in your life." How do you feel about your work / career? What are you trying to teach your kids about working to earn an income?
15. Some people prefer to buy things on credit rather than wait and save up. Do you think your kids understand the difference between the two?
16. Some people prefer to live for today and let tomorrow take care of itself. Others are concerned that money doesn't grow on trees. What are you trying to teach your kids?
17. Some people do not check their bank balance, recent transaction history, or bank statements. Others could readily tell you how much money they've got and where. How would you describe your approach to monitoring your bank accounts and bill payments? What do you think your kids know and understand about keeping track of money?
18. Does your family support a particular charity or charities? What is it important to you that your kids know and understand about supporting social or environmental causes?
19. Financial dilemma: If I offered your child \$100, and asked them how they would split the money between 3 jars (one for saving, one for spending, one for sharing), what do you think they would do? Why? What would you want them to do? Why?
20. We've spoken a lot about family attitudes and values to earning, spending, saving and sharing money. Are there ways that your ideas differ from your partner's in what and how you aim to teach your kids about money?

One aim of this study is to explore ways that parents and teachers might communicate about the financial values, attitudes, knowledge, and skills 10-12 year olds bring to school from home, and what parents may have done to cultivate these understandings.

21. Do you think that the sorts of things we've spoken about would be useful to your child's teacher to know?
22. Is there anything else you'd like to tell me about financial literacy teaching and learning?

APPENDIX H: STAGE 1 YEAR 6 STUDENT INTERVIEW PROTOCOL

Project Title: Investigating the role of attitudes and values in financial literacy teaching and learning

Year 6 Student Interview Protocol

First read Verbal Explanation for Primary students, as follows:

My name is **Carly Sawatzki** and I am a PhD student at Monash University. I am working to find out more about the ways in which you learn about money at home, at school, and in the community.

I am interested in what students your age understand about money, and how you have learned these things. I am also interested in how you solve mathematical problems involving money.

I may ask you about this by;

- Talking to you about your experiences with and observations about money
- Working with you do solve some mathematical problems
- Talking to you with a group of other students
- Sitting in your class

So that I have a record of what you tell me, I may record these meetings.

We have already contacted your parents or whoever it is that looks after you and they have filled in a form to say that it is OK for you to take part.

You can tell me at any time that you don't want to take part anymore and that is ok too.

Anything that you tell me as part of this project will be kept confidential. This means that I won't put your name, or the name of your class or school on anything that I may publish in the future.

Do you have any questions?

Then ask introductory questions:

1. How old are you?
2. Do you have any brothers or sisters?

Questions and dilemmas:

(Earning)

1. Can you tell me about a time when you've received money? Did you have to do anything to earn the money? What did you do with the money?
2. What's on your Birthday or Christmas wish list at the moment? What is it about this item that makes you want it?
3. How would you know where to buy this item?

Dilemma Six: Enterprise Part 1

It's the school holidays. Your Mum suggests that you might earn some money by helping in the garden. She is prepared to pay you 10c per weed pulled from the garden OR you can negotiate an hourly rate of pay.

- a. Would you prefer to be paid per weed pulled, or by the hour? Why?
- b. What hourly rate of pay would you want Mum to agree to? Explain why.
- c. How would you feel about doing this job?
- d. Is helping in the garden something you would do without being paid?

(Spending)

Dilemma Two: Oops... incorrect change

Your Mum asks you to buy 2 litres of milk on your way home from school today. The milk costs \$3.50. You also buy an ice-cream for \$2.50. You pay using a \$10 note. The woman is distracted by another customer and gives you \$10 too much change.

- a. What is the correct amount of change?
- b. What will you do about the error?
- c. If child indicates they would give back the money... What if you were given \$20 too much change?
- d. If child indicates they would keep the money... What if you knew the woman would have to pay \$10 out of her own money for the cash register to balance at the end of the day?

Dilemma Three: The accommodation

A single person and a married couple are planning a holiday together. The friends will share a two-bedroom holiday unit at a caravan park for 5 nights. One bedroom has a double bed, the other has two single beds. The cost is \$100 per night.

- a. What is the total cost of the accommodation?
- b. How much should the single person pay, and how much should the married couple pay? Justify your decision.

(Saving)

1. Financial dilemma: Imagine you receive a gift of \$100. How will you split the money between 3 jars? One jar is for saving, one jar is for spending, one jar is for sharing.

Dilemma Fifteen: Price vs quality

You would like a vest for the cooler weather.



Large Retailer

\$25



Smaller, fashion brand

\$30

- Which of the above would Mum/Dad be more likely to buy you? Why?
- Which of the above would you prefer for them to buy you? Why?

Dilemma Ten: Understanding fuel economy

Frank and Nellie own two cars. Each weekday, Frank drives to the closest train station, and takes the train to work in the city. He drives a total of 20km each week. Nellie, on the other hand, drives to and from work each day. She drives a total of 100km each week. Frank currently drives Car B.

	Car A	Car B
Size	large	small
Total running costs	30c per kilometre	15c per kilometre

- Is there a way for Frank and Nellie to save some money? Explain how.

(Sharing)

- Does your family support a particular charity? Do you think it is important to give money to social or environmental causes?

Dilemma Eight: Comparing charities – Where do the funds go?

Your parents are thinking about sponsoring a child through a charity, and have asked you to research two particular charities. Here is a summary of your findings:

	Charity A	Charity B
Amount	\$50 per month	\$40 per month
How the sponsorship money is spent	80% of the sponsorship amount goes to programs that benefit children and their communities. The focus is on providing clean water, food and medicine.	100% of the sponsorship amount benefits the sponsored child. The focus is on education, including school uniform, books, and school excursions.
Who benefits?	Children living in poverty overseas.	Disadvantaged children living in Australia.

- a. Which Charity would you prefer to support? Explain why.

2. Is there anything you'd really like to learn about earning, spending, saving or sharing money? Is this something you'd like to learn about at home or at school?

APPENDIX I: FINANCIAL DILEMMAS NOT SELECTED FOR INCLUSION IN THE EPMC PROJECT

Sharing holiday accommodation

A family group that includes 3 couples and 2 single people rents a 5 bedroom holiday unit near a popular beach for 7 nights. All bedrooms have their own bathroom. The apartment costs \$360 per night.

Give two options for how the cost of the apartment should be shared, and explain which you think is fairest.

Buying a car

Sally wants to buy a car. She guesses that she would travel around 20,000 km each year, and she assumes she will keep the car for 5 years.

A three year old hybrid is priced at \$20,000. The petrol usage is listed at 4 L/100km. The anticipated resale value in 5 years would be \$10,000.

A three year old petrol sedan is priced at \$10,000. The fuel usage is listed at 8 L/ 100 km. The anticipated resale value in 5 years would be \$5,000.

Assume that the cost of maintenance of both cars is the same.

Assuming that petrol costs \$1.50 per Litre, what are the advantages and disadvantages for Sally of each of these cars?

Buying a bicycle

Jake wants a bicycle but his parents say he has to pay for it himself. The bike costs \$340.

Jake has \$100 saved from his birthday and can save \$10 per week from money that he earns delivering the local newspaper.

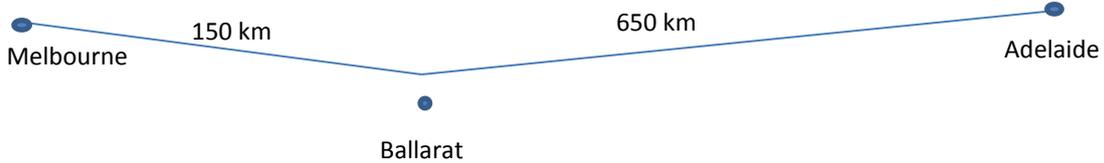
Jake's parents offer to lend him the money for the bicycle but he will have to pay them back within 12 months. They give Jake three options.

- An interest only loan so that Jake can buy the bike now, but he will have to pay his parents 1% of the loan each month until he repays the loan.
- A loan so that Jake can buy the bike now with no interest, but he will have to pay a handling fee of \$5 per each month until he repays the loan.
- A promise that if Jake saves half the money needed to buy the bicycle, they will pay half the cost of the bike.

What do you think Jake should do and why?

Hiring a bus for a basketball trip

A basketball team of 7 players hired a bus to take them to a competition. The bus cost \$500 to hire for one week, and they have to pay an additional 35c per Km they travel. Four players live in Melbourne and three players live in Ballarat. The Melbourne based players pick up the bus and drive to Ballarat to collect the others, and then drive to the competition in Adelaide, which lasts 5 days. They then return to their homes.



Give two options for how much they should each pay.

Insurance on a hired bus

The bus is worth \$50,000. The basketball team must purchase an insurance policy for \$100. If the bus is involved in an accident, the excess on this policy which they must pay if an accident occurs, is \$2,000. If they pay an additional \$200 when they purchase the insurance policy the excess will be waived in the event of an accident. What should they do?

APPENDIX J: FINANCIAL DILEMMAS INCLUDED IN THE EPMC PROJECT

SHOPPING FOR SHOES

Jenny and Carly go shopping for shoes. Jenny chooses one pair for \$110 and another for \$100. Carly chooses a pair that costs \$160.

When they go to pay, the assistant says that there is a sale on and they get 3 pairs of shoes for the price of 2 pairs.

Give two options for how much Jenny and Carly should each pay?

Explain which of these options is fairer.



Rationale for the lesson:

The task is to illustrate to students that sometimes there are 'realistic' situations in which they need to apply both mathematical and social thinking and communicate their reasoning. In this case, one type of solution – sharing the cost – results in a different outcome from another type of solution – sharing the saving. In such situations people need to negotiate.

Year level:

Year 5- 6

Particular pedagogical considerations:

If the students are not familiar with the context (shoe shopping) you might need to explain or even model the situation. In fact, using your own name or students' names to personalize it might help. Also having role plays at different parts of the discussion might also make the context easier to appreciate.

There may be words that the students do not know. Emphasise that the task is about exploring options and so the request to find two solutions is important. Also explain that communication and negotiation about what is fair happens many times in life, so encouraging students to discuss factors that led them to one decision over another, including their justification for their decision, is an important part of this task.

Note that, in a real situation, Carly and Jenny might resolve it by buying more shoes, you need to ban this type of solution. Explain that this is all the money that they have with them.

For the students:

Real life mathematical situations often have more than one possible solution. We need to understand the options and be able to explain which one they think is fair.

Introductory task:

You might choose to use a task like this to introduce the notion of discussing options by posing (or even modelling) this task:

Jenny and Carly go shopping for shoes. Jenny chooses one pair for \$20. Carly chooses a pair that cost \$40.

When they go to pay, the assistant says that because the total cost is more than \$50, they get \$12 discount between them.

Give two options for how much Jenny and Carly should each pay?

Enabling prompt:

Kerry and Kathy are twins and can share shoes. Kerry chooses one pair for \$20. Kathy chooses a pair that costs \$40. How much should they each pay?

Extending prompt:

Bert, Bob and Bill are shopping for shirts. Bill chooses a shirt costing \$30 and another for \$50. Bob chooses one shirt for \$60. Bert chooses one shirt for \$30 and another for \$40. When they go to pay, the assistant says that there is a sale on, and they get 5 shirts for the price of 3. Give two options for how much Bill and Bert and Bob should each pay? Explain which is the fairest.

Consolidating task:

Jenny and Carly go shopping for shoes. Jenny chooses one pair for \$110 and another for \$100. Carly chooses a pair that cost \$60. When they go to pay, the assistant says that there is a sale on, and they get 3 pairs of shoes for the price of 2 pairs (the cheapest pair becomes free). Give two options for how much Jenny and Carly should each pay? Explain which is the fairer.

Some different approaches to the main task:

One option is for Jenny and Carly to share the cost per shoe, the total of which is \$270. That means that Jenny pays \$180 and Carly pays \$90.

Another option is for Jenny and Carly to share their saving, which is \$100. So Jenny pays \$160 and Carly pays \$110.

A third option is to share the saving in the same ratio as the original cost of the shoes (Jenny $\frac{21}{37} \times 270$; Carly $\frac{16}{37} \times 270$)

MAKING CHOICES ABOUT SPENDING

How would you advise these people?

- Thomas is thinking about gym membership which is \$50 to join and \$50 per month. A single visit is \$15.
- Emma has three children at school: Andy, Allie and Amy. The school has their fete this weekend. Emma can order a 'ride wristband' online by tomorrow for \$30 for unlimited rides. If she waits until Saturday, wristbands will be \$40 each. Or, Emma can pay per ride on the day, with rides costing \$4 and \$5 each.
- Wendy is looking at a clothing shop which is advertising the following offer: spend \$100 get 10% off the total; spend \$200 get 20% off the total; spend \$300 get 30% off the total.

Rationale for the lesson:

While the arithmetic in these offers is simple, the decision making is less so. Such offers are made frequently and consumers need to be aware of options in evaluating such offers. The calculations have to be done in the context of the decisions to be made. Often the calculations alone won't be enough to decide which deal is better.

Year level:

Year 5- 6

Particular pedagogical considerations:

Many students may not be familiar with this type of decision making. Talk through the introductory task as a whole class making them aware that they are asked to explain what are their reasons for making decisions in each situation.

After the students have had some time to think about each offer by themselves, invite them to discuss the options and prepare their responses in pairs. Another options is to allocate them to mixed-ability groups, with one group discussing / reaching agreement on one offer. Each group can then report back to the class on the thinking / discussion involved in evaluating the offer assigned to them. This might be a series of two lessons.

There is no consolidating task for this lesson.

There are no definite right and wrong answers with these tasks. The intention is to create awareness of the need for considered decisions in such cases.

It might be worth mentioning that not all people offering deals are thinking of the customer's interests.

For the students:

Consumers need to make considered decisions when responding to 'special' offers. Not all offers are good for everyone.

Introductory task:

Pose this task and invite students to say how they would advise Bob. Have them work individually for a while then discuss their advice in pairs:

Bob is considering a 10 swim pass at the pool which costs \$30 and is valid for 6 weeks.
A single swim is \$3.50

So Bob needs to decide how keen he is on swimming.

Enabling prompt:

Some examples of prompts are:

Thomas decides to take up a gym membership which is \$50 per month. A single visit is \$15. How many visits does Thomas need to make each month?

Which is better: 25% off shoes marked at \$100, or a pair of shoes for \$60?

Extending prompt:

What are deals like this that you know of?

Suggest some deals for a school-based business initiative. For example, the school canteen, book club, Mothers' Day stall, Year 6 Market Day, Stephanie Alexander Kitchen Garden, etc

Some different approaches to the main task:

In the case of the introductory task:

Bob is considering a 10 swim pass at the pool which costs \$30 and is valid for 6 weeks.
(A single swim is \$3.50)

The students can work out that 8 single swims costs \$28, so it is only if Bob has 9 or 10 swims that the 10 swim pass is better value.

ANNA AND HER FRIENDS

Anna, Bernadette and Carol are going to the movies together. Tickets cost \$12 each, but there is a special offer for everyone who books and pays online - buy two tickets, get the third ticket free. Anna booked and paid for the tickets online.

When they arrived at the theatre, they noticed the pricelist at the shop. The price list reads as follows:

Bottled Water	\$4
Icecream	\$4
Medium Popcorn	\$8
Bottled Water, icecream & popcorn combo	\$12

Anna wants to buy a bottle of water, Bernadette wants the ice-cream and Carol wants the popcorn. Anna pays for the combo.

What might Anna say to Bernadette and Carol about how much they owe her?

Rationale for the lesson:

This is an example of the complexity of dealing with the offers that we often see as consumers. The intention is for students to read the whole question, consider the context, and make judgments about the fair way to work out how much they each owe. The complexity in this task comes from the number of steps in the calculation.

Year level:

Year 5- 6

Particular pedagogical considerations:

A brief conversation to find out about students' experiences with these deals, perhaps during school holidays, will inform you about their social understandings.

Because there is a lot to read, perhaps the students could discuss in pairs what the question is asking.

Encourage the students to give clear explanations of their solution, and to explain which is fair.

Key language issues include "option", "three for the price of two", "combo", "fair share", "owe"

For the students:

Sometimes you have to share the costs, and it is important to work out the fairest way to share the cost. It is also important to be able to explain why you think your solution is fair.

There is no consolidating task in this lesson.

Enabling prompt:

A prompt might be to break the task into parts.

Anna, Bernadette, and Carol are going to the movies together. Tickets cost \$12 each, but there is a special offer for everyone who books and pays online - buy two tickets, get the third ticket free. Anna booked and paid for the tickets online. How much should Bernadette and Carol each pay Anna?

Extending prompt:

Anna, Bernadette, and Carol are going to the movies together. Tickets cost \$13.50 each, but there is a special offer for everyone who books and pays online - buy two tickets, get the third ticket free. Above this, there is an online processing fee of 30c for every ticket booked. Anna booked and paid for the tickets online.

When they arrived at the theatre, they noticed the pricelist at the shop. The price list reads as follows:

Bottled Water	\$3.50
Icecream	\$4.50
Medium Popcorn	\$5.20
Bottled Water, icecream & medium popcorn combo	\$10

Anna wants to buy a bottle of water, Bernadette wants the icecream and Carol wants the popcorn. Anna pays for the combo.

What should Anna say to Bernadette and Carol about how much they should pay?

Some different approaches to the main task:

One approach is to have a table of the costs like the following:

	Anna	Bernadette	Carol
Movie tickets	\$8	\$8	\$8
Meal deal	\$3 (for the water)	\$3 (for the ice-cream)	\$6 (for the popcorn)
Amount owed Anna		\$11	\$14

CATCHING A TAXI

The taxi fare is \$3 flagfall (what you pay when you get into the taxi) and then \$1.50 per km after that. It does not matter how many people are in the taxi.

Mike and Matt decide to share a taxi because they are going in the same direction but to different houses. The journey to Mike's house is 20 km, then a further 30 km to Matt's house.

How much should each of them pay for the taxi?

Explain why your suggestion is fair for both people.

Rationale for the lesson:

The task is to illustrate to students that sometimes there are 'realistic' situations in which they need to apply both mathematical and social thinking and communicate their reasoning. In this example, there are benefits to sharing a resource (i.e., a taxi ride) – in that doing so results in a saving for both parties that would not otherwise be made. Can students figure this out?

Year level:

Year 5- 6

Particular pedagogical considerations:

If the students are not familiar with the context (catching a taxi) you might need to explain or even model the situation. There may be words that the students do not know, such as "flagfall", "per", "further".

Explain that communication and negotiation about sharing costs happens many times in life.

Encouraging students to discuss factors that led them to one suggestion over another, including their justification for their suggestion, is an important part of this task.

For the students:

Real life mathematical situations often have more than one possible solution. People need to identify and understand the options available to them before making a financial decision. They also need to be able to explain their decision in terms of what is fair for both Mike and Matt.

Introductory task:

You might elaborate the story (or do a role play) of two people needing a taxi but there is only one available, and they are travelling in the same direction.

Enabling prompt:

The taxi fare is \$3 flagfall (what you pay when you get into the taxi) and then \$1.50 per km after that.

The journey to Mike's house is 20 km. How much would Mike expect to pay for the taxi?

Extending prompt:

The taxi fare is \$3.20 flagfall (what you pay when you get into the taxi) and then \$1.61 per km after that. It does not matter how many people are in the taxi.

Mike and Matt and Merv do not know each other but decide to share a taxi because they are going in the same direction. The journey to Mike's house is 20 km, then a further 30 km to Matt's house and then a further 40 km to Merv's house.

How much should each of them pay for the taxi?

Explain why your suggestion is fair for everyone.

Consolidating task:

A plumber charges \$75 to come to your neighbourhood and then \$40 per hour after that. You have a job that will take 2 hours. Your next door neighbour also needs a plumber and they have a job that will take 3 hours. How much should the plumber charge and how should you share the cost?

Some different approaches to the main task:

One approach is to draw up a table.

	Mike	Matt
Share of flagfall	\$1.50	\$1.50
Share of the 1 st 20km	\$15	\$15
For the next 30 km		\$45
Total to pay	\$16.50	\$61.50

MEAL DEALS

I saw this advertisement at an airport.

A meal deal in an international fast food chain costs \$9 in Australia.

I know that \$US1 has the same value as \$A0.90

How much would you expect the meal deal to cost in the US? In Germany? In China?



Rationale for the lesson:

Students hear about different currencies in the media, and converting from one currency to another is a useful example of proportional reasoning.

Year level:

Year 5- 6

Particular pedagogical considerations:

It will be necessary to have a conversation about different currencies and the ways that they differ. The photo was taken at Beijing airport. RMB indicates that it is the currency of China called the Yuan. Explain when travelling it is necessary to do currency conversions frequently to check on the value of potential purchases, although usually these are approximations rather than exact calculations.

You might discuss what they think the photo means. Also explain that the Euro is used in most countries in Europe (such as Germany and Spain).

Required language includes “currency”, “conversions”, “\$US”, “Euro”, “RMB”, “Yuan”.

For the students:

Different countries use different money. Sometimes it is necessary to convert from one currency to another.

Enabling prompt:

If the meal deals costs \$US5, how much would you expect it to cost in Spain?

Extending prompt:

A meal deal in an international fast food chain is \$10 in Australia.

How much would you expect the meal deal to cost in the US? In Germany? In China?

Consolidating task:

There are some shoes that you like that cost \$120 in the United States. What would be good value if you buy the shoes in China? In France? In Melbourne?

Some different approaches to the main task:

\$A9 is the same as \$US10. Which is the same as 60 Yuan. Which is the same as 8 Euro.

APPENDIX K: STAGE 3 PRE-INTERVENTION TEACHER SURVEY

Section 6: Financial literacy items

When we ask about financial literacy teaching and learning, we're referring to attitudes, values, knowledge and skills about earning, spending, saving and sharing money. Please indicate the extent of your agreement with the following statements:

	SD	D	U	A	SA
a. Financial literacy is a specialised topic that should be taught for around 4 weeks each year.					
b. Financial literacy is best taught using purpose designed published programs					
c. Financial literacy teaching and learning should involve external organisations or guest speakers					
d. I have a good idea about what parents are teaching students about money at home.					
e. I am financially literate.					
f. I am confident about teaching financial literacy.					
g. I would like further PD about financial literacy.					

SD= strongly disagree D = disagree U= undecided A= agree SA= strongly agree

What are three things students should know and understand about money by the time they leave primary school?

- 1.
- 2.
- 3.

APPENDIX L: STAGE 3 POST-INTERVENTION TEACHER SURVEY

Section 4: Financial literacy items

Is there a particular story you would like to share with us? Please tick the task your story relates to, and briefly tell us about your experience:

- Shopping for shoes
- Making choices about spending
- Anna and her friends
- Catching a taxi
- The price of meal deals around the world

What did you find most difficult about teaching the financial literacy tasks? Please tick exactly three of the following:

- The literacy demands of the tasks
- Helping the students relate to the scenarios
- Helping students to understand how money was changing hands
- Encouraging students to find more than one option
- Encouraging students to compare and contrast different options in order to make a decision
- Getting students to explain their social thinking
- Getting students to explain their mathematical thinking
- Getting students to develop an argument based on both social and mathematical thinking

Please tick which of the following teaching strategies you used with the financial literacy tasks, and which you didn't use, but would use next time (tick all that apply):

	I did this	I didn't do this, but would use next time
I read the problem aloud		
I asked students to identify any words they didn't know or understand so we could define key terms as a class		
I asked students to underline / highlight the information that they thought was important to the problem		
I explained the difference between social and mathematical thinking		
I involved the students in role play		
I encouraged students to draw pictures		
I encouraged students to create tables		
I used concrete materials (i.e., notes and coins)		
I encouraged students to collaborate in small groups to discuss their problem solving approaches and solution/s		
I deliberately scouted the room to identify students to share their mathematical workings and explanations		
I asked open, sometimes provocative questions to stimulate different ways of thinking		
I ensured a range of options (mathematical workings and explanations) were recorded during whole-class discussion		
I created follow-up lessons		

Please indicate the extent of your agreement with the following statements:

Question	SD 1	D 2	U 3	A 4	SA 5
The financial dilemmas helped my students see that both social and mathematical thinking play important roles in financial problem solving.					
My students seemed to know more about using money than I had realised.					
These tasks helped me to feel more confident about teaching financial literacy.					
I will use these tasks again.					