CHAPTER 1

INTRODUCTION: ESTABLISHING MY INTEREST IN INTEREST

In my first year as a grade 6 teacher, Kate was one of the students in my class. She had a keen sense of humour and an enthusiasm for life. Kate excelled in a range of sports and had been elected by her peers as a house captain. Despite such strengths, half way through the school year I found myself wondering how I could contribute to switching Kate on to learning in the classroom. She consistently performed at the lower end of the class in terms of academic ability, yet she had a spark and energy that I believed could be harnessed. I just hadn’t found the hook, to connect her with classroom-based learning. The final term in the school year arrived and I began to plan a learning unit for science and technology. The unit focused on endangered Australian animals and incorporated an excursion to a natural history museum. The pedagogical approach on which the unit was based was a Learners’ Questions Approach (Faire & Cosgrove, 1988; Griffin, 1998). In the initial lessons, the students in my class engaged in activities that involved them in considering various endangered animals and reasons for their endangered status. As they read widely, each student made a choice of animal in which to specialise and posed curiosity questions to guide a research investigation. Kate selected the gastric brooding frog, an unusual and highly endangered frog which swallowed its spawn after laying it. The tadpoles then hatched and developed in the stomach of the mother frog, who regurgitated them once they were froglets. Kate was fascinated. She read with an excitement and enthusiasm that I previously had not thought possible. When she went on the museum excursion, Kate discovered that she knew more than the information conveyed in any of the exhibits. She began to see herself as an expert on the gastric brooding frog, as did her peers. The final stage in the unit involved each student writing an information report to share their knowledge about their animal. They then made an oral presentation to the class based on their written report and the collated reports formed a class book, Grade 6’s Australian Endangered Animals. Kate’s interest in
completing and presenting her report resulted in a higher standard of achievement than I had seen from her all year. She was highly focused and engaged in any aspect of the unit that related to her work on the gastric brooding frog. It seemed as though Kate was extending the boundaries of what she herself saw as possible in her learning.

I felt as though my role in connecting Kate with learning had happened by chance, rather than by design. I reflected on her interest during this unit, which had motivated her to achieve and to share her understanding and excitement for learning with others. If this was possible for Kate, how could I ensure that more of my students experienced and shared such interest in their learning? As Hidi, Renninger and Krapp (2004) acknowledge, ‘for education, questions arise as to why individuals are interested in one area or topic but not in another … most educators agree an important goal of education is the differentiation and stabilization of interests relevant to learning’ (pp. 90-91). Other questions began to arise from my classroom teaching experience that related to the process of students developing interest in learning: what could I do as a teacher to contribute to creating learning contexts that supported students’ interest development? How could I establish a rapport with students, to enhance their learning by making connections with their existing and emerging interests? I started to question how my pedagogical approach could help students to expand and develop new interests. Were there certain features in the approach that I had taken to teaching the endangered Australian animals topic that promoted and facilitated students’ interest in learning? There also was the issue of my own interest in what I was teaching and whether there was a ‘ripple effect’ when students saw their teacher, and also peers, interested in certain topics or certain learning tasks. My questions seemed to relate more to processes in the emergence, maintenance and development of interest, than to the effects of interest on other aspects of learning and motivation.

As I wanted to inform my classroom practice with educational research, I looked to three bodies of literature within the field of educational psychology: studies of interest, studies of motivation and studies of innovative classroom practice, particularly in science and technology education. My early teaching experience and the subsequent reading that I did marked the start of my own interest in conducting research in these areas. I set out to investigate children engaging in real classroom activities and the complex interaction amongst the students and the teacher as they learnt together (Pressick-Kilborn, 1999).
Interest as a unique motivational variable seemed to most closely describe the phenomenon that I was observing in my classroom, as it brings together affective and cognitive components of motivation (Hidi, 2006; Hidi & Renninger, 2006). When I started to search for studies conducted in real classroom contexts, however, I found that most interest research had been carried out in settings designed for the purposes of that research, with participants older than primary school students. Quantitative approaches were most frequently taken to research design, particularly in studies of situational interest. The body of research also focused on learning outcomes associated with interest, as distinct from processes of the development of interest. The research on individual interest generally had been conducted in more naturally occurring contexts however I located fewer studies than for situational interest. This possibly was the case because individual interest was more difficult to manipulate in the style of experimental and correlational studies that seemed to dominate for situational interest. I extended my literature search to consider motivation research more broadly, focusing on studies conducted in classroom settings. This led me to Paris and Turner’s (1994) theory of situated motivation. In particular, this theory resonated with my classroom teaching experience and observations of my students. I started to analyse the design of my classroom activities in relation to opportunities for student choice, challenge, control and collaboration. In this way, I gained insight into how my pedagogical decisions were impacting on possibilities for student engagement. Consideration of situated theories of learning and motivation brought me to sociocultural theories and concepts central to the writing of Vygotsky and neo-Vygotskian thinkers such as Valsiner (1992, 1997b). I began to see similarities between the emphases in sociocultural theories and the conceptualisation of interest proposed by Dewey (1913) in his seminal writing on interest and effort in education. Framing interest from a sociocultural perspective would, I began to think, enable a focus upon the transactions between individuals and contexts, emphasising a dynamic interdependence between social and individual processes (John-Steiner & Mahn, 1996; Rogoff & Chavajay, 1995). A sociocultural framework also emphasised development.

1 This classroom-based research project was designed in 2000 and data were gathered in three stages. A pilot study was conducted from October-December, 2000 followed by the main stage of the study from January – June, 2001. The final stage of the project comprised two follow up interviews with each focus student, the first in November 2001 and the second in September 2002. There has been a delay between the gathering of data and submission of this thesis, owing to variations in my PhD candidature as a result of work commitments and periods of parental leave following the births of my two children in 2005 and 2008. Such variations in my candidature have included transfer to part-time study and leave of absence from study. While the current research was designed in the context of the literature in the late 1990s, the conduct of this research has resulted in publications and conference papers that have contributed to the body of knowledge in this area. These publications and more recent literature are included in the review of literature and discussion chapter of this thesis.
over time and placed importance on conducting research in authentic environments, in particular in communities of practice (Lave & Wenger, 1991). I had started to consider the potential benefits of framing interest from a sociocultural perspective, although at this stage, it was a theoretical exploration. I wanted to establish a field study that could further investigate and develop the approach.

I started to read about a specific type of community of practice, a community of learners (for example, Bereiter & Scardamalia, 1993; Brown, 1997; Rogoff, Matusov, & White, 1996; Roth, 1998), which has knowledge building as its focus and an emphasis on innovative classroom design. If I was to further investigate the development of interest from a sociocultural perspective, I would need to conduct research in a classroom that was built on the assumption that students collaboratively construct knowledge and understanding through social interaction. Such a classroom would be characterised by students negotiating and sharing a sense of purpose and ownership as they participated in ongoing activities, with their teacher positioned as a more knowledgable learner. Classroom-based learning communities emphasised participation in authentic learning experiences focused on important ideas in the relevant discipline. Depth of understanding is a goal in such communities, where students have opportunities to pose their own questions to guide their inquiry. The notion of a classroom-based community seemed to me to be important for creating the type of learning environment that could promote interest development.

My decision to focus on science and technology as a subject domain arose both from the research literature and my classroom practice. Brown (1997), for example, had focused on science topics in her Fostering Communities of Learners projects and Roth (1998) also had based his learning communities research on science and technology-related topics. The pedagogical approaches taken to support the creation of a classroom-based community of practice seemed suited to processes of scientific inquiry. Such processes of inquiry that I had previously taught my primary school students included posing investigable questions, devising and conducting fair tests, designing and making models and systems, and sharing findings from investigations with others. Within my own classroom practice, science and technology had been the subject in which Kate had developed her interest in the gastric brooding frog. It also was the subject in which I’d seen my students highly engaged in hands-on tasks and investigations. Research showed, however, that while students have a great deal of
enthusiasm for science and its activities in the primary years, interest and enjoyment in science generally decline sharply during the secondary years (Hidi & Harackiewicz, 2000; Hoffmann, 2000; Krapp, 2006; Speering & Rennie, 1996). Studies such as Speering and Rennie’s (1996), however, had relied mainly on student self-report data collected in surveys and interviews. It appeared as though a classroom-based study could contribute to understanding more about the aspects of primary science and technology pedagogy that contribute to creating, maintaining and developing students’ interest.

I subsequently shifted my attention to devising a methodology for studying interest development from a sociocultural perspective. I needed to consider the most suitable approach to gathering data that would enable me to consider the total activity of the classroom, in relation to community, interpersonal and personal planes (Rogoff, 1998). I therefore decided upon a qualitative approach that incorporated a triangulated design, to allow me to gather data to consider the perspectives of multiple participants at multiple time points using multiple research strategies. The strategies selected included researcher participant observation of classroom-based activities recorded as field notes, audio tapes and video footage, and strategies to incorporate students’ and the teacher’s perspectives including interviews, retrospective ratings of interest and reflective writing. I also needed to ensure that the classroom in the study was a site in which I could observe students’ interest development. As a result, I decided that a design-based research approach similar to that used by Brown (1997) and Guthrie and Alao (1997) would be adopted. Central to design-based research was devising a set of guiding instructional principles to support the creation of a classroom community that promoted the development of interest. Therefore, the data collection approach that I developed is both theoretically based and aimed at furthering theory; data is being gathered so that individual and situational aspects of interest development can be considered as inclusively separate (Valsiner, 1998). At the same time, the primary aim of the classroom-based study is to further initial theorising of interest from a sociocultural perspective and contribute to how interest is conceptualised.

In conducting the research, I thus was seeking to investigate how interest could be reconceptualised using a sociocultural approach, which appeared suited to studying the complexity of interest development in a real classroom setting. From the outset, I anticipated that the research would make a contribution to theorising interest as a
motivational construct by drawing on key notions from sociocultural theories. Such key notions include the conceptualisation of classrooms as learning communities (for example, Brown, 1997); Valsiner’s (1997b) expanded zones system incorporating the Zone of Free Movement, the Zone of Promoted Action and the Zone of Proximal Development; the guidance and structuring of development through processes of canalisation and self-canalisation (Valsiner, 1992, 1997b); transformative processes of internalisation and externalisation (Valsiner, 1997c); intersubjectivity (Rogoff, 1990) and connectedness; and identity negotiation (Wertsch & Penuel, 1996). I also envisaged that my study would contribute to broadening the methodologies used in the study of interest. Furthermore, as the starting point of my own interest in conducting the study was based in my teaching, I wanted the research to inform classroom practice by providing insight into pedagogical strategies that promote interest development.

This thesis is structured in nine chapters. Following this introductory chapter, written to set the scene for the study I have conducted, there are two literature review chapters in which I consider the strengths and limitations of previous research. In the first chapter, I review the interest research literature and focus on how interest and its development have been conceptualised. Consideration is given to the contexts in which research has been conducted and the approaches to carrying out the research, including participants and measures used. In the second of the two literature review chapters, I focus on key elements of sociocultural theory that are potentially relevant to framing interest development. Chapter 4 of the thesis provides a rationale for the present study that emerges from the literature reviewed. This chapter justifies the methodological design of my study and concludes with the guiding research questions. In chapter 5, I present the research context and methodological strategies for the classroom-based project, along with my approach to data analysis and interpretation. Following the methodology chapter are two chapters that report the findings. In the first of these two chapters, Chapter 6, I report the findings related to the classroom community and interest development. In Chapter 7, I more specifically consider the participation of six focus students in that same classroom community and focus on how these students experienced interest in learning. In the final two chapters, I discuss the findings and conclude the thesis.
CHAPTER 2

THE RELATIONSHIP BETWEEN THE SITUATION AND INDIVIDUAL IN EXPLORING THE DEVELOPMENT OF INTEREST IN LEARNING

2.1 INTRODUCTION

The question of how to develop and facilitate students’ interest is one that is critical in both educational theory and practice (Fivush, 1998). Why children are interested in one area or topic but not another and how new interests emerge and grow are important questions that ideally should inform the design of engaging school curricula. Increased understanding of how interest in learning is created and develops, in addition to knowledge about students’ existing interests, will assist teachers in designing class programs and promoting ongoing activities in which there are opportunities for interest development along multiple pathways.

The primary purpose of Chapter 2 is to review literature relevant to considering the potential for reconceptualising the motivational construct, interest. In the first section of the chapter, I review and analyse Dewey’s (1913, 1916) early theorising about interest, focusing on two key aspects: the development of interest in social contexts, including in play, and the process of dynamic transactions between the individual and situation. In the second section of the chapter I review research conducted more recently from the dominant theoretical approach in which interest is conceptualised as situational or individual (Hidi, 2006; Krapp, Hidi, & Renninger, 1992; Schiefele, 1991). The literature is considered firstly in relation to studies of situational interest, including text-based, task-based and prior knowledge interest research. Secondly, I focus on studies of individual interest. Thirdly, I consider empirical research that focuses on both situational and individual interest within the same study. Three key aspects are highlighted in discussing strengths and limitations of previous research.
studies in each of these areas: (a) research contexts, (b) types of research and measures used, and (c) learning outcomes and variables studied that are related to interest. In the concluding section of the chapter, the relationship between situational and individual interest is discussed and limitations of the conceptualisation of interest as situational or individual are highlighted in regard to explaining interest development and ongoing transactions between individuals and other aspects of complex learning environments.

2.2 DEWEY AND HIS THEORISING OF INTEREST

If we can discover a child’s urgent needs and powers, and if we can supply an environment of materials, appliances and resources – physical, social and intellectual – to direct their adequate operation, we shall not have to think about interest. It will take care of itself.
(Dewey, 1913, pp. 95-96)

The theoretical construct, interest, is one that has been considered and examined in educational psychology since the late 19th century (Hidi, et al., 2004). In his work in the early 20th century, John Dewey emphasised interest as central to educational theory and practice. In 1913, Interest and Effort in Education (Dewey, 1913) was published and later, Dewey (1916) included a focus on interest in Democracy and Education.

2.2.1 Dewey’s conception of interest

In writing about interest in 1913, Dewey emphasised that ‘interest is not some one thing; it is a name for the fact that a course of action, an occupation or a pursuit absorbs the powers of an individual in a thorough, on-going way’ (p. 65). This statement reveals a number of characteristics of interest; firstly, there are different types of interest and actions that signify it, as well as different objects in which, or processes by which, individuals become absorbed. Secondly, in order for an individual to be thoroughly engaged and thus interested, the activity or pursuit must have the
potential to continue and grow over time. The implication is that interest needs to be considered in the context of on-going actions. Dewey (1913) considered that misconceptions about interest arise from ignorance of its moving and developing nature and from divorcing the object and self. Thirdly, Dewey (1913) stated that despite the diversity of interests, they all ‘mark an identification in action, and hence in desire, effort and thought, of self with objects’ (p. 90, emphasis added), thus stressing the importance of value through absorption and identification.

Four types of educative interest were distinguished by Dewey (1913, 1916): physical, constructive, intellectual and social interest. In discussing these types, Dewey (1913) emphasised the need to conceptualise activity in sufficient breadth, especially to enable realisation of the meaning and significance of what is being done. He related the appropriateness of the kinds of activity to children’s ages, individual differences, prior knowledge and social opportunities. Growth from finding meaning in physical and constructive interests, involving the senses and opportunities for hands-on interaction and discovery with concrete tools and materials in particular situations, was importantly distinguished from distinctively intellectual interests, which are more thoughtful, abstract, complicated and imaginative. Intellectual interest is present in physical and constructive activity, however Dewey (1913) made the distinction that intellectual, or theoretical, interest has a focus on action for the sake of finding out something, rather than in contributing to successfully doing something. Intellectual interests usually have a more remote end point, in terms of the need to engage in the activity for a longer time period (Dewey, 1913). It also is important to emphasise, however, that Dewey (1913) regarded interest and play as being important in physical, constructive and intellectual interest, where play is defined as ‘whole-hearted identification with what one is doing’ (p. 80). Finally, social interest, or interest in other people, was considered by Dewey (1913) as an especially strong and special interest that is intertwined with and permeates physical, constructive and intellectual interests.

The processes by which interest emerges were conceptualised by Dewey (1913) as being direct or indirect (mediated). Direct interest arises when the present activity satisfies in and of itself, and there is no gap between the means and the end and the action is immediate. Play was considered by Dewey (1913) to be of this type, where the object engrosses the child in terms of the value that is directly present. In contrast, the child experiences indirect or mediated interest when things to which s/he
was previously indifferent become interesting because of an awareness of relationships and connections. Dewey (1913) provided the example of a child learning a musical instrument. A fingering technique, in which the child is not interested when presented as an end in itself, becomes of interest when it enables the child to successfully play a favourite piece. A developing child is able to see and appreciate an act, thing or fact as part of a larger whole (Dewey, 1913). Dewey (1913) claimed that in this indirect process, there is a genuine case for ‘making things interesting’ that is not the same as teachers who problematically select subject matter then subsequently try to make this interesting to students. The development of children’s indirect interest is considered to be a sign of involvement in increasingly complex activities, for which there are more distant end goals and therefore a longer period of time of engagement in the steps within the process.

The potential for continuity of activity and development over time were important to understanding interest, in terms of its creation, maintenance and growth. Dewey (1913) considered agency and self-development, or self-expression, as being critical factors in such contexts of indirect interest. Emphasis is placed on the richness of interest and the importance of the value of steps in a process in their own right, rather than simply because they are significant in achieving the end (Dewey, 1913). Obstacles met in the process may contribute to the meaningfulness of the steps, invigorating the effort placed in achieving the end (Dewey, 1913). Thus, rather than obstacles or problems decreasing interest, a child can be motivated to understand the activity in new ways that are challenging and that energise its completion. ‘It is not too much to say that a normal person demands a certain amount of difficulty to surmount in order that he (sic) may have a full and vivid sense of what he is about, and hence have a lively interest in what he is doing’ (Dewey, 1913, p. 52).

Identification and absorption were two important aspects of Dewey’s conception of interest. To Dewey (1913), ‘genuine’ or ‘true’ interests were ‘signs that some material, object, mode of skill (or whatever) is appreciated on the basis of what it actually does in carrying to fulfillment some mode of action in which the person has identified himself (sic)’ (p. 44). Dewey thus recognised interest as a dynamic and propulsive state based on the pleasure of a course of action in which one identifies. He emphasised the place of interest in the maintenance of an enduring activity that develops over time. He also acknowledged the interactive relationship between the
individual and aspects of the environment in the creation of interest. ‘We say of an interested person that he (sic) has lost himself in some affair and that he has found himself in it. Both terms express the engrossment of the self in an object’ (Dewey, 1916, p. 126) and the way in which the object becomes valued in a way that absorbs and contributes to the identity of the person. The happiness that accompanies such absorption in what is being done was claimed by Dewey (1913) to be a sign of developing power, through an interest that is not self-conscious or selfish. Interestingly, Dewey (1916) observed children’s ‘real’ play as indicated by an attitude of ‘serious absorption’, brought about by stimulating situations and reflective of their social interest.

2.2.2 Interest development in social contexts: Dynamic transactions between individuals and situations

The attitudes of an individual were considered by Dewey (1916) to be always in response to other factors of the situation of which they were a part, in connection with the environment and social context.

Our desires, emotions, and affections are but various ways in which our doings are tied up with the doings of things and persons about us. Instead of marking a purely personal or subjective realm, separated from the objective and impersonal, they indicate the non-existence of such a separate world. They afford convincing evidence that changes in things are not alien to the activities of a self, and that the career and welfare of the self are bound up with the movement of persons and things. Interest, concern, mean that self and world are engaged with each other in a developing situation. (Dewey, 1916, pp. 125-126)

Thus, the development of the individual, or self, and the situation, comprising both other people and ‘things’, were not seen to be distinct or separate but dynamically interrelated in their activity. The emergence of interest thus is recognised in the engagement of the individual and the environment, more specifically within a situation that is developing through mutual actions. In considering developing interest, Dewey (1913, 1916) placed emphasis on interest as a form of self-expression, created in the context of successful participation in activities that develop over time. Particular focus
was given to interest development in school contexts and the context of human interaction in situations such as play.

Interest was regarded primarily by Dewey (1913) as a developmental form of self-expression. It therefore varies with age, prior experiences, social opportunities and ‘individual native endowments’ (Dewey, 1913, p. 67). This introduces the notion of children outgrowing interests and, as Dewey acknowledged, the importance of the timing of the introduction of certain activities and of increasing specialisation. Differences between opportunities for the development of interest also were important in Dewey’s consideration of the construct, with recognition of the varying social contexts in which people develop and the ‘natural’ talents of individuals. There is thus acknowledgment of the transactions that take place between the individual and the social environment for interest to develop. It is through experiencing pleasure through successful achievement, mastery and progress in the context of absorption in the activity that ‘legitimate’ interest emerges (Dewey, 1913). The pleasure cannot be separated from the activity (Dewey, 1913), which implies that the interest cannot be either.

The development of interest is contributed to by success for both children and adults (Dewey, 1913). If an activity can be approached with confidence, a sense of accomplishment and success, there is an associated sense of happiness and interest that signals developing power and absorption in the task (Dewey, 1913). According to Dewey, it is the emotional aspect of interest that brings pleasure, through engaging in activities that are increasingly complex, of importance and personal to the individual. This results in a sense of fulfillment, personal satisfaction and well-being. As Dewey (1913) claimed, ‘Interest, in the emotional sense of the word, is the evidence of the way in which the self is engaged, occupied, taken up with, concerned in, absorbed by, carried away by, this objective subject-matter’ (p. 90). He asserted that the nature of the interest depends on the objects that carry activities forward or that mark the achievement of an activity. Dewey (1913) considered an interest as an activity that moves towards an end, with meaning in the process as an important factor in the development of such an activity. Interest is created in both the process, or means, and in the end. In ‘normal growth’, Dewey (1913) claimed that interest in the means is not externally tied on to interest in the end; ‘it suffuses, saturates and thus transforms it. It
interprets or revalues it – gives it a new significance’ (p. 25). Again, the connectedness and meaning of the activity is emphasised in this statement. The developing interest in the process of the activity cannot be separated from the activity itself.

The development of activities also was important to Dewey’s notion of interest. He placed emphasis on the importance of the process, or means, in giving significance, value and meaning to the end (Dewey, 1913). Rather than considering activities as discrete entities, he acknowledged their interconnectedness and the ways in which one activity develops into the next. He associated interest with the development of activity and happiness (Dewey, 1913), emphasising that the development of interests takes time. Participating in an enduring activity enables interest to grow, change, evolve and gain significance in the course of action (Dewey, 1913).

Interest development in the context of school education and the relationship of the individual child to the learning material were discussed by Dewey (1913, 1916). He considered it problematic that teachers think that they can make things interesting and fail to capitalise on the activities in which the child is already engaged. Dewey (1913) indicated that rather than trying to create interest by adding seductive features or extraneous inducements to material to which children are otherwise indifferent, teachers need to locate objects and actions which are relevant to the normal activities of the children and thus give purpose and spirit to learning.

The function of this material in engaging activity and carrying it on consistently and continuously is its interest. If the material operates in this way, there is no call either to hunt for devices which will make it interesting or to appeal to arbitrary, semi-coerced effort. (Dewey, 1916, p. 127)

Connections and purpose need to be perceived amongst a child’s present activities, their capabilities and the material for it to be of interest. To Dewey (1916), interest was therefore the intermediary necessary for children to develop ‘existing activities into the foreseen and desired end’ (p. 127), with relevance of material selected by the teacher for the child as a central component. In order for connections to be made with what a child already values as significant, new topics and information need to be presented in
ways that relate to that child’s existing experience, knowledge and skills (Dewey, 1913).

The mistake lies in treating these existing activities as if they had reached their limit of growth; as if they were satisfactory in their present shape or simply something to be excited; or else just unsatisfactory and something to be repressed. (Dewey, 1913, p. 35)

Dewey was writing about children’s interest in school work almost one hundred years ago, at a time when universal, compulsory education had recently been introduced in the United States. His claim, however, that ‘Good teaching, the teaching of the future, will make school life vital to youth’ (Dewey, 1913, p. vii) appears equally relevant to the early 21st century.

The human context of interest development also was discussed by Dewey (1913). Identification with other people, as well as objects, as part of activity was an important characteristic of Dewey’s (1913) conceptualisation of interest. He argued that children need to see other people’s interest and action with things. These things can then become of interest, and thus regarded with thought, effort and desire, rather than matters of indifference to them (Dewey, 1913). As a result of children’s continuous contact with other people and the ways in which the activities of others deeply affects them, Dewey (1913) regarded children as more likely to be social in their interest than adults. He considered children’s activities to be so embedded in the social that the boundary between the individual and social activity is rarely considered by children, as is evident from their play. Accordingly, Dewey (1913) considered that interest in things emerges from our interest in people, such that a social interest is a way of broadening our activities and the self. This human context thus is vital for the development of interest, with interest as a sign of the union of the person, materials and the results of action (Dewey, 1913).

2.2.3 Conclusion

Almost a century later, Dewey’s conception of interest has significant implications for re-theorising interest as a motivational construct. Emphasis was placed by Dewey (1913) on interest being active, involving the individual in action; objective, in
that it attaches itself to an object that carries activity forward or marks the fulfillment of activity; and personal or emotional, in that the outcome is of importance and satisfaction to the individual, and associated with pleasure (Dewey, 1913). Dewey clearly conceptualised the dynamic interconnectedness of the individual person, objects and other people in specific meaningful contexts in which there was valuing of action, leading to the development and maintenance of interest. Identification of the self and the object of interest was regarded by Dewey (1913) as vital to self-development and self-expression, through the individual’s engagement in an activity or pursuit that has the potential to grow over time. Difficulties or problems encountered as an individual completes steps in an ongoing activity can contribute positively to interest development, rather than impeding it. Importantly, Dewey (1913) regarded children’s interest in things as emerging from their interest in people, thus emphasising the social context of interest development.

2.3 SITUATIONAL AND INDIVIDUAL INTEREST: A MORE RECENT CONCEPTUALISATION

For several decades following Dewey’s writings, interest received limited attention in the educational psychology literature. Behaviourist and cognitive approaches largely ignored constructs such as interest as motivators for learning (Hidi, 2006; Hidi, et al., 2004; Schraw, Flowerday, & Lehman, 2001). It was not until the late 20th century that there was renewed consideration of the role of interest, and emotion more widely, in motivational research (for example, Boekaerts & Boscolo, 2002; Hidi & Baird, 1986; Hoffmann, Krapp, Renninger, & Baumert, 1998; Krapp, et al., 1992; Schiefele, 1991; Tobias, 1994). Hidi (2006) considers interest as both a unique motivational variable, that links affective and cognitive components of motivation, and a psychological state characterised by increased attention, concentration and affect. It is the inherent emotional component that sets interest apart from other motivation constructs which are more cognitively oriented, such as goals and self-efficacy, and for which affect is regarded more as an outcome of cognitive processing (Hidi, 2006). As such, interest represents an integration of affect, motivation and cognition (Ainley, 2006). Recent research has presented interest as emerging from the interaction of an individual with objects of interest in his or her environment (Hidi, 2006; Hidi & Renninger, 2006; Krapp, 2002). Interest, therefore, has been conceptualised as comprising distinct situational and individual aspects that are used to identify and
measure interest (Hidi & Renninger, 2006), with differing significance assigned by researchers to the two components (Hidi & Berndorff, 1998).

2.3.1 Conceptualising interest as situational and individual: Definitions

The distinction between two broad conceptions of interest, situational and individual interest, has been made by Schiefele (1991), Krapp et al (1992), Schraw and Lehman (2001), Hidi and Renninger (2006) and many other motivational researchers. This conceptualisation is the basis for the majority of empirical studies of interest, both explicitly (for example, Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Hoffmann, et al., 1998; Mitchell, 1993; Schiefele & Krapp, 1996) and more implicitly (for example, Anderson, Shirey, Wilson, & Fielding, 1987; Wade, Schraw, Buxton, & Hayes, 1993).

Situational interest has been defined as ‘an emotional state brought about by situational stimuli’ (Schiefele, 1991, p. 302) and has an external locus, or is activated by the learning environment (Schraw, et al, 2001). This form of interest also is referred to as interestingness (Frick, 1992) and is the basis of approaches to studying interest that aim to identify features of a specific context that arouse and capture interest. It tends to be more short-lived and superficial than individual interest (P. A. Alexander & Jetton, 1996) and is generally aroused by specific features of an activity or task (Schiefele, 1998). Two aspects of situational interest, catch and hold factors, have been identified (Dewey, 1913; Hidi et al, 2004; Mitchell, 1993). Catch factors trigger interest by stimulating students in various but more temporary and emotional ways (Hidi, 2006). Hold factors maintain interest over time by empowering students through meaningful and involving activities (Mitchell, 1993). Distinction between cognitive and emotional interest also has been made by researchers of situational interest (Harp & Mayer, 1997), and it is the momentary affective reaction triggered by the situation that characterises this type of interest (Hidi & Renninger, 2006). Hidi and Harackiewicz (2000) and Ainley (2006) acknowledge that situational interest may involve negative affect as well as positive affect. Situational interest does not necessarily involve a high level of content knowledge (Renninger, 2000), as knowledge can be either high or low for a person with situational interest. In relation to classroom contexts, Bergin (1999)
has claimed that situational interest can be manipulated by educators over the short term, which is not the case for individual interest.

Individual interest has been conceptualised as ‘a continually evolving relation of a person and particular subject content’ (Renninger, 2000, p. 375). It is defined as ‘a relatively stable evaluative orientation towards certain domains’ (Schiefele, 1998, p. 93) or towards particular classes of objects, events or ideas (Krapp, Renninger, & Hoffmann, 1998). Individual interests have personal significance and are usually associated with high levels of knowledge and value, positive emotions and increased reference value (Krapp, et al., 1992; Renninger, 2000). In this conceptualisation, individual interest develops and remains a stable and enduring factor in one’s learning over an extended period of time, resulting in an individual continuing to reengage with particular content (Hidi & Renninger, 2006). It may be considered pre-dispositional and internally oriented (P. A. Alexander & Jetton, 1996; Bergin, 1999; Hidi & Renninger, 2006; Krapp, et al., 1992; Krapp, et al., 1998; Renninger, 2000), as a motivational belief and as a component of the developing self (Krapp, et al., 1998). Renninger (2000) emphasises that individual interest is both a ‘somewhat idiosyncratic psychological state of being interested and also a process of internalization through which a person comes to identify and be identified with the content’ (p. 375). In this personal context, Frick (1992) has used the term interestedness to distinguish individual interest that can be identified prior to the outcome of a learning event from situational interest, or interestingness, which is a feeling related to the particular outcome of that learning event. Renninger (2000) incorporates stored knowledge and stored value as components of individual interest, while Schiefele (1991, 1998) considers individual interest as both a latent and an actualised characteristic. The latent characteristic is further divided into feeling-related valences, which are feelings associated with a topic or object, and value-related valences, which involve the attribution of personal significance to an object. It is the actualised, or active, form of individual interest, however, that is accessible in studying children in classroom participation (Ainley, 2001), as latent interest can only be retrospectively inferred from what is observable in action. Although differing slightly in emphasis, both Renninger’s and Schiefele’s conceptualisations of individual interest consider the value or personal meaning of a subject or object as a defining feature of such interest. Individual interests appear to be more, rather than less, stable in children, although children are also always in the process of consolidating, merging and developing new interests (Fink, 1995; Renninger, 1998, 2000). In writing about the nature of individual interest,
Renninger (2000) emphasised that the specific character of an individual interest will always be different between individuals who appear to have similar contents of interest. The specific character of an individual interest is influenced by the curiosity questions generated by an individual, along with their current knowledge, sense of possible selves and feelings of competence, as well as the support from and interaction with others and the nature of the tasks in which they engage (Renninger, 2000).

Ainley, Hidi and Berndorff (2002) have distinguished a third type of interest, *topic* interest, which is defined as ‘the level of interest triggered when a specific topic is presented’ (p. 545). Although an early study by Schiefele and Krapp (1996) equated topic interest with individual interest, Ainley et al (2002) have identified this type of interest as having both individual and situational aspects, but argue that it can be differentiated from either individual or situational interest. Krapp (2006) has since further clarified that topic interest has been used in empirical studies to refer to both a short term situational interest, or to an individual interest in relation to a longer term willingness to engage with a certain thematic area. Thus, this type of interest can be considered as based on the situational-individual distinction. Topic interest has been studied empirically in the context of text-based learning (for example, Ainley, Hillman, & Hidi, 2002; Schiefele, 1998; Schiefele & Krapp, 1996).

The majority of empirical studies of interest have tended to focus on either situational or individual interest. Relatively few studies have considered interaction between the types of interest within the same research (Ainley, Hidi, et al., 2002), although this is increasingly emerging as a focus in interest research following the Four Phase Model of Interest Development proposed by Hidi and Renninger (2006). The Four Phase Model brings together conceptualisations of situational interest and individual interest as each comprising two phases: a trigger phase and a maintenance phase for situational interest, and an emerging phase and a well-developed phase for individual interest. This model is considered further later in the present chapter (section 2.4). In reviewing empirical studies of interest in the sections that immediately follow, I give consideration to the specific research contexts, the types of research and measures used, and the learning outcomes and variables studied that relate to situational and individual interest respectively. These aspects of studies are highlighted in discussing the strengths and limitations of this previous research.
2.3.2 Studies of situational interest

The studies of situational interest researchers generally fall into three broad categories: text-based, knowledge-based and task-based interest (Schraw & Lehman, 2001). The aspects or properties of a text that affect interest, such as vividness and seductive details, have been the focus of text-based interest researchers. Researchers of knowledge-based interest have considered the way that prior knowledge impacts on situational interest, usually in the context of text-based tasks. Task-based interest researchers have focused on participants' goals or approaches to an activity by changing features of the task, to impact on the way the task is perceived. Consideration of situational interest in relation to text-based interest, including knowledge-based interest, and task-based interest provides the structure for this subsection of the chapter.

2.3.2.1 Text-based interest

A significant amount of research into the relationship between interest and learning is in the context of text-based learning. Research relating to text-based learning was the area in which the re-emergence of interest as a focus of study in educational psychology initially occurred in the last two decades of the 20th century (Hidi, et al., 2004). As Renninger and Wade (2001) have documented, empirical research has established that students' interest is associated with or influences various aspects of literacy. Studies of situational interest and text-based learning have focused on how interest elicited by text segments, topics and themes have contributed to increased comprehension and learning (Hidi, 2001). Prior subject matter knowledge and how it impacts upon text processing (P. A. Alexander, 2004; P. A. Alexander & Jetton, 1996; Schiefele, 1996; Schiefele & Krapp, 1996) also have been considered in situational interest research focused on learning from text.
Research contexts

Most studies of text-based interest have been undertaken in settings designed specifically for the purposes of the research with relatively large sample sizes. Participants mainly have been tertiary students in colleges and universities (Dai & Wang, 2007; Harp & Mayer, 1997; Schiefele & Krapp, 1996; Schraw, 1997; Wade, et al., 1993), with very few studies involving children of primary school age (de Sousa & Oakhill, 1996). The focus text types have included narratives (for example, Schraw, 1997; Dai & Wang, 2007) and factual texts (for example, Harp & Mayer, 1997; Dai & Wang, 2007).

Types of research and measures used

Text-based interest research has been dominated by experimental (for example, de Sousa & Oakhill, 1996; Harp & Mayer, 1997) and correlational studies (for example, Schraw, 1997; Dai & Wang, 2007). Both types of studies usually have been conducted over a short time frame, sometimes in a single session of data collection which may be as short in duration as one hour (Schraw, 1997). In both experimental and correlational studies, interest usually has been measured using self-report interest questionnaires (for example, Schraw, 1997) completed before and/or after the reading task, with questionnaires also commonly used to assess text comprehension. Typically, the research methods employed result in the collection of data that can be quantified and statistical analyses have been used in nearly all studies of text-based interest.

Learning outcomes and variables studied that relate to interest

A number of studies have established the features of text that contribute to enhancing situational interest. Schraw, Flowerday and Lehman (2001) cited research, including the correlational study conducted by Schraw (1997), that demonstrates that situational interest increases when there is coherence in text, identification with characters, suspense, and concreteness and imageability of salient text segments. Additionally, Anderson et al (1987) found that novelty, inclusion of life themes and material that depicts intense action or feeling increased situational interest in sentences. Hidi and Harackiewicz (2000) also reported that changes to certain aspects of the learning environment can promote text-based interest. Task presentation, teaching materials and variations in individuals’ self-regulation were all found to impact
upon text-based interest (Hidi & Harackiewicz, 2000). For example, educational materials presented in more meaningful, challenging and/or personally relevant contexts were shown to stimulate interest (Hidi, 2001).

Positive learning outcomes associated with high situational interest in text-processing research (Ainley, Corrigan, & Richardson, 2005; P. A. Alexander & Jetton, 1996; Anderson, et al., 1987; Hidi, 2001; Hidi, Renninger, & Krapp, 1992; Krapp, et al., 1992; Schiefele, 1991; Schiefele & Krapp, 1996; Tobias, 1994; Wade, 2001; Wade, et al., 1993) are summarised in Table 2.1. Hidi (2001) has reviewed research suggesting that attention may be a variable that mediates the relation between interest and learning. The research of de Sousa and Oakhill (1996) has further elaborated the nature of the relationship between level of interest and primary students’ comprehension monitoring. De Sousa and Oakhill (1996) found that good comprehenders performed well on both a high interest and low interest reading task, whereas poor comprehenders showed significant improvements on the high interest task. They suggested that learning in contexts of high interest may be particularly important in improving the comprehension monitoring skills of weaker readers (de Sousa & Oakhill, 1996).

The inclusion of seductive details, which are interesting but unimportant or irrelevant information added to text, has emerged as a focus of a body of text-based interest research. Seductive details have been found to be recalled better than important but uninteresting information (Wade, et al., 1993). Wade et al (1993) have suggested that information that is emotionally interesting to readers is able to be processed more quickly but that it also causes readers to spend more time attending to it in ways that are qualitatively different to more important details in factual texts. P.A. Alexander and Jetton (1996), however, distinguished between narratives and factual or expository texts. Narrative texts differ from factual texts because structurally important elements are usually more recognisable and they are not intended to contribute to subject matter knowledge, requiring less hierarchical and domain specific knowledge for processing (P. A. Alexander & Jetton, 1996). P.A. Alexander and Jetton (1996) further emphasised the importance of reader prior knowledge when considering text-based interest and seductive details. They cited research which found that young adult readers who came to a physics text with high prior knowledge were more likely to recall more of the important scientific information as well as the seductive details. High
Table 2.1  
*Summary of research findings from studies of interest and text-processing*

<table>
<thead>
<tr>
<th>High levels of interest in text-based learning contexts influences:</th>
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<tr>
<td>recall patterns</td>
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<tr>
<td>deeper comprehension and processing or improved quality of learning</td>
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<tr>
<td>elaboration</td>
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<td>involvement</td>
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<tr>
<td>concentration</td>
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<tr>
<td>attention to important content</td>
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<td>higher levels of arousal</td>
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<td>enjoyment</td>
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<td>visual imagery</td>
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<td>information-seeking strategies</td>
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<td>use of effortful strategies</td>
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<td>critical thinking</td>
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<tr>
<td>persistence</td>
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<td>further participation</td>
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<td>increased self-regulation</td>
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knowledge individuals recalled more of the important information, however, when a version of the text excluding personally-involving information was presented to them.

In their reviews of studies relating to knowledge-based interest, Tobias (1994) and P.A. Alexander (2004) each have drawn conclusions that highlight the relationships between interest and knowledge. Tobias (1994) proposed a quadrant model of the interest-prior knowledge relationship, with both variables divided into high and low categories. He emphasised that there was a continuous linear relationship between low and high interest, and low and high prior knowledge. While people who fall into the categories of low interest-low knowledge and high interest-high knowledge Tobias claimed could be easily understood, the other two categories were expected to be more transitory; high interest-low knowledge individuals develop their knowledge if their interest is maintained and thus move into the high interest-high knowledge category, whereas low interest-high knowledge individuals do not renew or update their knowledge over time, so that they come to be characterised as low interest-low knowledge. P.A. Alexander (2004) concluded her review by highlighting that the nature of the relationship between knowledge and interest is dependant on the type of knowledge and the form of interest being measured. While individual interest was positively associated with domain or topic knowledge, relationships between knowledge and situational interest in text-based learning contexts were less clear because of inconsistencies in measurement and problematic research design. In another review of interest research, Hidi et al (2004) concluded that knowledge alone does not increase text-based situational interest and learning, citing previous research that had found that prior knowledge ratings were only marginally related to perceived interest.

Conclusion: Text-based interest

Studies of text-based interest have identified aspects of texts and text-based learning environments which increase situational interest. Research in this area also has established relationships between high levels of situational interest and positive learning outcomes, particularly for secondary and tertiary students. A limitation of the existing body of literature is the contrived nature of the research contexts, particularly in relation to tertiary students who elect to participate in exchange for course credit points (for example, Schraw, 1997; Harp & Mayer, 1997), and the specific focus upon learning
from isolated segments of text. Many empirical studies of text-based interest involve participants in a short-lived activity focused on a discrete passage of text, in a context removed from the on-going social and cultural activities in which those people regularly participate. As a result, there are few opportunities within the context for developing genuine interest in the task (Dewey, 1913). To address this existing limitation, future research should focus on text segments from novels, magazine or online articles or non-fiction books that have been read in their entirety by participants. Such texts should be mandatory readings that are part of the school or tertiary curriculum that the students engage with in an on-going way, as part of their everyday learning. An alternative would be to conduct a study in relation to the novels or materials read by participants in a book club or reading circle. In this way, the findings from previous studies reviewed here could be examined in more authentic contexts.

Clarification of the complex relationships among prior knowledge, interest and learning is another area for future research. Recent empirical studies with this specific focus are difficult to locate, although there have been studies in which measures of prior knowledge have been incorporated (for example, Del Favero, Boscolo, Vidotto, & Vincentini, 2007). Wade (2001) also pointed to the need to clearly articulate and develop new ways of conceptualising and measuring interest, importance and prior knowledge in this aspect of interest research, a concern shared by P.A. Alexander (2004).

2.3.2.2 Task-based interest

Researchers also have considered the relationship between task characteristics and situational interest in a range of domains, including mathematics (Mitchell, 1993), science (Blumenfeld, Puro, & Mergendoller, 1992; Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998) and physical activities (Chen, Darst, & Pangrazi, 2001), as well as interesting features of class lessons broadly (Askell-Williams & Lawson, 2001). Collectively, studies of task-based interest have identified aspects of specific tasks and learning environments more broadly, within and across particular domains, which can be incorporated in the design of learning materials and activities to promote student interest.
Research contexts

Studies of task-based interest have been conducted in middle school classrooms (Chen, et al., 2001; Askell-Williams & Lawson, 2001), secondary schools (Mitchell, 1993; Blumenfeld, et al., 1992; Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998) and tertiary settings (Sansone, Wiebe, & Morgan, 1999). Most of the studies have been conducted in authentic classroom contexts (Askell-Williams & Lawson, 2001; Blumenfeld, et al., 1992; Mitchell, 1993), with some research involving an intervention that involved collaboration with classroom teachers in its design and implementation (Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998). In contrast, the research contexts created by Sansone et al (1999) and Chen et al (2001) were specific to the purposes of the research. While the majority of tasks were cognitive, Chen et al (2001) focused on physical activities involving basketball and gymnastics skills in their research.

Types of research and measures used

Experimental design has been used by Hoffmann and colleagues (Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998) as well as Sansone et al (1999). Hoffmann and colleagues, for example, conducted a quasi-experimental intervention project in junior high schools to create a learning environment designed to foster the development and maintenance of students’ interest. The intervention is notable, as it was designed collaboratively by the researchers and the teachers engaged in the project, and involved new curriculum, part-time single-sex teaching and a focus on improving classroom interaction. Hoffmann and colleagues used questionnaires and achievement tests to evaluate the effectiveness of the intervention.

Correlational studies (Chen, et al., 2001; Askell-Williams & Lawson, 2001) also have been conducted to investigate situational task-based interest for middle school students. In one such study, Askell-Williams and Lawson (2001) asked participants to nominate the features of interesting class lessons across all school subjects. Using a writing task, the researchers sought to identify meaningful clusters of student generated statements, reducing the data to enable use of cluster analysis to create an elaborated dendogram, and multidimensional scaling. In another study, Chen et al (2001) examined a theoretical model of situational interest and its sources. Students completed a situational interest scale consisting of Likert type items after engaging in
videotaped or participatory physical education activities in a 20 to 30 minute lesson. Correlation and regression analyses and path analyses then were applied to identify relationships between situational interest and its sources, and potential mediating variables.

In one of the first mixed method studies in this literature, Mitchell (1993) explored interest in authentic classroom activity in secondary mathematics. He devised an open-ended questionnaire which was used in conjunction with focus group sessions to identify interesting and boring aspects of students’ experiences in their every day mathematics lessons. The data gathered were then qualitatively analysed and a hypothetical model of situational interest was proposed, based on catch and hold facets of secondary mathematics classes. The final stage of the research represented the core of the study, and involved the development of an interest survey which tested the hypothetical model previously developed from the qualitative data. The data from this survey were analysed quantitatively, using factor and correlational analyses, to assess the tenability of the structure of the multifaceted model proposed.

*Learning outcomes and variables studied that relate to interest*

One of the main contributions that studies of task-based interest, by definition, have made to the literature is in identifying attributes of tasks that build on and contribute to developing students’ interest. As Blumenfeld et al (1992) concluded, this can be achieved in one of two ways: 'bringing the lesson to the students' and 'bringing the students to the lesson' (Blumenfeld, et al., 1992, p. 234). Successful teachers employ both approaches, which involves 'providing opportunities to learn and enhancing interest and value', ('bringing the lesson to the students'), and 'requiring students to think about the material and support their efforts to accomplish this' ('bringing the students to the lesson') (Blumenfeld, et al., 1992, p. 234).

Studies of task-based interest also have identified specific task attributes in different subject domains that contribute to generating students’ interest. In Hoffmann’s (2000, 2002) instructional interventions in science classrooms, the program included opportunities to marvel, links to prior experiences, first-hand experiences, discussions and reflections on the social importance of science, contexts that are application-
oriented and references to the human body. By orienting instruction to students’ general interest in physical matters, Hoffmann (2000, 2002) found that learning processes were supported, higher achievement resulted and knowledge was greater and longer lasting. Hoffmann (2002) also concluded that orienting instruction to promote students’ interest was particularly important for girls, who need support to develop a positive physics-related self-concept, in order to develop a general interest in physics and higher levels of achievement in the subject. Mitchell (1993) focused on the notions of catching and holding interest (Dewey, 1913). In his study of mathematics lessons, Mitchell (1993) identified group work, computers and puzzles as novel tasks that could spark or temporarily stimulate students’ interest, while meaningfulness and involvement contributed to maintaining it by empowering the students. Involvement stood out as the facet with the strongest relationship with overall situational interest (Mitchell, 1993). Finally, in their study of physical activities, Chen et al (2001) identified instant enjoyment as having a mediating effect on other sources of task-based situational interest. This finding suggests that instant enjoyment derives from novelty, exploration intention, and attention demand of an activity, which leads to situational interest. Interestingly, challenge contributed little to situational interest in physical activities. Chen et al’s (2001) findings support the notion that interest and enjoyment are related, but separate, motivators and that ‘instant enjoyment is not a product from engagement in an activity but a process by itself during which a sense of becoming interested can be generated’ (Chen, et al., 2001, p. 396).

Another important outcome of studies of task-based interest has been the focus on social contexts and the relationships between participants when learning. Dewey (1913) earlier identified children as having an inherent interest in people, and this has been evident in more recent studies. Mitchell (1993), for example, highlighted group work as contributing to catching students’ interest, while Hoffmann and colleagues (Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998) stressed the need to emphasise the social importance of the content of students’ learning. Furthermore, Askell-Williams and Lawson (2001) identified two dimensions of task-based interest in their study: a student-teacher continuum, with student thoughts and behaviours at one end and teacher observed behaviours and personal qualities at the other. The second dimension was interpreted as an individual-social learning continuum, with students’ thoughts about their own learning at one end, and collaborative student activities at the other. Askell-Williams and Lawson (2001) concluded that middle school students in
their study associated interest in class lessons with teachers’ personalities and professional competence, collaborative learning activities and social learning situations.

Self variables also have been considered in relation to task-based interest. Sansone et al (1999) approached the study of task interest from a different angle by focusing on students’ processes of interest self-regulation during a boring activity. They found that students with high hardiness were more likely to copy more letters when they were given the information about the benefits of the boring task, an effect mediated by their attempts to use strategies to make the task more interesting. Highly conscientious individuals persisted longer than those with low conscientiousness. The development of self-efficacy and individual learning achievement were associated with interest by middle school students in the study conducted by Askell-Williams and Lawson (2001).

Conclusion: Task-based interest

Experimental and correlational research designs have dominated studies of situational task-based interest, involving quantitative analysis of data and consideration of interest over relatively short periods of time. Participants in such studies mostly have been adolescent and young adult students, and future research should be extended to investigate younger children’s task-based interest. Future research design should incorporate the collection and analysis of qualitative data in either mixed method or qualitative studies, to extend the types of understandings about this form of situational interest. As Dewey (1913) identified, interest develops in relation to interconnected activities, which also should inform the design of future research projects in this area to a greater extent. A number of studies were conducted in authentic classroom environments, and notably, Hoffmann and colleagues (Hoffmann, 2000, 2002; Hoffmann & Haussler, 1998) worked with classroom teachers to design and implement interventions aimed at promoting students’ interest. Conducting research in authentic settings enabled a number of researchers to highlight the role of the teacher, and more specifically the relationship between the teacher and students, in contributing to students’ interest in learning.
Mitchell’s (1993) study makes a unique contribution to the situational interest literature through his concern with developing a model of interest based on a consideration of theory and previous interest research. He defined situational interest as ‘an interest that people acquire by participating in an environment or context’ (p. 425). As such, Mitchell’s definition more closely approximates Dewey’s earlier conception of interest. Interaction between that individual and the environment, which comprises objects, activities and other people, is a central feature of situational interest as defined by Mitchell (1993), through meaningful participation in that environment. This concern for participation in an authentic context and also for students’ perceptions of interest was reflected in Mitchell’s development of both his measurement instruments and subsequently his model of interest.

### 2.3.2.3 Conclusions about studies of situational interest

Schraw, Flowerday and Lehman (2001) have highlighted three variables which impact upon students’ experiences of increased situational interest: meaningful classroom choices; coherence, relevance and vividness in written texts; and increased prior knowledge. Hidi and Berndorff (1998) and Schraw and Lehman (2001) have summarised the learning outcomes most frequently associated with situational interest. In educational settings, Hidi and colleagues (Hidi & Anderson, 1992; Hidi & Berndorff, 1998) have argued that research findings related to situational interest can be easily incorporated into teachers’ curriculum design, especially when working with students in large class groups.

Reflective of the way in which situational interest is defined, empirical studies of this aspect of interest broadly have focused on the relationships between features of learning tasks or environments that elicit interest across groups of people, and how evoking such interest may improve students’ learning outcomes (Hidi & Berndorff, 1998). Research into situational interest has typically been quantitative, with many experimental and correlational studies conducted in contexts designed specifically for the purposes of the research. The studies usually have been short-lived, often presenting the participants with isolated activities which do not have the potential to continue or grow over time (Dewey, 1913). Such research requiring experimental control appears to be at odds with Dewey’s (1913) notion of the emergence of interest
as developing through the mutual actions of the individual and the situation, as there is an inauthenticity inherent in the research context. It brings into question whether ‘genuine’ interests, as defined by Dewey (1913), can be studied in experimental research.

Situational interest research has, however, established aspects of learning tasks and environments that promote situational interest, with pedagogical implications that can be drawn for future investigations in authentic contexts. P.A. Alexander and Jetton (1996) have noted the lack of studies with young children and studies in authentic classroom contexts, specifically in relation to research into importance and interest in text-learning environments. Within the research reviewed, these limitations are evident in situational interest research more generally. Jetton and P.A. Alexander (2001) also identified the need for research that focuses on the role of the teacher in facilitating the development of children’s interest.

Where quantitative research has dominated studies of situational interest to date, researchers investigating individual interest have taken a more varied approach, with the inclusion of a greater number of qualitative studies. Such research is highlighted in the section of the chapter that follows.

2.3.3 Studies of individual interest

Krapp, Renninger and Hoffmann (1998) have made the distinction between two types of questions posed by researchers of individual interest. The first type of question concerns ‘the function and effects of interest on learning and development’ (p. 457), and focuses on the outcomes and specific effects of interest. The second type of question addresses conditions or processes of interest, and as such is characterised by greater complexity in considering issues such as the role of interest in human development. They have further distinguished individual interest research according to three common bases or traditions: interest as habitual preference (or attitude, disposition and/or trait); interest as a motivational belief; and interest as a component of the developing self (Krapp, et al., 1998).
2.3.3.1 Research contexts

Individual interests have been investigated across the lifespan, with research studies focused on the emergence of interest in early childhood (J. M. Alexander, Johnson, Leibham, & Kelley, 2008; DeLoache, Simcock, & Macari, 2007; Johnson, Alexander, Spencer, Leibham, & Neitzel, 2004; Leibham, Alexander, Johnson, Neitzel, & Reis-Henrie, 2005; Renninger & Leckrone, 1991), students’ engagement in school-based learning (Ainley, 2001; Elsworth, Ainley, & Ho, 1999; Lipstein & Renninger, 2006; McPhail, Pierson, Freeman, Goodman, & Ayappa, 2000; Renninger, Ewen, & Lashier, 2002) and vocational education choices (Athanasou, 1998; Prenzel, 1998). Renninger and her colleagues have investigated individual interest in out-of-school education contexts including online communities of teachers (Renninger & Shumar, 2003) and holiday workshops (Renninger, Bachrach, & Posey, 2008). Research contexts related to individual interest also have considered atypical learners. Katz and Renninger (2007) studied the nature of interest of young adults with Asperger’s Syndrome, while Fink (1995) investigated the role of individual interest in dyslexic adults’ success in learning to read.

2.3.3.2 Types of research and measures used

While experimental studies (for example, Renninger, 1998) and correlational studies (for example, Hoffmann, et al., 1998) of individual interest have been conducted using similar measures to those previously discussed in section 2.3.2, such as interest questionnaires and achievement tests in relevant subject domains, it is the more widespread use of qualitative research designs, data collection strategies and analyses that marks this body of literature. This possibly is the case because studies of individual interest have tended to focus on smaller numbers of participants, thus limiting possibilities for quantitative analysis. By definition, individual interests are both idiosyncratic and identity-related (Renninger, 2000), and therefore may be more meaningfully described qualitatively. For example, De Loache et al (2007) employed semi-structured interviews with parents to investigate the extremely intense interests of young children, to more richly describe the nature of individual children’s interests. Fink (1995), McPhail et al (2000) and Ainley (2001) all conducted interviews in which guiding questions were posed to retrospectively explore the role of interest in learning
contexts. In particular, Renninger and her colleagues have drawn strongly on qualitative research strategies in both gathering data and reporting findings in their research program, for example using ‘textured description’ and analysis of cases (Renninger, et al., 2002) and portraiture (Lipstein & Renninger, 2006). As Renninger and Leckrone (1991) have acknowledged, self-report measures typically employed in studies of interest may not be as effective as observation in identifying interest, because individuals may not be reflectively aware of interests. Accordingly, Renninger’s research has combined participant questionnaires and interviews with observations of students engaged in activity and use of ‘think-alouds’ as students complete tasks, to gain insight into processes (for example, Renninger, et al., 2002).

Two specific empirical studies of individual interest have been selected from the research literature for particular focus in this review (McPhail et al., 2000; Ainley, 2001). Both of these studies have incorporated innovative aspects of qualitative research design that can be related to Dewey’s (1913) earlier theorising about the need to consider interest in relation to ongoing actions in meaningful social contexts. Both studies also have implications for the research design of future studies that are focused on investigating the complexity of interest development in classroom-based learning environments.


Individual interest in a classroom context was the focus of a year-long mixed method study of McPhail et al. (2000). At the outset of the project, the researchers made observations of the nature of the curriculum in a grade 6 classroom. The research team then created a brainstorming task which required the students to imagine that they were responsible for designing an ‘ideal’ weekend for a visiting international student of the same age, to gain insight into free time activity preferences. The research team subsequently used semantic and conceptual mapping to collapse the data. A list of 20 ways of learning thus were derived from the brainstorming activity and the students were asked to indicate the three ways that helped them learn best and the three ways that helped them learn least well. A further brainstorming activity led to the researchers gathering data about topics that students were interested in studying. The information gathered during these tasks was then used as a stimulus for individual interviews with each student, which probed the nature of their interest in
these topics (length of time interested, source of interest, other people's interest in the same topic, related areas of interest). The researchers then used all of the data gathered to identify six possible inquiry areas – *animals, fitness (movement)*, social studies, *drama, science* and computers – and students were then asked to rank the areas according to their interest. The four most popular content choices (italicised above) were used to form inquiry groups, with each student allocated to an inquiry group based on their first or second preference. Four hour long sessions and a culminating group activity were subsequently led by the researchers in each of the interest-based inquiry activity settings. Data were gathered during the inquiry group activities using Experience Sampling Measure (ESM) questionnaires and focus group interviews with students from the science and drama groups. In addition, semi-structured interviews were conducted with two target students from each inquiry groups. The target students were identified by the class teacher as being particularly disengaged from their everyday schoolwork.

In analysing and interpreting the data, McPhail et al (2000) divided their sources into two groups: categorical/denotative (what grade 6 students were interested in studying) and interpretative/connotative (how they talked and responded before, during and after engaging in their chosen inquiry settings). In reporting the findings, the authors found a significant difference between the mean scores of students who received their first choice of interest-based inquiry activity and students who did not when t-tests were used to compare students' ESM questionnaire responses on scales of affect and activation. Students in first choice groups reported being interested in more topics related to their activity setting, and for longer periods of time. McPhail et al (2000) then focused on each of the four inquiry activity settings and drew on interview data to analyse students’ statements about their interest. They concluded that the students’ inquiry interests of animals, movement, science and drama were linked to the materials and ways of being engaged associated with those domains. For example, the students who indicated interest in participating in the science group preferred scientific topics and engagement through scientific modes of inquiry. The results of the study provide support for curriculum design which finds synergies between students’ interests in particular content and ways of learning, and classroom activity settings which provide opportunities for learning about topics of interest in preferred modes of learning. The authors found that middle school students’ identities as competent learners could be fostered when there is an understanding of their learning interests, and these learning interests are taken into account in the design of curriculum.
A study conducted by Ainley (2001) provided a response to a call by McPhail et al (2000) for more research which aims to understand young adolescents' 'individual ways of thinking and operating in the world in relationship to motivation to learn' (p. 62). In a classroom-based research project, Ainley (2001) focused on one student's active state of interest, or an actualised form of individual interest (Schiefele, 1991, 1998), and the personal meaning which characterises interest. Video data from two classroom science lessons were analysed and some elements of interest were observed, with discussion relating these elements to theoretical conceptualisations of interest. Ainley (2001) emphasised the importance of an 'integrated data set' through her inclusion of self-report measures together with video data, as well as interviews with the student while the student was watching herself participating in the lessons on the replayed video 14 months later. The teacher of the class also had been retrospectively interviewed and this provided another source of data in relation to the student's interest. Even though there was a considerable time lapse between the lessons videoed and the interviews, the strength of Ainley's (2001) study design lies in the triangulation of data sources, which leads to a clearer understanding of the complexity of interest development in classroom settings.

2.3.3.3 Learning outcomes and variables studied that relate to interest

Individual interest researchers have studied processes which enhance the development of interest and which focus on its relational nature. For example, a relationship has been established between individual interest and school-aged students' abilities to work with difficult texts, and to successfully complete word problems in mathematics and school projects (Hidi, et al., 2004). The influence of parents, teachers and peers on children's interest development has been emphasised by Renninger (1992, 1998), while Fink (1995) identified the relationship between the individual and the learning environment as crucial for motivation and learning.

Identified individual interest can provide a forum for learning skills when the teaching context is modified to include such individual interests (Renninger, 1998). Renninger et al (2002) found that when individual interest is used as the context for
learning in reading or mathematics, students with well-developed interest are likely to connect to tasks in that domain in terms of meaning. The authors concluded that providing contexts of well-developed interest gives students the chance to ask questions about the task, which 'leads them to make connections between the contexts of well-developed interest and the subject matter to be learned' (Renninger, et al., 2002, p. 487). Individual interest can be employed by teachers in systematic ways to help students to connect and reflect on classroom-based tasks, which supports students in developing skills and becoming more strategic (Renninger, et al., 2002). In her findings, Fink (1995) emphasised that high individual interest enabled adults with dyslexia to overcome their learning difficulty. Reading an intriguing topic enabled them to gain practice, fluency and skill development in reading, as well as increasing the depth of background knowledge in a single, high interest domain (Fink, 1995). Implications for teaching practice emphasised the situatedness of individual interest (Fink, 1995).

Individual interest researchers have focused on changes in the nature of this form of interest over time. Research has established that very young children can have stable and intense interests that are associated with increased attention, recognition and memory (Hidi & Berndorff, 1998). School-aged students' individual interests can be identified and drawn upon to enhance the contexts in which they learn (Hidi, et al., 2004), and learner profiles indicate that students with ability in a given domain but who lack interest are also not strategic (Renninger, et al., 2002). The study of interest in relation to vocational education has distinguished vocational education environments from school learning settings. Researchers of vocational interest have tended to study interest over time, with the aim of tracing changes in individual interest to the characteristics of the learning environment (Prenzel, 1998), and development of the individual in family and school contexts that contribute to selection of professional careers (Krapp, et al., 1998).

Gender is another area of focus for researchers of individual interest, both in terms of gender differences in the interests of learners and the differences in the ways that interest is related to girls' and boys' learning. A focus on gender was particularly evident in conference proceedings edited by Hoffmann et al (1998). The aim of the collection of papers was to provide a foundation on which to consider the role of individual interest and gender in learning and development. While papers on situational
interest were included in this book (for example, Hidi & Berndorff, 1998; Hidi, Weiss, Berndorff, & Nolan, 1998), the majority of papers focused on the relationships between individual interest and gender across a range of settings and age groups in different countries (for example, Athanasou, 1998; Hoffmann & Haussler, 1998; Renninger, 1998).

2.3.3.4 Conclusions about studies of individual interests

Considered collectively, individual interest studies have differed from those focused on situational interest in two main ways. Firstly, there has been a greater focus on how interest changes over time. Secondly, research has shown that incorporating identified interest in curriculum can enhance learning processes in various subject domains. Overall, more innovative and varied research designs and methodological approaches have been incorporated in studies of individual interest (for example, Renninger & Leckrone, 1991; Fink, 1995; McPhail, et al., 2000; Ainley, 2001), along with a wider range of ages of participants, and greater diversity of contexts in which research has been conducted. Future research into the interests of young children faces the challenge of incorporating the voices of the children themselves to a greater extent, with the need to triangulate such data with that already being gathered through observation of children’s activities and interviews with parents. Continued use of longitudinal research designs also would be productive in future research, to explore how meaning and identity are related to the development of individual interest, as people participate in ongoing activities which have the potential to grow over time (Dewey, 1913).

The qualitative approaches in the highlighted empirical studies of individual interest have demonstrated how different research designs, data collection strategies and approaches to analysis can be used to investigate questions related to learning processes in authentic classroom interaction. Such qualitative approaches appear suited to exploring the nature of the transactions between individuals and authentic learning environments that create interest, and thus advancing theorising of the nature of the relationship between situational and individual interest.
2.3.4 Studies of situational and individual interest

A relatively small number of studies have been conducted in which both situational interest and individual interest are investigated within the research (Ainley, Hidi, et al., 2002; Ainley & Hillman, 1999; Chen & Darst, 2002; Del Favero, et al., 2007; Rathunde, 1993, 1998). Such research appears to be increasing, however, as the Four Phase Model of Interest (Hidi & Renninger, 2006; see section 2.4 of the present chapter) has resulted in a number of empirical studies that have explored aspects of the relationship between situational and individual interest (Harackiewicz, et al., 2008; Katz & Renninger, 2007; Lipstein & Renninger, 2006; Renninger, et al., 2008). Additionally, a review of studies conducted by Bergin (1999) has considered both individual and situational factors to draw conclusions about influences on classroom interest. As Bergin (1999) argued, ‘It is important to recognize that personal or individual factors always interact with situational factors to create interest, or lack of interest’ (p. 89). In studies that have investigated both situational and individual interest, this recognition is explicit in the conceptualisation of the research.

2.3.4.1 Studies prior to the Four Phase Model of Interest Development

Research contexts

Studies of situational and individual interest have been conducted with middle school students (Chen & Darst, 2002; Del Favero, et al., 2007) and secondary students (Ainley & Hillman, 1999; Ainley, Hillman, et al., 2002), in varying subject domains. While Ainley and her colleagues focused on English texts, Chen and Darst (2002) investigated motor skill activities in physical education lessons and Del Favero et al (2007) studied Italian students’ learning of historical concepts. In each study, the research context was one created specifically for the purposes of that research.

Types of research and measures used

Quantitative approaches to measurement and analysis have continued to be taken by some researchers investigating situational and individual interest, particularly
Mary Ainley and her colleagues have devised a particularly innovative methodology for measuring interest in their study of secondary students' situational and individual interest in prescribed English texts (Ainley & Hillman, 1999; Ainley, Hillman, et al., 2002) and science and popular culture texts (Ainley, Hidi, et al., 2002). These studies were designed to map relationships between processing variables triggered by the arousal of topic interest. The research program has made a significant contribution to interest research more broadly. It is unique in the way that both types of interest were examined in the context of secondary students' school learning using an innovative computer program that enabled consideration of the sequence for processing the task in real time. The study thus examined interest as a developing process through a more dynamic rather than static approach to its measurement, focusing on the micro-level of a single task in the pre-task, on-task and post-task stages (Ainley, 2006). In this way, Ainley and her colleagues have been able to demonstrate the need for support throughout a task for the state of interest to be maintained (Ainley, 2006, 2007).

Some potentially problematic elements have arisen in the studies by Ainley and Hillman (Ainley & Hillman, 1999; Ainley, Hillman, et al., 2002), however, in that the researchers aimed to embed this text-based investigation in a context related to the ‘real life’ activities of the participants by selecting passages from prescribed English novels in the school curriculum. These passages were not, however, from texts that the students in the sample had read in their entirety. Consequently, students were still reading isolated passages as has been the case in other studies of text-based interest previously reviewed. This detracted from the potential of this study to investigate interest in an authentic on-going learning activity. Ainley (2006) also has acknowledged some of the issues relating to the use of the probes measuring interest and affect during participants' completion of the reading tasks, such as reliability and validity of single-item measures and distraction effects. Furthermore, the text passages in each of the studies were presented as part of an interactive computer program. While this program positively facilitated the collection of students' responses as they engaged with the texts, through the inclusion of the probes, as a consequence it presented the novel or reading material in quite a different form to that in which it would normally be
read, thus introducing a confounding element which may have impacted upon interest in the text.

Two other studies of situational and individual interest each have involved instructional interventions. Chen and Darst (2002) investigated middle school students’ situational interest and individual interest in learning motor skills in the context of basketball, a sport that the students had learnt in physical education lessons since primary school (Chen & Darst, 2002). Students were given a questionnaire to measure their individual interest prior to engaging in a chest pass test which assessed their level of skill. Subsequently, students participated in two tasks, one to learn more about stationary chest passes and the other to learn to pass-shoot. The latter task was novel to these students, as it had not been used by their teachers previously. The students completed a situational interest questionnaire immediately after engaging in each of the learning tasks. Statistical tests were used to analyse the data, including correlation and MANOVA analyses and hierarchical log-linear modeling.

Another instructional intervention was designed by Del Favero et al (2007). These researchers examined the impact of two instructional approaches that emphasised different types of problem solving, on middle school students’ learning of historical concepts, interest and self-perception of competence in history. The study engaged one hundred Italian 8th graders, who in the course of participating in the research project learnt two history topics through one of the two instructional approaches: problem-solving through group and whole class discussion (8 hours of lesson time) or individual problem-solving (5 hours of lesson time). The activities in each topic were the same, regardless of the instructional approach, and involved the students in examining and analysing historical documents, and using methods of historical inquiry to solve open-ended problems. Student interest was measured using questionnaires, in which students rated statements on a four point scale for situational and individual interest, and responded to open-ended questions to assess their topic interest based on their knowledge of the topic before and after participating in the instructional intervention. While all data gathered were reliant on self-report measures, the authors also presented a detailed description of the activities in each approach. It is also of note that Del Favero et al (2007) distinguished between features of the environment which were a source of situational interest and features which supported situational interest, viewing social interaction as a supporting condition. The analysis of
data, which comprised a series of statistical analyses (ANCOVAs, log-linear models, structural equation models, repeated-measure ANOVAs) to consider relationships amongst the motivational variables, also reflected the view of instructional context as a condition.

Learning outcomes and variables studied that relate to interest

In each of the empirical studies reviewed, the findings provided insights into the nature of the relationship between situational and individual interest. For example, Chen and Darst (2002) found that for the students’ self-ratings of interest in a pass-shoot task, individual interest and high situational interest were not correlated. The authors concluded that this result supports the notion that individual and situational interests are independent motivational entities, with distinctive motivational functions at particular learning stages. At a high skill level, HLM results showed that high situational interest was associated with high individual interest. Chen and Darst (2002) speculated that students with relatively high skill levels may be at a competent stage, where individual and situational interest are ‘intertwined’ (p. 264), however this is clearly contradictory to their previous conclusion regarding the distinctiveness of the two types of interest. Such contradictions indicate a need for ongoing research in this area, as Del Favero et al (2007) concluded. They found that the complexity of classroom environments and of relationships amongst motivational variables requires different approaches to both measuring interest and analysing data in classroom settings (Del Favero, et al., 2007).

The findings of these studies into situational and individual interest also have established relationships between the different forms of interest and other variables such as gender and task characteristics. Ainley’s studies, for example, have confirmed that when gender stereotypes in reading interests are built into the underlying topics reflected by text titles, there are strong gender effects on the level of interest triggered (Ainley, 2006). Also in relation to the relationship between interest and gender, Chen and Darst’s (2002) study revealed that initial skill level, which was strongly positively correlated with individual interest, played a more important role than gender in students’ situational interest in learning motor skills. As predicted, the pass-shoot task in their study was more situationally interesting to students than the stationary chest pass task, in terms of total interest, novelty, challenge, attention demand, exploration
opportunities and instant enjoyment (Chen & Darst, 2002). The findings of the study by Del Favero et al (2007) indicated that discussion with peers and teachers, a form of social interaction, promotes students' situational interest. Such findings are reflected in the situational and individual factors that influence interest in classrooms identified in Bergin’s (1999) review of a range of studies of interest. Situational factors identified include hands-on activities, discrepancy, novelty, food, social interaction, modeling, games and puzzles, content that has general, inherent interest (for example, relating to sex, scandal), biophilia, fantasy, humour and narrative (Bergin, 1999). Individual factors identified include belongingness (cultural value, identification, social support), emotions, competence, utility-goal relevance and background knowledge (Bergin, 1999). As Renninger, et al (2008) have acknowledged, however, the ways in which situational factors support interest development also appear to vary depending on whether the individual student has an emerging or well-developed interest in the domain.

The affective component of interest also has been emphasised in Ainley’s research program. Her studies have shown that students have an immediate affective reaction to a task, which influences subsequent affective reactions towards that task and an individual student’s decision-making about whether or not to continue reading the text (Ainley, 2006). She also has drawn on the findings of her research program to explain two ways in which interest in continued reading of a text can be triggered and supported by affective, motivational and cognitive functions related to situational and individual factors (Ainley, 2006). It is here that Ainley (2006) has indicated a challenge for future research, in identifying new directions for exploring the ways that the interdependence of affect, motivation and cognition function as interest supports student learning.

2.3.4.2 Studies incorporating the Four Phase Model of Interest Development

Most recently, Renninger and colleagues (Lipstein & Renninger, 2006; Katz & Renninger, 2007; Renninger, et al., 2008) and Harackiewicz et al (2008) have reported on research that has considered relationships between situational and individual interest through focusing on the development of interest, specifically in relation to the Four Phase Model (Hidi & Renninger, 2006; section 2.4).
Research contexts

Each of the studies reviewed was undertaken in authentic learning environments, with participants engaged in every day activities as a part of their ‘real life’ learning. Renninger and her colleagues investigated children’s interest development in the context of writing as a domain of potential interest for 12-15 year olds (Lipstein & Renninger, 2006) and out-of-school choral and biology workshops for 10-12 year olds as part of a summer program (Renninger, et al., 2008). Katz and Renninger’s (2007) study of young adults with and without Asperger’s Syndrome (AS) provided a markedly different context for considering the relationship between situational and individual interest, given the nature of interest for those with AS. Where interest is positively associated with attention, learning and goal setting for learners without AS, learners with AS have intense, idiosyncratic interests that usually are recognised as a liability for learning (Katz & Renninger, 2007). Lastly, Harackiewicz et al (2008) studied the development of interest for college students enrolled in an introductory psychology subject by considering the relations between goal theory, interest theory and performance. This study considered different phases of situational and individual interest while also focusing on relationships amongst different motivational variables.

Types of research and measures used

The three studies conducted by Renninger and colleagues were characterised by different research designs and qualitative approaches to collecting, analysing and presenting data, reflective of the different research contexts. Lipstein and Renninger (2006) used open-ended and forced choice questionnaires (178 students) and follow up, in-depth, structured interviews (72 students). The participants interviewed were selected based on their gender, age and identified interest in writing. In reporting the findings, portraits, or fictional composite case descriptions drawing on commonalities across a group of students, were created for each phase of interest development (Lipstein & Renninger, 2006). Such a narrative technique has the advantage of being based on patterns across the students rather than presenting idiosyncrasies associated with a particular student, however the voices of particular students can be incorporated. Renninger et al (2008) used participant observation and in-depth interviews with eight children to assess their phase of interest for, self-concept of ability in and definition of music and science. In addition, interviews were conducted with parents and instructors in relation to the children’s participation. Tasks also were administered to the children.
during the interviews to assess their learning in relation to the workshop content in both domains. Data were gathered at the beginning and end of the five week summer program, and then five weeks after it, to assess change over time. The researchers studied interest as either in the early phases of development or in the later phases, rather than at one of the four specific phases (Renninger, et al., 2008). Broader identification of the phase of interest was due to problems in distinguishing between more specific phases in the real life context of the research, as well as the challenges posed by more accurate measurement in such a small sample (Renninger, et al., 2008). In the third study, Katz and Renninger (2007) conducted semi-structured interviews via e-mail using the same set of descriptive and open-ended questions for all twenty participants (10 with AS, 10 without, aged 19 – 28). They subsequently analysed the data using discourse analytic methods and grounded theory approaches, which enabled analysis of both form and content of communication.

Through a longitudinal design in which questionnaire, grade-related and course data were gathered at five different time points, Harackiewicz et al (2008) conducted a correlational study which examined 858 students’ initial interest, situational interest – both in relation to catch and hold factors – and achievement orientation. Performance was assessed through students’ final grades in the subject and in subsequent psychology courses taken, as well as their grade point average, both for the semester in which the introductory psychology course was taken and at the end of the degree. Continued interest in psychology, which the authors related to individual interest, was inferred from further subjects in psychology taken by students as well as their choice to major in psychology. Data were analysed quantitatively using factor analyses and a series of regression analyses to consider both the short-term and long-term outcomes (Harackiewicz, et al., 2008).

Learning outcomes and variables studied that relate to interest

As a result of all of these researchers incorporating the Four Phase Model (Hidi & Renninger, 2006) in the theoretical framework guiding their research, it is evident that there are insights into the relationship between situational and individual interest that focus on development. In the studies undertaken by Lipstein and Renninger (2006) and Renninger et al (2008), findings were presented about phases of situational and individual interest by considering relationships between students’
interest development and goals, and supportive contextual conditions. Lipstein and Renninger (2006) also examined students’ conceptual competence and strategy use as writers. The profiles of learners in different phases of interest development created in this study have pedagogical implications, with interest being described as both a mediator and outcome of motivation for writing (Lipstein & Renninger, 2006). Similar to the earlier study by Lipstein and Renninger (2006), Renninger et al.’s (2008) research indicated the value in knowing a learner’s phase of interest for providing appropriate environmental support for development, particularly in terms of differing responses to triggers and the importance of proximal goals. Katz and Renninger (2007) found similarities between both AS and non-AS learners, in terms of the affective and cognitive components of interest; changes in the content, structure and form of interest over time; and the role of the environment in the development of interests. For AS learners, however, there was greater intensity of emotion associated with past and present interests. AS Learners also focused on details related to their interest areas, rather than on classes of events or ideas, or concepts. AS learners’ topics of interest tended to be less common amongst other young adults of a similar age, and they were less likely to receive positive social support if their interests were perceived as age inappropriate. Reengagement with their topics of interest centred on accumulating more details, rather than responding to new curiosity questions. As such, the characteristics of interest for AS learners present challenges to the Four Phase Model, in that the role of curiosity questions, the need for social support and increased conceptual concern as markers in the development of interest from situational to individual are brought into question for this population.

Other motivational variables also have been investigated in the studies reviewed here. Lipstein and Renninger (2006) examined the relations amongst students’ interest and their perceptions of effort, self-efficacy and feedback preferences in their writing. In addition to relationships between students’ interest development and goals, and supportive contextual conditions, Renninger et al (2008) investigated students’ self-concept of ability. The study by Harackiewicz et al (2008) also revealed relationships between interest and mastery goals over time. Initial interest was found to predict mastery goal adoption, situational interest during the introductory psychology subject and continued interest. The effects of initial interest on continued interest were partially mediated through mastery goals, ‘suggesting that interest can deepen over time because initial interest motivates individuals to take a task-focused approach to the material with a desire to learn more about the topic’ (Harackiewicz, et al., 2008, p.
Mastery goals thus were found to be both a product and a predictor of interest, or a 'mediating mechanism' for the continued development of interest in a topic.

**2.3.4.3 Conclusions about studies of situational and individual interest**

Studies of situational and individual interest have provided important findings in relation to the nature of interest. The studies reviewed are characterised by diversity in the approaches to conducting research, including quantitative, qualitative and mixed method approaches; smaller and larger scale studies; and innovative strategies for investigating and measuring interest (for example, Ainley & Hillman, 1999; Ainley, Hillman, et al., 2002), and presenting analysis and interpretation (for example, Lipstein & Renninger, 2006). Also evident in this body of research is consideration of interest in relation to other motivational variables. As such studies are representative of an emerging area of research in the field, it appears that as guiding research questions change in nature, so will methods used to investigate interest. Collectively, these studies have implications for pedagogical design that supports the creation of effective learning environments to promote interest development. The research also gives insights into social contexts for learning and interest development, and emphasises the importance of the affective component of interest.

A limitation of some of the studies (for example Bergin, 1999; Del Favero, et al., 2007), however, lies in the view of social interaction as a contextual factor, as having an influence on interest, rather than as fundamental to the experience of interest (Dewey, 1913). A further limitation evident in research to date is that most intervention studies have been short lived. There is a need to design longitudinal research projects that allow interest development to be considered over time. Furthermore, to investigate the complexity of processes of interest development in authentic classroom contexts, consideration of other methodologies is necessary. The dominance of self-report measures is still evident in the current body of research into situational and individual interest. Participants in these empirical studies also have tended to be middle school, secondary or tertiary students.
It seems likely that as research is conducted into interest development, particularly in investigating and establishing empirical evidence to validate the Four Phase Model proposed by Hidi and Renninger (2006), there will be further studies of situational and individual interest within the same projects (see section 2.4). As Wade (2001) has highlighted, in practice, situational and individual interest are highly interrelated and more research is needed that investigates that relationship. Further research also is needed that investigates the relationships amongst situational and individual interest and other motivational variables, in studies with longitudinal designs. As Harackiewicz et al (2008) concluded 'interest must be conceptualized as an ongoing process and studied over time to elucidate the processes through which initial interest affects goal adoption and continued interest, as well as the processes through which goal adoption influences the development and deepening of interest' (p. 118).

Notably, Rathunde (1993, 1998) is one of few researchers who theoretically has sought to move beyond the situational-individual distinction. Rathunde (1993, 1998) has argued that such integration becomes possible through focusing upon the experience of interest. While analysis of individual interest considers a person’s long-term orientation toward the object or content of interest, analysis of situational interest considers the properties or qualities of that object or the content. Rathunde (1998) has suggested that both levels of analysis can be united through considering the experience of interest, as the dynamic relationship between the person and the object, or the self and the environment, becomes the focus. Sustenance of this person-object relationship, through the provision of support and challenge within social contexts such as the family, will lead to the experience of abiding interest (Rathunde, 1998). The notion of self-environment synchrony is the process by which interest is created and Rathunde’s argument clearly draws on Dewey’s (1913, 1916) earlier theorising. This notion of synchrony is further advanced by Rathunde (1993) by drawing upon Csikszentmihalyi’s (1990) theory of flow, in which there is a negotiated balance between a person’s skills and challenges. Rathunde (1993) has acknowledged flow as a more intense experience than interest, because of the extreme concentration and sense of transcendence often associated with the former. However, he has maintained that the negotiation of interest is similar to that of flow, because of the balance between spontaneity and goal direction needed to experience the mode of serious play that is undivided interest (Rathunde, 1993, 1998). If this relationship is not balanced, fooling (spontaneity without goal direction) or drudgery (working towards goals without
immediate involvement or meaning) may result. According to Rathunde (1993, 1998), *divided interest*, or an absence of interest, arises if a person perceives a task as neither goal-related nor involving. Through considering the experience of interest, it becomes possible to conceptualise interest in a way that moves beyond the distinction between situational and individual factors to focus on the coordination of affect – enjoyment and positive feelings – and cognition – relevance and meaning (Rathunde, 1998). On-going empirical research that attempts to explore and refine such alternative theoretical frameworks for explaining the nature of interest clearly will make an important contribution to the field.

### 2.3.5 Broad conclusions about studies of interest

In broadly considering the research literature in relation to the two different aspects of interest, three key issues arise. Firstly, the majority of interest studies have maintained a focus on learning outcomes related to interest, rather than on processes of interest creation and development (Schiefele, 1998) and the experience of interest. Where processes have been the focus of interest research, consideration has been given to specific micro-level processes (for example, Ainley & Hillman, 1999; Ainley, Hillman, et al., 2002) rather than broader developmental processes. Secondly, relatively few studies have been conducted in authentic learning environments in which participants are engaging in every day tasks that hold meaning in the broader activities of their lives. Research contexts in interest research mainly have been designed for the purposes of that research and, as such, are relatively short-lived. Participants in interest research usually have been adolescents and young adult students, with fewer studies of children of primary school age or younger. Thirdly, the quantitative methodological approach that has dominated interest research to date has both contributed to and been the result of the previous two issues raised. These characteristics of the current interest research literature have implications for the ways in which processes of interest development can be conceptualised within the present theoretical framework.

There are challenges evident in attempting to study interest and its development which extend beyond the current conceptualisation of situational and individual interest. Dewey (1913) placed emphasis on the dynamic interrelationship
between the developing individual and the situation; he conceptualised interest as emerging through the mutual actions of the person and their environment. His notion of interest was developmental, in that he acknowledged the importance of ongoing activities, and the timing of the introduction of activities and their interconnectedness in order to give significance, meaning and value. In order for interest to develop, Dewey (1913) emphasised the need for an activity or pursuit to have the potential to continue and grow over time, highlighting the importance of value and identification. More recently, interest development has re-emerged as the focus of researchers who have sought to focus on the relationship between the situational and the individual over time.

2.4 CONCEPTUALISING THE PROCESS OF INTEREST DEVELOPMENT

In considering possible relationships between situational and individual interest, some contemporary interest researchers with a focus on the development of interest have suggested that individual interest arises and develops through experiencing an activity that holds special personal significance (Hidi et al., 1992; Hidi & Renninger, 2006). These researchers have proposed that this development probably takes place over time, with repeated exposure to and experience of related topics or activities. As knowledge and value of an initially situational interest increases, it shifts to hold a personal value, or individual interest (P. A. Alexander, 1997; P. A. Alexander & Jetton, 1996; Hidi & Anderson, 1992). Positive emotion is likely to be the basis of the development of interest, along with focused, generative and deep learning behaviours (Hidi, et al., 2004). As a result of the tendency of psychologists to study processes of cognition, motivation and emotion separately (Hidi, et al., 2004; Meyer & Turner, 2002) until quite recently (for example, Schutz & Pekrun, 2007), such assertions have remained speculative.

While other models of interest development have been proposed that are based on the existing framework of situational and individual interest (Krapp, 2002, 2005; Todt & Schreiber, 1998), it is Hidi and Renninger’s (2006) Four Phase Model of Interest that has gained prominence in the literature. According to this model, interest originates when situational interest in the content of a particular subject is triggered. From this first phase can evolve a second phase of situational interest, in which interest is maintained. A person’s curiosity questions about the subject content can lead to the
shift from maintained situational interest to emerging individual interest, which is the third phase in the model. Efforts to self-regulate and identify with the content of interest also characterise this third phase, along with a need for some external support in working with this content. Finally, with increased self-regulation and identification, the fourth phase of interest development can emerge. This fourth phase is that of a well-developed interest, characterised by perseverance, metacognitive awareness and recognition of the contributions of others to the domain or discipline (Renninger, 2009). Interest in all four phases has both affective and cognitive components, however Hidi (2006) has considered that the relative strength of each component changes over time with the importance of cognition increasing as interest develops. As learner characteristics change in each phase of interest, so do their feedback needs and wants (Renninger, 2009).

One of the strengths of the Four Phase Model is that Hidi and Renninger (2006) have drawn on a wide range of studies of interest that have focused on one of these phases of interest. The distinction between the two phases of situational interest in the Model is reflective of Dewey’s (1913) earlier notions of catch and hold aspects of interest development. Through using the concept of phases, rather than stages, there is recognition that interest can progress or regress, be dormant or disappear (Renninger, 2009). The incorporation of a multidirectional notion of development in the Model reflects a dynamic conceptualisation of interest development. The Four Phase Model (Hidi & Renninger, 2006) marks an initial attempt to explain how the relative importance of situational factors and individual factors change in relation to each other in each of the phases of the Model. However, the conceptualisation of the situation and the individual maintains a distinct separation between the two aspects, suggesting that an alternative approach to framing the situation and individual is required to better capture Dewey’s (1913) emphasis on dynamic interrelationships. The Four Phase Model is continuing to be developed. Support for it is emerging through studies that consider the phases of interest development within the one research project, marking a more integrated study of situational and individual interest as previously discussed in this chapter (section 2.3.4.2).
2.5 CHAPTER CONCLUSION

Theories of interest and empirical studies conducted from the 1980s to the present have incorporated some aspects of Dewey’s (1913) earlier conceptualisation of interest. These aspects include notions of identification, absorption and the study of interest in relation to activity. The dynamic interrelatedness of the individual and situation evident in Dewey’s (1913) conception of interest, as well as the emphasis on the process in giving significance, value and meaning to the end, have not been reflected in more recent research. The developmental nature of interest inherent in Dewey’s (1913) theorising only has emerged as a focus of empirical research in a small number of more recent studies that have investigated relationships between situational and individual interest.

Theoretical distinctions between situational and individual interest have made important contributions to understanding the nature of interest, particularly in relation to learning outcomes associated with student interest. Studies of situational interest mainly have focused on the environmental setting and characteristics of particular situations that elicit interest across individuals (Hidi & Berndorff, 1998). In comparison, individual interest research has tended to focus on the origins and effects of having personal interest, through considering the differences between people (Mitchell, 1993; Hidi & Berndorff, 1998). In the past, however, different groups of researchers have concentrated on one or the other, such that different bodies of research have emerged. Jetton and P.A. Alexander noted in 2001 that most of the research on interest has involved short snapshots of how interest relates to student learning. Such cross-sectional studies are informative and a necessary step in any maturing program of research. Still, cross-sectional studies offer only a glimpse of interest at a given point in time. Few studies have attempted to assess interest over time, or sought to construct a developmental model of this construct (p. 312).

As the emphasis in interest research has more recently shifted to the nature of interest development (for example, Hidi & Renninger, 2006), however, the relationships between situational and individual interest have become a renewed focus. This
renewed focus creates possibilities for new theoretical frameworks in which the dynamic interrelationship between situational and individual aspects of interest can be reconsidered.

Considering interest within new theoretical frameworks leads to different research questions, which require different methodologies. The types of experiments and correlational studies that have characterised much of the previous interest research, particularly studies of situational interest, appear best suited to examining the outcomes of interest from an individual differences perspective. This is due to the fact that the study of the experience of interest and processes of interest development would need to occur over a longer period of time, in the context of activities more authentically situated in the social and cultural lives of the participants, where there is potential for that activity to have genuine meaning and to become personally valued (Dewey, 1913). Some of the studies of individual interest, and of situational and individual interest, that have been highlighted in this chapter provide insights into how such future research can be conducted into processes of interest development in authentic learning contexts. In real life settings, social relationships are not controlled by the researcher and the social context is not regarded as a variable. The personal meanings created by the participants in social activity are genuine.

If interest in learning is considered as being created in social contexts, the focus shifts and importance is placed on social relationships and on the people with whom the learning experience is shared, the processes by which learning occurs and the perceived value and meaning of the activity in relation to the context, colleagues and processes. The social, cultural and physical contexts of learning and motivation thus become more than variables to be studied in terms of their influence on individual development. The following chapter of this thesis is a review of literature that investigates key notions from sociocultural theories that appear relevant to reconceptualising interest, with a focus on development in dynamic, complex learning environments.
CHAPTER 3

KEY SOCIOCULTURAL NOTIONS FOR RECONCEPTUALISING INTEREST

3.1 INTRODUCTION

In this chapter, I argue that a sociocultural approach to conceptualising interest development, deriving from the work of Vygotsky, may provide an alternative explanatory framework to the dominant theory that maintains a clear distinction between situational and individual interest, as previously reviewed in Chapter 2. In the first section of Chapter 3, consideration is given to the way sociocultural theories frame development and learning. In the second section, I elaborate how key notions in sociocultural theories can be used to frame interest development. It is in this second section that Valsiner’s theoretical ideas are brought together with those of the communities of learners literature. The final section of the chapter focuses on the emerging body of literature on sociocultural theories of interest and its development.

3.2 THE ORIGINS OF INDIVIDUAL DEVELOPMENT AND LEARNING: KEY IDEAS IN SOCIOCULTURAL THEORIES

Sociocultural approaches to development and learning, which have their origins in the work of Vygotsky and his colleagues, are based on ‘the concept that human activities take place in cultural contexts, are mediated by language and other symbol systems, and can be best understood when investigated in their historical development’ (John-Steiner & Mahn, 1996, p. 191). Accordingly, sociocultural theorists consider that the origins of individual development and learning lie in social activity, with processes of individual development and learning constituted by practices and activities that are
interpersonal and cultural-historical (Rogoff & Chavajay, 1995; Wells, 1999). A distinct feature of sociocultural approaches is the view that 'individual ('intrapsychological') mental functioning derives its existence and form from social ('interpsychological') processes, and as a result such individual functioning retains an essentially social character' (Wertsch & Penuel, 1996, p. 417). There is mutuality of relations between the person and the social world that Valsiner (2001) characterises as an exchange process. Such a process clearly is bidirectional and dynamic. From this perspective, development can be defined as the processes by which new relationships are established with people, tools, topics and so on, in the context of learning (Valsiner, 2001). Sociocultural theory therefore adopts an integrated, transformative perspective on development and learning which emphasises a dynamic interdependence between social and individual processes (John-Steiner & Mahn, 1996; Miller & Goodnow, 1995; Rogoff & Chavajay, 1995; Shanahan, Valsiner, & Gottlieb, 1997).

An important aspect of a sociocultural explanation of the interdependence of the social and the individual is the Vygotskian concept of the zone of proximal development (ZPD). The concept is vital to framing the ways in which the social world of the child and the child’s individual development are interrelated (Gallimore & Tharp, 1990; Valsiner & van der Veer, 1993; Winegar, 1988). ‘The context in which the interaction occurs is of crucial importance’ (Tudge, 1990, p. 156) to understanding development that is culturally appropriate. The most commonly cited definition of the ZPD is ‘that difference between a learner’s actual development level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers’ (Vygotsky, 1978, p. 86). The emphasis thus is on a dynamic process of development and on interdependence. The focus is on what the child presently can do with modelling and assistance, or scaffolding, becoming what the child soon will be able to do independently (Vygotsky, 1978). Development thus is conceptualised as a process of transformation ‘of what is possible at an earlier stage of an organism’s life into what is actual at a later stage. The later stage, in turn, provides the organism with new possibilities, some of which become actualized and serve as a basis for still further development’ (Valsiner, 1997b, p. 176). The ZPD is described by Wells (1999) as a site of conflict and contradiction as well as unanimity, as it is responsively co-constructed given the participants’ current goals as they jointly engage in a specific activity. Valsiner (1997b) is one sociocultural theorist who has more recently refined the
concept of the zone of proximal development in an expanded zones structure (section 3.3.1).

It is through the creation of zones of proximal development that children, and other learners, receive support for internalising and externalising the understandings, skills and roles of their culture (Valsiner, 1992; Winegar, 1997). Internalisation describes how values, beliefs, goals and meanings shift transformatively from the social world, or the interpsychological, to the personal world, or the intrapsychological (Valsiner, 1997c). It is not a process that individuals engage in independently, but instead describes a complex, active process of negotiation and co-construction or reconstruction of meaning in the course of collaborative activity (Tudge, 1997). As Winegar (1997) defines internalisation, ‘it is a person-environment relationship that itself emerges within person-environment relationship’ (p. 31). The process thus involves the individual and the social world in the joint construction of personal meanings (Tudge, 1997; Valsiner & Lawrence, 1997).

Externalisation describes the reciprocal, complementary process (Valsiner, 1997b; Winegar, 1997) of how the individual expresses what has been transformatively internalised and made personal back to the social world. Emphasis is given to the selective nature of the process, in that the expression of the individual involves choice, but is also related to the immediate social context and the individual’s interactions with others (Walker, In press). Tudge (1997) has acknowledged that in the process of externalising, there is simultaneous internalising; through expressing ideas to the social world, new personal understandings emerge. Observations of internalisation are inferred from products of externalisation in the context of action over time (Valsiner, 1997b; Winegar, 1997).

A transformative notion of internalisation and externalisation is theoretically and empirically useful because a sense of boundary between the individual and the learning environment is maintained (Pressick-Kilborn, Sainsbury, & Walker, 2005) but the focus is on the dynamic relationship between the two aspects. At the same time, an inclusively separate notion of the individual and the field of participation is incorporated. The individual can be distinguished but can only be understood in relation to the context. ‘Inclusive separation of the participants and the field of participation’ (p. 353) is
claimed by Valsiner (1998) to enable description of the structure of total activity, such that the internalisation and externalisation process conceptually includes both movement from the extrapersonal to the intrapersonal world, and the reorganisation of the individual’s relationship with the world (Tudge, 1997; Valsiner, 1997c).

Framing development and learning in terms of a transformative internalisation and externalisation process also places emphasis on the agency of the individual. The individual is actively changing and modifying the values, beliefs, goals and meanings in the process of internalisation and externalisation (Pressick-Kilborn, et al., 2005; Walker, In press) and thus developing as ‘self-constructing persons within their cultural worlds’ (Valsiner & Lawrence, 1997, p. 99). The relative psychological autonomy of the person, while interdependent and intertwined with any situated activity context, is thus maintained through selective and constructive internalisation and externalisation processes (Valsiner, 1997b, 1997c). Externalisations of the personal sense systems, or personal culture, of individuals create and maintain collective culture (Valsiner, 1997a).

Canalisation is a concept used by Valsiner (1992; 1997b; section 3.3.1) that can be incorporated in sociocultural theories to frame social guidance of the internalisation and externalisation process. As Valsiner and Lawrence (1997) explain, ‘People construct personal meanings for the events they experience, with the assistance and boundaries provided by the social structures and other individuals’ (p. 87). Canalisation by the social world refers to the ways in which social structures and other people, consistent with their values and goals and those of the culture at large, channel a learner’s activities in certain ways so that development is organised in some, rather than another, future direction (Valsiner, 1997b). Resistance to the canalisation of others can force changes in external constraint systems (Valsiner, 1997b). Self-canalisation refers to the developing person’s construction of ‘his or her own psychological functions in the process of social experiencing’ (Valsiner, 1992, p. 34). As a process, self-canalisation thus represents ‘the emergence of an intrapsychological self-constraining system’ (Valsiner, 1997b, p. 309).

Identity is another key idea in sociocultural theory that can be framed in relation to internalisation and externalisation processes. The personal meanings constructed in the process of internalisation, then the subsequent ways in which values, beliefs, goals
and meanings are externalised by the individual contribute to how that individual sees themselves. Such externalisations also contribute to how the individual is considered by others and to the construction of that individual's identity. Externalisations are made in the context of an individual's engagement in cultural practices. Miller and Goodnow (1995) have argued that the very concept of practice 'recognises that the acquisition of knowledge or skill is part of the construction of an identity' (p. 9). Identity formation occurs in human action, according to the sociocultural theory of Penel and Wertsch (1995), as sociocultural processes dynamically interact in coordination with individual functioning. Penel and Wertsch (1995) have emphasised the importance of other people, highlighting that the selection, choice and commitment to different people and idea systems as an individual engages in activities is a key process in identity formation. Similarly, Wells (1999) has emphasised the ZPD as a site of identity formation. The notion of identity also plays an important role in sociocultural theories as 'the vehicle that carries our experiences from context to context' (Wenger, 1998, p. 268).

In sociocultural theories, it is through the creation of intersubjectivity as people learn together that development becomes possible (Rogoff, 1990, 1998). In order for children and more experienced peers or adults to create ZPDs, mutual understanding or intersubjectivity needs to be negotiated amongst the people engaged in learning together. A sense of connectedness between people in the context of learning is a vital aspect of the creation of intersubjectivity (Cole, 1996). Walker (In press) has emphasised the nature and quality of interpersonal relationships as being important to internalisation and externalisation processes. Intersubjectivity is continually being negotiated in relation to specific activities, including amongst children and adults with established relationships. The creation of intersubjectivity enables the negotiation of shared purpose, focus and values (Rogoff, 2003).

From a sociocultural perspective, what individuals value can be best understood in relation to cultural practices. Miller and Goodnow (1995) define practices as 'actions that are repeated, shared with others in a social group, and invested with normative expectations and with meanings or significances that go beyond the immediate goals of the action' (p. 7). Cultural practices carry with them normative expectations about how things will be done (Miller & Goodnow, 1995). In turn, these expectations reflect value commitments held by members of the social group, or
community. These values channel, or canalise (Valsiner, 1992; 1997b; section 3.3.1), the opportunities for the learning and development of individuals. In the same way that internalisation and externalisation are transformative processes, an individual may likewise contribute to change in the practices that are more widely valued within a community (Miller & Goodnow, 1995). The beliefs and values of the individual also afford and constrain possibilities for future development and learning.

Finally, the interdependence of social and individual processes in sociocultural theory is further explained through the notion of communities of practice (Lave & Wenger, 1991; Rogoff, 1998; Rogoff & Chavajay, 1995). A community of practice is a social group that collaborates to achieve shared goals through particular cultural practices and activities. The practices of a community provide the wider context in which ZPDs are created, internalisation and externalisation processes, and canalisation processes occur. A community of learners can be considered as a particular type of community of practice, in which academic practices are the focus of the community (section 3.3.2).

3.2.1 Conclusion: Key ideas in sociocultural theories

The distinction between sociocultural perspectives and other theoretical approaches is based on the way in which the interdependence of the individual and the context is characterised (Nolen & Ward, 2008; Pressick-Kilborn, et al., 2005). Sociocultural approaches frame development and change in relation to the key ideas highlighted, which emphasise the interdependence of the social world and the developing individual: the zone of proximal development, the transformative processes of internalisation and externalisation, canalisation, identity, intersubjectivity and connectedness, value and communities of practice. While sociocultural theories of cognitive development originating from the work of Vygotsky have been prevalent for some years (for example, Moll, 1990), only recently has consideration been given to motivational constructs, such as interest, from a sociocultural perspective. A relatively limited literature addresses motivation from a distinctly sociocultural perspective (Hickey, 1997; Hickey & McCaslin, 2001; McCaslin, 2009; Pressick-Kilborn, et al., 2005; Pressick-Kilborn & Walker, 2002; Sivan, 1986; Walker, In press; Walker, Pressick-Kilborn, Arnold, & Sainsbury, 2004; Walker, Pressick-Kilborn, Sainsbury, &
MacCallum, In press). In conceptualising interest more specifically, certain ideas from sociocultural theory are particularly relevant. These ideas are elaborated in the following section.

3.3 KEY IDEAS IN CONCEPTUALISING INTEREST WITHIN A SOCIOCULTURAL FRAMEWORK

The separation of the situational and the individual in contemporary studies of interest, as previously discussed in Chapter 2, weakens the emphasis on the dynamic and interdependent relationship between the person and the environment which was a feature of Dewey’s (1913) earlier theory of interest and a central concern in the theories of Vygotsky (1978). Consideration of interest from the point of view of sociocultural theory and research, specifically from the perspectives of (a) Valsiner’s (1997b) theoretical development and extension of the notion of the zone of proximal development and (b) empirical investigations into classroom-based learning communities (for example, Brown, 1997), provides the seeds of an alternative framework for interest and its development.

3.3.1 Co-creating possibilities for the development of interest within zones

Valsiner (1992) is one sociocultural theorist who specifically has considered the way in which the social world contributes to the development of interest. From a sociocultural perspective, social processes that expand or limit the activities of an individual may also assist or constrain the emergence and development of interest (Valsiner, 1992). Through the notions of canalisation and self-canalisation, Valsiner (1992) has explained how the social world and the opportunities available to individuals create the context in which interest may ‘emerge’. According to Valsiner, interests emerge when an individual translates internalised information and functioning into externally observable actions. “Interest” can be described as emerging from the structure of my “personal senses” in my personal culture at a given time’ (Valsiner, 1992, p. 35), a description which recognises the changing and self-constraining nature of interest. Self-canalisation is likely to take place simultaneously with canalisation through interaction with others within the communities of practice in which an individual participates.
Although Valsiner has not brought together the concept of canalisation and the zone of proximal development specifically in relation to interest, it appears as though this is a theoretically useful development. By consideration of these two aspects of Valsiner's sociocultural theory, an explanation of interest development becomes possible. Interest is canalised within a zones system, part of Valsiner’s reconstructed notion of the zone of proximal development (Valsiner, 1997b). Zones are described by Valsiner (1997b) as transient, abstract organisational devices that provide the framework for constraints and affordances to development in the present, and possible directions of nearest future development. While the ZPD represents all of the possibilities for development within the present context, paths of action and development are constrained or limited (Zone of Free Movement - ZFM), as well as promoted (Zone of Promoted Action - ZPA), and thus possibilities for action within the ZPD become actualised in the ZFM/ZPA system. Valsiner (1997b) proposes that the zones are useful in explaining regulation of the ongoing developmental process, through the restructuring of the zones and the relationships between them. The use of the ZPD/ZFM/ZPA terminology thus provides a framework for discussing the canalisation processes in development (Valsiner, 1997b).

3.3.1.1 The Zone of Proximal Development (ZPD)

While Valsiner (1997b) has used the notion of the Zone of Proximal Development, it is reconstructed with the aim of fitting it with his other two zone concepts, the ZFM and ZPA. Thus, the

ZPD becomes a zone that denotes the range of possible nearest-future transformations of present psychological processes, conditional on the present organisation of the ZFM/ZPA structure. It is obvious that the ZPD in that system becomes subservient to the present-state field-theoretic explanation and is oriented toward explaining the social roots of individuals’ experiences. (Valsiner & van der Veer, 1993, pp. 56-57)

The ZPD is the zone that contains all of the possibilities for development, given the present, and as such the ZPD is ‘empirically unaccessible’ (Valsiner & van der Veer,
1993, p. 57), while the ZFM/ZPA structure describes the present constraints and promoted actions in the child’s development. If field observations are the basis of a study, then it will only be an actualised subset of the possibilities within the ZPD which are studied.

### 3.3.1.2 The Zone of Free Movement (ZFM)

The ZFM is a means to describe the structuring of a child's access to different aspects of his or her environment. It includes the objects that are available to the child within this accessible area and the ways in which the child acts with those available objects within the accessible area (Valsiner, 1997b). The zone is socially constructed, in that it is based on the cultural meaning systems of the child’s caregivers, who lead the organisation of the ZFM for the developing child, and is formed in interaction with them. When a child and caregiver enter a new setting, the ZFM is reconstructed through the caregiver’s analysis of the possible actions afforded by the new environment and a knowledge of the previous actions of the child. Thus, the organisation of the dynamic relationship between the child and the environment is on the basis of the cultural meanings of the communities of practice in which the child participates, as well as the caregiver’s knowledge of the specific child’s actions and development. Valsiner (1997b) has argued that as the child develops, the ZFM becomes internalised, providing a structure for personal thinking and feeling through semiotic regulation.

The main implication of the ZFM for interest is that it promotes canalisation through the constraints created on the possible child-environment interactions. The child’s access to areas of the environment, which includes the social environment and the objects within it, along with the possible actions with those objects, will guide the interest of the child that is co-constructed within the setting. The relationship between the child and the caregiver, including perceptions of interest and participation, and the caregiver's knowledge of the child’s skill development, will be crucial factors in the co-construction of this zone. As the child develops, the internalised ZFM contributes to self-canalisation processes.
3.3.1.3 The Zone of Promoted Action (ZPA)

The ZPA is conceptualised by Valsiner (1997b) as mutually intermapped with the ZFM to constitute a functioning system: the ZPA is focused on the promotion of new skills and the ZFM on constructed constraints. The ZPA is conceptualised as those actions of the child with a set of activities, objects or areas in the environment that are encouraged by the caregiver (Valsiner, 1997b). The caregiver directs the child’s actions in accordance with their own goals and as such, the ZPA is created through what is expected by others in a given situation (Klaue, 1989). As a zone, it can include areas currently outside the ZFM to focus upon development across boundaries, but has a non-binding nature. As a consequence of the latter, the child may reject the promotional efforts of the caregiver and choose to act in other ways within the ZFM. However, in common with the ZFM, the ZPA provides canalisation, and also self-canalisation, of the process of development. An internalised or semiotic level of the ZPA emerges, thereby ‘constructing a new personal relationship with the action-ZFM/ZPA domain’ (Valsiner, 1997b, p. 194) within the cultural meaning system. The ZPA may be co-constructed by the caregiver and the child in order to promote interest in an activity, object or aspect of the environment, with actions encouraged that are within and contribute to the cultural and personal meaning systems.

3.3.1.4 Conclusion

An emphasis on the social origins of development and learning through the negotiation of zones that promote and constrain actions, provides important insights for a theory of interest development. An enriched understanding of the processes by which interest develops in and through everyday activities may be gained by considering the interrelationships between the individual and the environment, rather than primarily focusing upon one (individual interest) or the other (situational interest) as in previous contemporary conceptualisations of interest. Adopting the theoretical notion of inclusive separation enables consideration of aspects of the individual or the situation while maintaining the structure of the total activity.

In considering the dynamic interrelationships between the individual and the sociocultural context, it follows that the motivational implications of learning in the system of the ZFM/ZPA and ZPD cannot be made without acknowledgment of a broader purpose for learning. As suggested earlier in this chapter, such a purpose for
learning is created within the broader context of participation in communities of practice, specifically communities of learners when considering the context of school-based education. Thus, it becomes important to consider the argument that the ZPD needs to be theorised simultaneously … as a process of knowledge co-construction and as a process of becoming a member of a community … the ZPD is more than a social space within which skills, strategies and knowledge are acquired. The ZPD is the space that enables communities to be established and identities to be transformed. (Renshaw, 1998, p. 88)

While the ZPD as part of Valsiner’s zones system canalises the development and learning of the individual, the constraints and promoted actions contribute to the practices of the community and result from community membership. It is through negotiation of the ZFM/ZPA system that learners become members of a community of practice and, through the same process, the practices of the community are transformed.

3.3.2 Learning communities

Sociocultural perspectives on learning have led researchers with dual interests in learning and the design of innovative classroom environments to conduct empirical investigations of classroom-based learning communities. Well-known investigations of learning communities have been conducted by Ann Brown and her colleagues (Brown, 1997; Brown, et al., 1993; Brown & Campione, 1996; Brown, Ellery, & Campione, 1998; Campione, Shapiro, & Brown, 1995), Bereiter and Scardamalia (1993; Scardamalia, Bereiter, & Lamon, 1994), the Cognition and Technology Group at Vanderbilt University (1994, 1997) and Barbara Rogoff and her colleagues (Rogoff, et al., 1996; Rogoff, Turkanis, & Bartlett, 2001). Other investigations of learning communities have been conducted by Cobb, Stephan, McClain and Gravemeijer (2001), Riel (1998), Renshaw and R.A.J. Brown (1997), Roth (1998), and Walker and Lambert (1995). These investigations have in common an underlying sociocultural theory of learning, an emphasis on collaborative student learning, and student classroom engagement in
various inquiry-oriented learning and thinking practices for the purpose of knowledge building. Distinguishing elements of classroom-based learning communities have been drawn from previous research (Bereiter & Scardamalia, 1993; Brown, 1997; Rogoff, et al., 1996; Roth, 1998) and are presented in Table 3.1.

In classroom communities, learning is scaffolded by the activities of students and the teacher as they contribute support and direction in shared endeavours, and the tools and artefacts that are used in the classroom. It is significant to note that in classrooms and schools organised as learning communities, there is a fundamental transformation of the underlying model of instruction, which is different to classrooms in which cooperative learning strategies are used in a teacher-as-expert classroom structure (Rogoff, et al., 1996). Dynamic relations exist amongst class members as different roles and responsibilities are assumed depending upon the focus activities. Classroom learning communities thus involve, as Brown (1997) notes, the creation of multiple ZPDs, while from the perspective of Valsiner’s (1997b) sociocultural theory, they involve processes of canalisation, including self-canalisation.

In relation to the Fostering Communities of Learners project, perhaps the best known of the learning community investigations, Brown (1997) has identified four key ideas – agency, reflection, collaboration and culture – which contribute to the development of a culture of learning within the classroom. These four ideas are also central, as Renshaw (1998) has indicated, to the notion of the ZPD in which the context of learning is that of participant in a community. Through participation in a community of learners, students are enculturated into activities in which certain objects of interest and ways in which interest is demonstrated are valued more highly than others. However, this is not a one-way process. The novice learner collaborates with other community members – which include caregivers, in Valsiner’s terms, and peers, as Tudge (1990) has emphasised – in order to transformatively internalise and externalise the cultural meanings and practices within that community. Through this process, the learning culture, or cultural meaning systems, of that community develops, responding to the perceived needs of and interests expressed by the novice learners. The culture of the community, which encompasses the values and purpose negotiated and upheld within that community, canalises the development of the novice learners as part of the process of enculturation. The development of interest in learning is part of this process.
Table 3.1

*Distinguishing elements of classroom-based learning communities*

<table>
<thead>
<tr>
<th>Elements of a classroom-based learning community</th>
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<tbody>
<tr>
<td>1. Shared responsibility for learning, as a collaborative endeavour with values of the students and teacher reflected in the learning processes and products</td>
</tr>
<tr>
<td>2. Dynamic and complementary group relations</td>
</tr>
<tr>
<td>3. Contribution to own learning and group’s functioning to develop a <em>culture of learning</em> within the classroom</td>
</tr>
<tr>
<td>4. Varying roles of members that shift within the system</td>
</tr>
<tr>
<td>5. Leadership, guidance and on-going feedback from more skilled partners for active learners</td>
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<tr>
<td>6. Reflection on and attention to the learning process</td>
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<tr>
<td>7. Students have the freedom to make their own choices and negotiate specific goals within the overarching goals established by the teacher</td>
</tr>
<tr>
<td>8. Active use of strategies to support student agency</td>
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<tr>
<td>9. Focus on authentic problems, rather than categories of knowledge, over sustained periods of time to allow depth of study</td>
</tr>
<tr>
<td>10. Inquiry is driven by students’ questions</td>
</tr>
</tbody>
</table>
of enculturation, as activities within specific communities are structured so as to support the social, cognitive and affective development of learners.

Interest develops through social interaction in learning communities. As learners participate in culturally valued activities with particular people and tools, their participation is canalised by the community of which they are a member. Participation in a learning community and the active internalisation of their cultural meaning and value systems also leads to self-canalisation which further contributes to interest development through focus upon certain types of activities, processes and objects across the communities of practice in which the individual participates. As individuals externalise expressions of their interest, the other members of the communities respond in ways that may further contribute to canalisation of interest development for specific individuals.

Interest has been studied in learning communities in empirical research conducted by Pressick-Kilborn and colleagues (Pressick-Kilborn, et al., 2005; Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Walker, et al., In press) as discussed in detail in section 3.5 of this chapter, and by Nolen (2006, 2007). Nolen’s longitudinal study of young children’s emergent motivation to read and write included a more specific focus on interest, as the same group of students progressed from kindergarten through to grade 3. The investigation was framed from a situative perspective (Nolen & Ward, 2008) and focused on literacy instruction in different contexts. Classroom observations were made, interviews were conducted with students and teachers, and a grounded theory approach was used to qualitatively analyse data. The emphasis in Nolen’s (2007) findings was on social contexts, particularly those in which writing develops and thus focused on classroom communities which provide opportunities for children to develop identities as writers. Nolen’s (2007) analysis drew on the notion of canalisation of interest as previously suggested by Pressick-Kilborn and Walker (2002), to focus on the relationships that children develop over time with teachers and peers that canalise interest. This analysis highlighted three of the main ways in which the classroom contexts shape interest development: ‘through constraints on the purposes of writing, on who comprises the audience, and on whose norms are used to judge the writing’ (Nolen, 2007, p. 251). Nolen (2007) defined literate communities as those in which the choices within the constraints created by the teacher afford opportunities for creativity, self-expression and communication. She concluded that the children’s
existing needs and interests could be tapped into through such opportunities in the classroom community, but opportunities to develop an interest in writing and become identified as authors also were created (Nolen, 2007).

When considering the social construction of interest in a learning community, it is important to recognise that all members of a specific community participate in multiple communities of practice both within and outside the school learning context. In these different communities of practice, individuals interact with other groups of people working towards the goals of their community and engage in practices relevant to the achievement of those goals. Often, the goals and practices of these communities will overlap in ways that reinforce and strengthen the individual’s developing motivation and interest. When students in a class group participate in an excursion to a museum, for example, they become part of a transient community of museum visitors interacting with museum staff and the museum exhibits (Matusov & Rogoff, 1995). The engagement of these students in valued activities related to their ongoing classroom endeavours is likely to further develop students' interest in aspects of their school activities (Brophy, 1999; Renninger, 2000). According to Wenger (1998), one reason that schools gain relevance to students is because of the possibilities for engaging in ‘experiments of identity’ (p. 268). Where the goals and practices of different communities are in opposition, however, the development of motivation and interest may be impeded as learners place greater value on one set of goals and practices at the expense of another set of goals and practices. In academic contexts, this may result in student resistance (Renshaw, 1998), and consequent low motivation, towards the practices of the community. Participation in multiple communities of practice, therefore, provides possibilities for and constraints on interest development which may be in tension or accordance, depending on the values and goals of the specific communities and the personal meanings and developing sense of identity of the participating individual.

3.3.3 Conclusion: Key ideas in conceptualising interest within a sociocultural framework

By drawing on key ideas such as zones of development and learning communities, a sociocultural theory emphasises the dynamic nature of transactions between the individual and the environment which give rise to interest. The individual
and situation are conceptualised as inclusively separate (Valsiner, 1998). Consideration is given to ways in which both physical and social contexts constrain and offer possibilities for the creation, maintenance and development of interest using the notions of canalisation and self-canalisation (Valsiner, 1992, 1997). Processes of interest development thus become the focus, rather than the outcomes of those processes. Furthermore, a sociocultural theory places emphasis on the human relationships (Renshaw, 2003) within which interest is created and developed. Finally, framing interest development in relation to participation in learning communities opens up a broad range of possibilities for research designs and methodologies, because of the different emphases in research questions in relation to sociocultural theories. Complex qualitative or mixed method designs thus are considered as important as experimental and correlational designs common in previous research (Chapter 2), in order to understand interest development in naturalistic contexts.

3.4 THEORISING INTEREST FROM A SOCIOCULTURAL PERSPECTIVE

In beginning to reframe interest and its development from a sociocultural perspective, there are two chapters within the literature that are particularly relevant. The first is a theoretical discussion of the nature of interest by Valsiner (1992; section 3.3.1), who explicitly framed his conceptualisation of interest from a sociocultural perspective. Valsiner (1992) highlighted the problems posed by attempts to empirically examine the emergence and development of interest. He suggested that in empirical studies, an important issue concerns the use of commonsense, everyday language to refer to the psychological construct, interest (Valsiner, 1992). The personal sense with which the term interest is used by a participant in a research study may not be the same as the more general shared meaning in which the psychologist is using the term (Valsiner, 1992). This is problematic in terms of the operationalisation of interest in empirical investigations, in which the assumption is often made that self-reports of ‘interest’ directly represent the psychological concept. Valsiner (1992) therefore claimed that ‘in order to study interest one cannot study ‘interest’, but something else from which recognizable ‘interest’ emerges’ (p. 33). Interest is conceptualised as being ‘not in the object, nor in the mind of the child, but it emerges as a result of processes that link the two in irreversible time’ (Valsiner, 1992, p. 33). The study of interest, therefore, becomes the study of developmental processes that give rise to what is labelled as ‘interest’ in every day terms.
A move to a process-oriented theoretical view of ‘interest’ is based on the recognition of the process of constant irreversible person–environment transaction. Once an emphasis is placed upon the process aspects of transactions, the question of ‘interest’ is no longer limited to an ontological issue (“what is interest?”), but acquires a developmental focus as well (“how does whatever is interest emerge from whatever interest is not?”) (Valsiner, 1992, p. 33).

Thus, rather than placing emphasis preferentially on either the individual or the situation when conceptualising interest, as has been the underlying approach in most previous studies, interest is conceived as a dynamic, developmental process of interaction between the individual and the situation.

The second chapter of particular relevance is a review of research written by Renninger (2000). Renninger’s chapter is important because it is one of the first indications in the interest literature of aspects of sociocultural theories being incorporated by an established interest researcher. In considering the possibilities of particular contexts for the development of individual interest, Renninger (2000) framed her discussion in terms of the opportunities for extension or constraints on development. She included the term apprentice to describe the processes by which one interacts with others in developing individual interest (Renninger, 2000, p. 396). Furthermore, Renninger (2000) incorporated ideas that are central to a sociocultural theory, particularly a focus on processes of internalisation and identity in relation to interest, with an emphasis on the importance of activity and the role of others in supporting and shaping the content of interests. The development of value in relation to interest was considered in terms of the individual’s sense of possible selves, and individual interest was considered as residing in the ‘possibilities for activity with a task that are perceived by the individual’ (Renninger, 2000, p. 396), rather than in the task or the person. While Renninger (2000) incorporated such ideas about interest in this chapter that clearly chime with sociocultural theory, also conceptually apparent is the influence of information processing theory. Renninger (2000) continued to emphasise stored knowledge and stored value in her framing of individual interest. In the place of the metaphor of storage, a sociocultural theory would be more likely to draw on the concept of identity, to explain how an individual co-creates knowledge and value in one context and community of practice, then brings that to new contexts and communities.
of practice, in a dynamic process of ongoing transformation of both the individual and the communities of practice. The dynamic nature of interest and identity can be further emphasised in a sociocultural approach, through drawing on notions of canalisation and self-canalisation, and transformative internalisation and externalisation.

While Renninger has not reconceptualised value and knowledge in terms of sociocultural theory, there is an on-going interest in the potential of sociocultural approaches evident in her research. For example, Renninger and Shumar (2003) conceptualised interest as social by definition, because it exists in the relation between a person and his or her environment. Not exclusive to a sociocultural approach but in accord with one also is Renninger’s selection of naturalistic research contexts (for example, Renninger, et al., 2002). Most recently, however, Renninger’s (2009) theorising of interest and identity development has conceptualised notions of identity in relation to interactions with others across contexts, but subsequently focused on self-representation and age-related development rather than pursuing a line of argument framed from a sociocultural perspective.

3.5 EMPIRICAL STUDIES OF INTEREST FROM A SOCIOCULTURAL PERSPECTIVE

There is a small body of empirical research conducted from a distinctly sociocultural perspective (Lightfoot, 1988; Pressick-Kilborn, et al., 2005; Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Walker, et al., In press), to which my own theorising and the present study of interest development contribute. The same structure that framed discussion of empirical studies in Chapter 2 is used in the review of these empirical studies. Firstly, there is a focus on the contexts in which the research was conducted, followed by consideration of the types of research and measures used. Next, the learning outcomes and variables studied that relate to interest are discussed. Finally, conclusions about the empirical studies are drawn.
3.5.1 Research contexts

Each of the studies reviewed was conducted in an authentic learning environment. Lightfoot (1988) investigated the interaction between a mother and her infant in the negotiation and canalisation of interest as the infant gained competence in climbing up and down a step in the home, while Pressick-Kilborn and colleagues (Pressick-Kilborn, et al., 2005; Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Walker, et al., In press) have focused on students’ interest as they participated in classroom-based learning communities. Pressick-Kilborn’s study is detailed in this thesis and was focused on grade 5 students who were engaged in learning science and technology.

3.5.2 Types of research and measures used

As is typical of most research from a sociocultural perspective, each of these empirical studies made use of qualitative methodologies, particularly observation (Lightfoot, 1988; Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Pressick-Kilborn, et al., 2005; Walker, et al., In press) and interviews with participants at different time points throughout the data collection period (Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Pressick-Kilborn, et al., 2005; Walker, et al., In press), to support the subsequent analyses and interpretations. In addition, I have used self-report strategies for students to describe and retrospectively rate the intensity of their interest in relation to specific classroom-based tasks (Chapter 5, section 5.4.2). Observation and self-report data have been used to identify key episodes in the classroom-based learning community’s activities and narratives have been written, and subsequently analysed and interpreted using a sociocultural framework in reporting the findings (Pressick-Kilborn & Walker, 2002; Walker, et al., 2004; Walker, et al., In press).

The classroom-based research also was conducted over an extended period of time. In my study, the main phase of the data collection took place over two school terms (6 months), which enabled observation of students engaged in a range of on-going activities in different sociocultural settings. In addition, two follow-up interviews with focus students in the study were conducted five and 15 months after the conclusion of the main phase, to investigate aspects of interest development over a longer time period (Pressick-Kilborn & Walker, 2002).
3.5.3 Learning outcomes and variables studied that relate to interest

Consideration has been given to examining processes of interest development as it is co-created through social interaction in the context of particular learning activities in each of the empirical studies reviewed. Lightfoot’s (1988) study, for instance, provided an example of the way a mother’s values and goals encouraged negotiation with her infant, and channelling of activities and interest, as intersubjectivity was created. The relationship between the child and the environment was highlighted by Lightfoot (1988) as a ‘co-constructed totality’ (p. 63). The mother responded to cues provided by her child’s affective and sensorimotor actions in order to ascertain how she could transform and structure the child’s environment so that the child could successfully climb up and down a step. The mother’s responses were directed so as to create interest and foster the development of competence. In another study, Walker et al (2004) investigated social interaction in a group of three students who were collaboratively engaged in a problem-solving task. The key sociocultural notions of canalisation, intersubjectivity and internalisation and externalisation were drawn upon in analysis and interpretive discussion. The researchers emphasised that ‘scaffolding through interaction with peers, teacher, researcher and materials both created and limited the possibilities for the development of the students’ activities and thus the paths along which their interest in learning might develop, and the ways in which interest is internalized and externalized’ (Walker, et al., 2004, p. 250).

The theoretical notion of canalisation also was emphasised in the studies reviewed. For example, Walker et al (In press) focused on one student and analysed her participation in a classroom-based learning community by framing discussion in relation to canalising and self-canalising factors. They concluded that for this grade 5 student, both the contexts of her class and her family created affordances and constraints on the possibilities for her development of interest in learning and her developing identity in relation to the domain of science (Walker, et al., In press).
3.5.4 Conclusion: Studies of interest from a sociocultural perspective

In this small group of studies, interest has been dynamically conceptualised to allow for exploration of the relationship between the situation and the individual. Qualitative research designs and methods have been used to investigate the emergence, maintenance and development of interest in naturalistic settings. Compared with the studies of interest reviewed in Chapter 2, the research participants have been younger, either primary school-aged or in infancy, and the data collection periods have been considerably longer.

Sociocultural studies of interest have emphasised different aspects of interest from most of the studies reviewed in Chapter 2. In particular, the notion of canalisation has been used to frame interpretation of data and other motivational researchers, such as Nolen (2007) and Turner and Patrick (2009), have indicated that it is theoretically and analytically useful. Some of the other aspects emphasised in a sociocultural framework also are beginning to have an impact on how interest is framed by researchers who previously have based their work in the dominant social cognitive perspective on interest. For example, the importance of human relationships for development emphasised in sociocultural theory has apparently highlighted the role of others in the theorising of interest development in the Four Phase Model, and also encouraged articulation of the contextual nature of individual interest (Hidi & Renninger, 2006).

3.5 CHAPTER CONCLUSION

In beginning to explore the potential for a sociocultural theory of interest, I have drawn upon two established sociocultural approaches in this chapter: firstly Jaan Valsiner's (1997) theorising that focuses on the canalisation and self-canalisation of development and his work on the zone of proximal development and other related zones of development, and secondly on investigations of one type of community of practice, classroom learning communities (for example, Brown, 1997; Brown, et al., 1993). I have argued that Valsiner’s notions of canalisation and self-canalisation and his development and extension of the zone of proximal development can provide
important insights into and aid an understanding of the creation and subsequent development of interest. I also have argued that classroom-based learning communities, and other communities of practice, play important roles in assisting or constraining the development of interest.

A sociocultural perspective provides key notions which can be used to reconceptualise relationships and transactions between individuals and situations when theorising interest. A sociocultural theory of interest emphasises its developmental nature, focusing on the human relationships, cultural practices and physical environments in which interest originates and through which it is canalised. Notions such as transformative processes of internalisation and externalisation, and self-canalisation, are important to explaining the agency of the individual, and the transactions between the person and the communities of practice in which they participate. There is an emerging body of literature that is focused on sociocultural theories of interest. Further empirical research that frames interest from a sociocultural perspective, particularly in real classroom learning environments, is needed to advance and refine such theorising.
CHAPTER 4

RATIONALE FOR A SOCIOCULTURAL STUDY OF INTEREST DEVELOPMENT IN A CLASSROOM-BASED COMMUNITY OF LEARNERS

The previous two literature review chapters of this thesis have raised a number of issues in relation to the strengths and limitations of interest research to date and recent research that has investigated the possibilities of a sociocultural approach for conceptualising and studying interest development.

Previous interest research and theorising from a social cognitive perspective has distinguished between situational and individual interest to explain changes in the source, nature and intensity of interest over time and the relationships between interest and various aspects of learning. Explanations for the development of interest have been advanced within this framework most recently by Hidi and Renninger (2006; Hoffmann, et al., 1998) in the Four Phase Model of Interest Development. A sociocultural approach provides an alternative theoretical lens through which interest development may be considered that allows for elaboration of the nature of person-environment transactions within which interest develops. Further, a sociocultural approach highlights the importance of studying interest in real life contexts over time, which enables exploration of canalisation and self-canalisation processes as interest is internalised and externalised.

One of the main emphases when interest is framed from a sociocultural perspective is an elaboration of the way that interest develops within person-environment interactions. Previous conceptualisations of interest are consistent with a sociocultural approach that locates the creation and development of interest in the transactions between an individual and the environment in which that individual
participates. Elaboration of these transactions is possible through the notions of inclusive separation and the process of internalisation and externalisation, to explain how situational interest and individual interest co-occur, as Hidi and Renninger (2006) argue.

A sociocultural perspective emphasises the mutually constitutive nature of the development of the learning context and the individual learner (Wells, 1999). The context incorporates the peers and teacher with whom the student participates in learning and the ways in which intersubjectivity is negotiated. The student’s observations of ways of engaging with the content and activities within a domain, and opportunities within the context for creating interest with others through participation in real life activities within that domain, are important aspects in the creation and development of interest. The advantage of developing a sociocultural theory of interest that incorporates the notion of internalisation and externalisation as a dynamic, bidirectional system (Valsiner, 1997c, 2001) is that inclusive separation of the individual and the field of participation, or learning context, is conceptually and empirically possible (Valsiner, 1998). This allows for consideration of extrapersonal and intrapersonal development while maintaining the study of the total activity and provides a framework in which the co-occurrence of situational and individual interest can be studied and better explained.

A second significant benefit in framing interest from a sociocultural perspective is that it highlights the importance of research being conducted in real life contexts over time. Emphasis shifts to understanding development in relation to students’ participation in ongoing activities that are real in terms of the learning context, the meanings that the activities hold and the relationships with the people with whom the students are learning. A number of sociocultural theorists fundamentally view learning as the process of developing more central participation in particular communities of practice (for example, Lave & Wenger, 1991; Rogoff, 1998; Rogoff, et al., 1996; Rogoff, Paradise, Arauz, Correa-Chavez, & Angelillo, 2003; Wenger, 1998). Conceptualising the classroom as a specific type of community of practice, as a community of learners (Brown, 1997), places emphasis on students engaging in collaborative endeavours to learn about topics and issues that relate to the key concepts within a domain. The practices and values of a community of learners are dynamic; as students and teachers participate in activities within the community, they engage in ways that create, promote
and value certain processes and tools for completing tasks and ways of thinking about content within a domain. It is within the context of the classroom community that certain possibilities for engaging with a domain, topic and tasks are co-created by the students and the teacher as they interact and respond to one another's actions and shared ideas. Certain physical resources, such as networked computers, may also be accessible to students, which enable particular types of engagement with the content or with experts within a domain. Clearly, a classroom learning community intersects with other communities, such as families and out-of-school groups in which the students may participate, such as sporting clubs. Students' participation across a range of intersecting communities of practice will contribute to the ways in which their interest development is channelled or canalised along particular pathways.

It is also within the classroom community, as well as other intersecting communities of practice, that the learner explores and constructs identity. Identity incorporates notions about the self and the focus of potential interest, in terms of whether the learner can imagine having an interest within a particular domain (Renninger, 2009), and envisages participation within the domain over time that will enable that interest to develop along particular pathways. Possibilities for participation relate to both the values that the community holds, articulates and enacts, as well as the value that the learner places on the community's activities as a focus of potential interest (Nolen, 2006). The opportunities available to the learner to increasingly become a central participant in the activities of the community also are important to channeling, or canalising, interest and to negotiating identity development.

A key advantage of a sociocultural approach to explaining transactions between the broader learning context and individual contexts is that theoretical notions of canalisation and self-canalisation within zones of free movement (ZFM), promoted action (ZPA) and development (ZPD) (Valsiner, 1997b) can better describe and deepen understandings of processes of interest development. From a sociocultural perspective, a student's participation in particular communities of practice canalisates that student's interest, in that certain possibilities and constraints are negotiated and co-constructed with the teacher and other students. Canalisation processes guide a student's participation and make possible certain ways of valuing the processes and content of classroom-based learning.
Self-canalisation and negotiation of the ZFM/ZPA system are processes that recognise the agency of the individual student. The associated emotions and behaviours as students participate in classroom-based tasks are ways that interest, or conversely lack of interest, are externalised or expressed within a learning community. The specific learning community is an aspect of the broader context of the community activities, as well as individual practices as students and their teacher interact. Such individual expressions of interest contribute to promoting and limiting the community activities and the development of interest along established and/or new pathways within the ZFM/ZPA system. It is important to acknowledge the possibility of conflict between canalisation processes and self-canalisation processes, such that individuals may resist participation in classroom activities or a lack of interest may be experienced or expressed.

4.1 RESEARCH DESIGN

The present study has been designed to contribute to developing a sociocultural approach to theorising interest by investigating processes of development and social interaction in real life contexts over time. There is an emphasis on the social nature of interest but also the concern to explore individual variations in ways of participating and experiencing interest as it develops and is canalised in the classroom community.

A qualitative approach appears best suited to a sociocultural study of interest in a learning community because the associated research methods enable consideration of the learning contexts and interaction amongst participants in a way that contributes to researcher insights into different learners’ experiences and perspectives on their participation. It also supports the collection of rich descriptive data at the points at which interest may emerge and develop or not develop. As Valsiner (1992) and Winegar (1997) have discussed, we can only study internalisation processes by making inferences from externalised expressions or actions. This observation further indicates the need for a longitudinal research design to consider changes over time and the collection of data from a range of sources at varied time points to inform and enrich such inferences in relation to developmental change.
To further develop a sociocultural approach to conceptualising interest, the design of this study draws on a tradition of research that aims to inform and extend both theory and practice. The early design-based research conducted by Ann Brown and her colleagues (Brown, 1992, 1997; Brown, et al., 1993; Brown & Campione, 1996) in the Fostering a Community of Learners (FCL) program and the approach to design principles developed by John T. Guthrie and his colleagues (Guthrie & Alao, 1997; Guthrie & Cox, 2001; Guthrie, et al., 1998; Guthrie, Hoa, Wigfield, Tonks, & Perencevich, 2006) in the Concept-Oriented Reading Instruction (CORI) program strongly inform the research design of the present study. The key aspects of early design-based research that also characterise my research are that:

1. the study is an intervention guided by instructional design principles developed from the research literature to create an innovative classroom environment.

2. collaboration with the classroom teacher is integral to the conduct of the study.

3. case studies in naturalistic contexts are conducted at multiple levels. In particular, the study is focused on (a) an innovative classroom, (b) small groups of students working on specific tasks, (c) individual students and (d) the classroom teacher.

4. the concern of the research is to develop theory and practice.

Systematic evaluation/iteration/intervention is not characteristic of my study, which is where it differs from more recent research that has been conducted using a design-based approach (Barab & Squire, 2004; Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Joseph, 2004).

The purpose of the design approach in my study is to establish a classroom learning community in which the development of interest can then be investigated, to provide evidence to support and extend theorising interest from a sociocultural
perspective. Articulation of the principles on which the planning of classroom-based activities will be structured is therefore essential from the outset of the project. According to Guthrie, such principles consist of a set of features of the classroom context. ‘An ideal set of design principles is sustainable and capable of producing lasting change. They are feasible, able to be adequately understood, and realistically implemented by educators’ (Guthrie & Alao, 1997, p. 96). In my study, there were two stages in articulating the instructional design principles that were to characterise the study’s classroom context.

In the first stage, during the pilot phase of the study, I provided the classroom teacher with research literature that included principles from previous studies of classrooms as communities of learners (Bereiter & Scardamalia, 1993; Brown, 1997; Collins, 1998), key elements of theories of situated motivation (Paris & Turner, 1994) and findings relating to student interest in learning in classroom-based settings (Ainley, 2001; Bergin, 1999; Guthrie & Alao, 1997; Mitchell, 1993) and learning within the specific subject domain of science and technology (Faire & Cosgrove, 1988; Griffin, 1998). These principles, elements and findings from the literature were consistent with the specific focus of my research project on developing a context for exploring the strengths in framing interest from a sociocultural perspective. This research literature was shared with the classroom teacher to create a common base from which to construct more explicit instructional or pedagogical principles that would guide the design of learning units for students during my study’s main phase. The purpose in developing such principles was to create an innovative learning context in which interest development was socially and physically supported so that within my research, I could study the processes of that interest development within the class community and for individuals.

In the second stage, the classroom teacher and I negotiated a set of instructional design principles. These guiding principles were based on the literature we had considered during the pilot phase, but also incorporated the classroom teacher’s knowledge of the specific school context, the students’ prior experiences of learning science and technology and the nature of the content focus of the learning units. This contributed to the classroom teacher’s sense of being able to control these aspects of the classroom context, thus increasing the potential effectiveness of the design principles and the likelihood of them being integrated into this teacher’s practices over
the longer term. Rather than being a static set of principles, these evolved as they were informed and refined in interaction with the students during the main phase of the research project.

In designing the science and technology units, the seven initial instructional design principles were as stated below:

(1) The learning units are organised by the teacher in three clear phases: (a) Exploratory experiences are planned at the beginning to develop a common set of reference activities; (b) Increased opportunities for student direction of learning activities, through choice and negotiation of tasks and/or task focus; (c) Context for sharing and applying understandings concludes the learning unit.

(2) Students engage in hands-on investigations and design and make tasks, with opportunities to choose amongst options, pose and investigate their own questions or pursue study of content that surprises or intrigues them, or negotiate possible pathways within tasks and in ways of recording their investigations and findings.

(3) The teacher includes individual activities (including the creation of individual products informed by group work) and opportunities for collaboration with peers (in student chosen and teacher chosen groups) within learning units.

(4) Opportunities for small group and whole class discussion time are planned and guided by the teacher, when students engage in sustained talk about focus science concepts and, where relevant, problematic knowledge or issues that are the concern of the broader scientific community; for example, wildlife conservation and captive breeding programs.

(5) The teacher supports students in making links with domain experts and relevant institutions or communities of practice beyond the classroom, including promoting discussion and resource gathering at home as well as e-mail communication.
(6) The teacher shares her own enthusiasm for topics or ideas and other emotions she may feel during the process of learning together. The teacher leads the learning process because of her status as a more expert learner, however this leadership is democratic in its style and the teacher is an active participant in the learning process.

(7) Reflection on the learning process is fostered through written and oral reflection prompts, such as questions for journal reflection (individual and shared) and class newsletter contribution (shared).

These seven instructional design principles are based on motivational research, and more specifically interest research, in classroom-based settings (Ainley, 2001; Bergin, 1999; Guthrie & Alao, 1997; McPhail, et al., 2000; Meyer & Turner, 2002; Mitchell, 1993; Paris & Turner, 1994). Underlying the set of design principles are the four critical characteristics of academic tasks that motivate learning – choice, challenge, control and collaboration – as identified by Paris and Turner (1994). Design principle 2 reflects the research findings of McPhail et al (2000) and Ainley (2001), as well as Bergin (1999) in his review of literature, to highlight aspects of the classroom context that foster student interest. Design principle 6 is based on research that illustrates the importance of teachers’ affective responses, in that teachers’ demonstrations of positive personal emotions and motivation to learn correlate with student reports of positive affect and learning motivation (Meyer & Turner, 2002).

These initial instructional principles also are based on research that identifies key characteristics of classroom learning communities (Bereiter & Scardamalia, 1993; Brown, 1997; Collins, 1998; Roth & Lee, 2006), to support the classroom in this research project in developing as a community of learners. For example, design principle 1 reflects the cycle of learning which Brown (1997) identified as characterising a classroom community of learners: ‘(a) research, (b) in order to share information, (c) in order to perform a consequential task’ (p. 404). Design principle 2 bases inquiry on students’ own questions (Bereiter & Scardamalia, 1993) and creates opportunities for students to negotiate learning tasks and paths to completion. This enables diverse practices to legitimately develop within the classroom and thus more closely resembles an everyday out-of-school community than one typically based in a school (Roth & Lee,
Design principle 4 promotes student engagement with significant issues that are concerns of the broader scientific community, while design principle 5 supports communication between students and experts within the broader community (Brown, 1997). Design principle 6 reflects the decentralised authority and egalitarian structure of the classroom as a learning community (Collins, 1998) and the active participation of the teacher (Bereiter & Scardamalia, 1993).

Discussion of the ways in which these instructional principles were translated into practice and refined in the course of the science and technology units is continued in Chapters 6 and 8.

4.2 BROAD ANALYTICAL APPROACH

To capture such processes of interest development and interaction amongst participants within varied contexts necessarily means that levels of analysis change to simultaneously focus on whole class, small group and individual levels. This consideration of social and individual contexts is consistent with Rogoff’s (1998) notion of planes of focus, which allows the researcher to zoom in on one particular plane by foregrounding it analytically, keeping the other planes in view but as contributing to the overall context, rather than with a distinct focus. Similarly, Roth (2001) has used analytical zooming to identify patterns that occur simultaneously at multiple levels of the relations between the setting and individual. As noted in Chapter 2 of the literature review, many previous studies of interest have focused on interest as an internal state, conceptualised and studied only at level of the individual, or on interest as aroused by situational characteristics, for which attributes of external stimuli have been studied. As previously discussed, this distinction between the situation and the individual is conceptualised differently from a sociocultural perspective, so that the research questions that are asked focus more specifically on the dynamic transactions between the individual and the situation or context in which interest is created, maintained and developed over time.
4.3 BROAD AIMS

There are three broad aims of my study, in the following order of importance: firstly, to explore possibilities for theorising interest and its development from a sociocultural perspective; secondly, to develop a classroom-based research project to qualitatively explore and refine theorising of interest from this perspective; and thirdly, to consider implications for classroom practice and guiding pedagogical principles for supporting students' development of interest in classroom-based learning. The multiple purposes reflect a concern to inform both understandings of interest as a motivator for learning and innovations in educational contexts, and in the process, to contribute to overcoming fragmentation between basic and applied research in educational psychology (Pintrich, 2000).

4.4 RESEARCH QUESTIONS

To address these broad aims, the specific research questions that are investigated in my study are:

1. What roles do students' peers and the teacher play in co-constructing possibilities and constraints for the development of interest within a classroom-based learning community?

2. In what ways do the social and physical contexts of the classroom interact with self-canalisation processes to create possibilities for and constraints on the interest development of individual students?

3. What similarities and differences are evident in the students' participation in learning community activities and the experience and expression of interest of individual students?

4. What evidence emerges of students' interest in specific topics of study within the classroom that extends beyond this context, to out-of-school settings and other communities of practice in which the children participate?

5. How can teachers help students develop interest in classroom-based learning? More specifically, how do curriculum and organisational decisions made by the
teacher contribute to possibilities for social interaction and the physical settings in which students learn, in ways that support the development and sharing of interest?
5.1 INTRODUCTION

A sociocultural perspective emphasises the need to explain the development of interest in the context of participation in a community of practice. In any specific community of practice, certain activities are valued in relation to learning processes and subject matter. Theoretically, it has been argued in the preceding chapters that personal value and the construction of meaning have social origins, and both community and personal values and meanings channel, or canalise, the development of interest. Canalisation occurs within social and physical contexts, such as classrooms and excursion sites, in which children interact and learn with peers and teachers. Specific contexts create possibilities and constraints for interest development and the development of identity as a learner. These possibilities and constraints contribute to zones of action, movement and development, which are negotiated as people learn together. To further explore, inform and refine these theoretical claims in relation to a sociocultural theory of interest, the present study considered the classroom practices in the case of a specific learning community in which students engaged in science and technology lessons. This enabled a research focus on both the community and personal cultures that contributed to interpsychological and intrapsychological canalisation processes of students’ interest and, more broadly, to their motivations for learning.

This classroom-based study was conducted to inform an emerging sociocultural theory of interest development. The previous chapter established the need for this study, provided a rationale for locating it in a design-based research tradition (Brown, 1992; Guthrie & Alao, 1997; Guthrie & Cox, 2001; Guthrie, et al., 1998; Guthrie, et al.,
and outlined the broad aim and specific questions guiding the research. The purpose of Chapter 5 is to discuss the research design and qualitative strategies that were used to enable consideration of possibilities and constraints on interest development as students and their teacher engaged in activities in different ways, across varied social and physical settings. In this chapter, the main features of the study are described and its purpose explained. Included is an outline of the process of negotiating access to the school and the specific classroom, along with a description of the school and the members of the class, both students and teacher. Sources of data and methods of collecting data are described and the approach to data analysis and interpretation is indicated.

5.2 A BRIEF OVERVIEW OF THE RESEARCH PROJECT: EXPLORING THE DEVELOPMENT OF INTEREST WITHIN A CLASSROOM-BASED COMMUNITY OVER TIME

In this study I explored the activities and participation of a teacher, Ms Wheeldon, and students in a grade 5 class, 5W, as they taught and learnt about two different topics in science and technology lessons. The main phase of the study took place over a 6 month data collection period (January 2001 – June 2001) at Heathville College, an independent girls’ school2. This main phase was designed to enable interest to be considered from a sociocultural perspective as pedagogical design principles were developed, applied and reviewed to support the creation of a community of learners in science and technology lessons. In the main phase, the purpose was to gather evidence relating to the origins and development of interest through focusing on interaction amongst students and student-teacher interaction, as well as focusing on the contributions and responses of individual students within the class environment. Gathering such evidence about participants’ interaction in a classroom-based community provided opportunities for identifying the ways that the students and the teacher created, negotiated and responded to learning contexts in the classroom, playground and excursion sites. This enabled investigation of dynamic contexts in which interest may originate, be canalised, transformatively internalised and externalised. In gathering evidence about classroom practices, activities and interaction, the main strategies used to record researcher participant observation

2 While gender has been considered as an important variable in many previous studies of interest (for example, Hoffmann et al 1998), it was not the focus of my study.
included field notes, audio and video tapes, and still photographs. However, equally important was the use of various strategies, such as interviews and written reflections, to capture the perceptions of the individual participants in the learning community. The research design of this study thus aimed to ensure that observation was not limited to description and explanation of observable classroom behaviour, but also potentially provided access to factors underlying and contributing to the patterns of classroom interaction (Hammersley, 1990, p. 93), activities and practices. Consistent with contemporary approaches to design-based research (Edelson, 2002), ideally the study contributes to both educational theory and professional practice.

This main phase followed a three month pilot phase during the previous year (spanning August – September, October – November 2000), with a different class of grade 5 students but with the same teacher. The purpose of the pilot phase was to trial and develop strategies to support the creation of a classroom-based learning community in the main phase, to trial methods of gathering data and to develop a collaborative relationship with Ms Wheeldon through co-planning and team-teaching science and technology lessons. Data were not gathered from specific students in this initial phase, but researcher field notes were recorded in relation to classroom organisation and interaction, the focus and content of student learning, and specific events. Prior to conducting the pilot phase of the study, informed written consent was obtained from the principal of the participating school (Appendix A) and the classroom teacher (Appendix B). Prior to participation in the study's main phase, informed written consent was given by students (Appendix C) and their parents or guardians (Appendix D). Pseudonyms have been used for the school and individual participants, and data have been securely stored (Punch, 1998).

5.3 THE RESEARCH CONTEXT

In this study, I sought to observe social interaction within a classroom learning community to try to gain insight into the origins and development of interest in learning within the domain of science and technology. By working closely together, the aim was for the classroom teacher and researcher, explicitly, and the students, implicitly, to develop a class environment that was guided by curriculum design principles that support the development of a classroom community and motivation, more specifically, interest in learning. With this focus, I sought to select a school that encouraged
progressive education and a teacher who was comfortable using collaborative, negotiated approaches to learning. Consideration of sampling was therefore important. As Wellington (2000) acknowledges, sampling always involves compromise at some level, whether a study is of qualitative, quantitative or mixed-method design. The researcher’s judgment and focus of inquiry should guide the selection of a sampling strategy, so that the phenomena under examination can be most clearly understood (Maykut & Morehouse, 1994). Purposive or theoretical sampling (Llewellyn, Sullivan, & Minichiello, 1999) therefore was employed in this study, with selection of participants in terms of the school, class and teacher based on relevance to the emerging theory of interest development. The focus was on identifying a school that supported innovative practices and fostered a culture of learning for both students and teachers. Within this school, there was a further concern to locate a classroom which was student-centred and in which the teacher was willing to apply and develop pedagogical design principles to facilitate a classroom learning community. Furthermore, I was concerned with identifying a class, and focus students within that class, in which the children already expressed interest and lack of interest in or resistance towards aspects of learning, so that it was possible to study the development of interest.

5.3.1 The school research site: Heathville College

Heathville College is an independent pre-school (P) to grade 12 girls’ school in suburban Sydney. It is a private school, in that parents pay fees for their daughters to attend, and it also has an affiliation with one of the main Christian denominations in Australia. However, religious beliefs are not a criterion for student enrolment and as a result, Heathville College is an ethnically and religiously diverse school, which attracts students living in mainly inner city, western, northwestern and southern Sydney metropolitan regions. Students are from families that can afford the costs of private school fees (approximately AUS$6000 per annum in primary school years). The school awards a small number of academic scholarships to cover secondary school (grades 7-12) tuition fees of high achieving students, but also awards bursaries to enable enrolment of students from lower socioeconomic households.

Heathville College has a primary school with approximately 350 students enrolled from Kindergarten to grade 6, with staff employed by the school as classroom teachers as well as specialist teachers in learning support (gifted and talented, English
as a Second Language and special education), music, sport, library, languages other than English and computing. As an independent school, families make a choice to send their daughters to this particular school and reasons for choice obviously are varied, but may be influenced by religion, desire for single sex schooling, dissatisfaction with local public schools, the academic reputation of the school, or the facilities available to students. Parental involvement in the school occurs through organisations such as the Parents and Friends Association and canteen assistance, with minimal involvement in class learning and teaching programs outside of accompanying classes on excursions. Parent information evenings are held in term 1 each year, with parent-teacher interviews formally held once during the year but with teachers and parents meeting more often if the need arises. Parents receive formal reports about their child’s progress towards learning outcomes at the conclusion of terms 2 and 4. These reports are accompanied by a portfolio containing work samples completed by their daughters that demonstrate the level of achievement of outcomes.

At the time of the research, the staff at the school was encouraged to include progressive teaching and learning approaches in their class programs, supported by a head of curriculum P – 12 and a liaison curriculum coordinator in the primary school who provided professional guidance and encouragement to teachers. Leading up to the pilot phase of the project, I was invited to present a session about classroom learning communities at a P – 12 staff development day and to be a ‘critical friend’ of the head of curriculum who was developing new programs in the lower secondary school at the time. I was keen also to contribute to the broader school context through my research, and for other teachers in the school to contribute to the focus of the research project. Two series of professional development workshops were held at the school to engage staff in professional discussion and ‘trials’ of strategies relating to two important features of the research project: the classroom as a learning community and learning journals. At the beginning of term 4, flyers were displayed in staff areas from P – 12 inviting teachers to attend the initial workshops for one or both of the workshop series. These workshops were held after school and reminders about the workshops were also included on the staff bulletins in the weeks they were held. Eleven teachers (2 preschool, 7 primary school, 2 secondary school) participated in the first workshop focusing on learning communities and ten teachers (7 primary school, 3 secondary school) participated in the first learning journals workshop. The purpose of the first workshop in each series was for me to share some of the research relating to each focus topic and for the teachers to share aspects of their current practice that were
relevant. By the end of the first workshop, the aim was for teachers to identify a new strategy that they would like to trial in their own classrooms. The second workshop then focused on providing collaborative support for this change, with the third workshop intended to share the perceived success or otherwise of the use of the strategy. The teachers were contributing to my research project indirectly, as the strategies trialed impacted upon those that were used in designing the learning units in the main phase of the project and in collecting data through reflective, journal-style writing.

Prior to conducting this research, I was employed as a classroom teacher at Heathville College (1995 – 1998). There were advantages in conducting the project in a familiar school context in which I had previously taught. The benefits included having an established relationship with the students as a participant in their learning activities, which involved a degree of trust and shared history, and an established ‘insider’s’ understanding of the school culture and dynamics amongst staff. In the main phase of the research project, some of the students in the focus class had been taught by me over a four week period when I worked as a casual relief teacher at the school in 1999. According to the students, I had a reputation for being a fair, ‘fun’ teacher and during the time that I was conducting my research at Heathville, some students and parents approached me to ask whether I would be returning to the school to teach. Generally, I appeared to have a positive image as a teacher in the eyes of the students. In the year following the main phase of the data collection (2002), I was employed again as a teacher at the school, to work part-time as a grade 6 English teacher for a small extension class. Some of the students from the grade 5 research class were members of this grade 6 group in the year following my project.

5.3.2 The classroom teacher: Ms Wheeldon

Ms Wheeldon was asked to participate in this study because of her reputation amongst students, parents and staff at the Heathville College. She was an enthusiastic, committed and competent teacher, with an often zany sense of humour that she shared with both colleagues and students. In 1999, she was selected by Heathville College’s executive team to form part of a small group of staff to consider innovative teaching and learning strategies and programs. From the outset of the present study, Ms Wheeldon was open to fostering learning in science and technology guided by design
principles developed from a community of learners pedagogical model (Brown, 1994, 1997 #46), in both classroom and out-of-classroom learning environments.

At the time of the study, Ms Wheeldon was a generalist primary teacher in her late twenties who had taught in urban schools and as a governess in rural Australia. She was of Anglo-Saxon descent and had grown up in rural Australia. She had been employed by Heathville College for four years and it was her third consecutive year of teaching grade 5. Initially, I had met Ms Wheeldon in 1998 as a teaching colleague when I was also teaching at Heathville. In the two years before the pilot phase commenced, we developed and had maintained a friendship that was based on our shared professional interests.

Throughout the research project, Ms Wheeldon demonstrated that she was a reflective teacher, frequently initiating discussion with me about ways of improving and extending her practice and critically questioning aspects of research into classrooms as learning communities. Her own commitment to continued learning and a desire for ongoing development in her teaching was reflected in her decision in 2002 to commence a Masters of Education degree and her selection by an Asian Studies teaching association to be a member of an educational study tour in India in 2003. The credibility and dependability of the project also were enhanced by the role that Ms Wheeldon played in providing insights into the students’ involvement and expressions of interest, and as a sounding board in regard to emerging research themes. She was invited to read and contribute comments to my analytical and interpretive summaries, and was provided with opportunities to verify or offer alternative interpretations (Lincoln & Guba, 1985). Since her involvement in the project, we also have engaged in writing together for conference presentations and publication.

5.3.3 The classroom research site: 5W

The primary concern in this study was to gain deep insight into the interaction and activity of one grade 5 class and to investigate how this may lead to the development of interest or, conversely, a lack of interest in learning. Grade 5, the second last year of primary school, was selected because of research indicating that students’ interest and motivation for learning broadly, as well as in science more
specifically, generally declines during the transition to high school and as they enter adolescence (Hidi & Harackiewicz, 2000; Speering & Rennie, 1996). It therefore was anticipated that the pattern of motivational decline would not yet have taken effect. The participants in this study were members of a class of 26 grade 5 students (10 – 11 years old), one of two grade 5 classes at Heathville College. The students in the class came from diverse ethnic backgrounds, including Greek (5 students), Chinese (3), Vietnamese (2), Indian (2), Korean (1), Italian (1) and Lebanese (1), with most of these speaking another language in addition to English at home.

Two school terms (approximately 6 months) were spent observing the focus class in the main phase of the project. During these two terms, I worked closely with Ms Wheeldon to develop the class science and technology learning units so that there was an emphasis on applying guiding design principles for fostering a classroom learning community. Features that were emphasised included opportunities for student collaboration, negotiation and choice in their learning; a focus on ‘real life’ problems and issues; contact with experts in the fields of study, such as an electrician and science educators from the Taronga Zoo; and integrated activities that lead to a task that requires application; and evaluation of what has been learnt. These features have been identified as key aspects of a community of learners (Brown, 1997) and strategies used by Brown such as jigsaw groups were also employed in the present study.

The two class learning units focused on electricity and conservation of energy resources (term 1 – 11 weeks), and eggs, egg-laying animals and the role of zoos (term 2 – 9 weeks). These topics had been taught by the class teacher in previous years, but the learning units were refined and further developed in the course of this research project. Science and technology lessons were timetabled weekly and were usually just over one hour in duration. Towards the end of each unit, however, additional classroom time was allocated to science and technology, as tasks such as designing and making a model of a zoo enclosure were integrated with art. Following collaborative planning meetings, Ms Wheeldon created overviews of the units as records within her teaching program (Appendix E).

From within the grade 5 class, six students were selected as key informants or focus students in the study. The decision was made to select six because this seemed a manageable number, given that the project was being conducted by a single
researcher, yet it also provided the potential for investigation of the variation amongst the individual children. At the beginning of term 1, observations made by Ms Wheeldon and me in the first three weeks of the academic year were used to guide selection. The criteria included students who self-identified by expressing interest or, conversely, lack of interest in science and technology as a school subject domain, or who were initially observed as engaged in or resistant towards participation in science activities during classes. The focus students were not intended to be representative of the class. The selection of the students was guided by the ‘interestingness’ of each student, in the context of the research project’s focus on the development of interest as students participate in the activities of a classroom learning community.

5.4 STRATEGIES FOR GATHERING DATA: UTILISING MULTIPLE RESEARCH METHODS OVER MULTIPLE TIME POINTS

In this study, I sought to more richly and insightfully describe the processes of interest development. The four research questions articulated in the previous chapter have guided this study, so that the focus is on investigating:

1. the theoretical and methodological consequences of reconceptualising interest from a sociocultural perspective.

2. the role of peers and the teacher in constructing possibilities and constraints for the development of interest within a classroom-based learning community.

3. the social contexts of the classroom and how these interact with self-canalisation processes to develop possibilities for, and constraints on, the interest development of individual children.

4. the curriculum and organisational decisions made by the teacher that support the development of students’ interest.
Thus, the focus was on the classroom as a dynamic research site over time, with the aim of gaining in-depth insight into the interactions amongst students and their teacher within specific activity contexts. The strategies used to collect data needed to take into consideration that we do not recognise interest until it actually emerges in an externalised form (Valsiner, 1992). My approach to data gathering thus needed to create opportunities for locating evidence of recognisable interest emerging in the classroom community more broadly and for focus students more specifically. I needed to collect data about the classroom learning context, science and technology activities, small group learning and individual participation to provide sufficient information to allow me to ‘back track’. By back tracking, I mean that once students began to express their interest, I needed to be able to consider previous events and lessons to try to identify the origins and development of that interest in the social interaction of the classroom and in an individual’s participation.

To facilitate data back tracking and to enhance data credibility, information was gathered from multiple sources using different research methods over the six month period. This created a relatively prolonged engagement with the school and classroom setting. The advantages of spending a prolonged period in the setting included the building of trust between the researcher and participants and opportunities to observe learning processes over time (Lincoln & Guba, 1985; Wolcott, 2001). The research design incorporated data triangulation, in the forms of time triangulation and person triangulation, and methodological triangulation (Delamont, 2002; Wellington, 2000). There were multiple copies of the same type of data source collected over the main phase of the study, as well as different sources of data collected in relation to the same events by using different methods. As a participant observer during 5W science and technology lessons, I took field notes and audio, video and photographic records over two school terms, with students engaged in learning about two different topics. At the same time, reflective writing and class notes/program outlines were collected from students and the teacher, and a researcher journal was kept. Furthermore, informal and semi-structured interviews with focus students and regular discussions with the teacher provided opportunities to probe the perspectives of the different participants in the classroom learning community. Such interviews were conducted at regular intervals during the six month main phase, but also to follow up students’ on-going experiences and reflections on their classroom participation during the project at two subsequent time points. In employing triangulation in the research design, trustworthiness is enhanced (Lincoln & Guba, 1985) and there is an acknowledgment and utilisation of
subjectivities in the research context (Bassey, 1999) through data being gathered from various participants in the classroom activities so that multiple perspectives, including that of the researcher, can be considered.

The strategies for gathering data are described in detail in the sections that follow. For each strategy, an overview of the approach I took to collecting the data is described and the purpose of using the strategy is highlighted. Participant observation is the first strategy discussed, as it was used to understand the classroom community context, small group interaction and individual participation. Strategies to understand individual perceptions of participation in the classroom activities included reflective writing, trajectory graphs, family conversations and interviews with focus students. These strategies are detailed in subsequent sections.

5.4.1 Participant observation

Participant observation was the central strategy that I used to gather data. This involved me making and recording observations of classroom activities and students’ participation whilst interacting with the students and teacher. For the most part, my role in the present study verged on ‘complete membership’ within the school context, contributed to by my former employment and continued work there as a casual teacher. Although it is acknowledged that teachers and parents possibly perceived me differently in my role as a researcher, it is evident from interviews with students during and following the project that they saw me as an additional teacher, assisting their ‘real’ teacher in the classroom. Over the two terms that I was in the field for the main phase of the study, my participation appeared to become less prominent to the students and teacher through my on-going engagement in the activities of the class group. Delamont (2002) and Hitchcock and Hughes (1995) advise that in such cases, strategies for making the familiar ‘strange’ should be considered. An example of such a strategy in the present study was the engagement of critical colleagues both within and outside the research site to gain insight into different perspectives on the familiar context of the classroom. From the students’ acceptance of my presence in the classroom as shown by their willingness to approach me for assistance, to share stories about their lives and the expectation that I would be present for science and technology lessons, it appears that I became accepted by them as having insider status.
5.4.1.1 Observations of classroom activities, interaction and participation: Whole class, small groups and individual students

Observations of the 5W classroom community, in particular student interaction and participation, were made by focusing on three overlapping contexts: the activities of the class as a whole, including Ms Wheeldon; the activities of small groups of students as they completed learning tasks; and the activities of individual students. Interaction was observed amongst 5W students, as well as between students and Ms Wheeldon, during science and technology lessons or related events such as a guest speaker visit. Observations primarily were made in the classroom, but also in the playground and at a field trip site, Taronga Zoo.

Observational data included both verbal and nonverbal cues and provided me with a contextual knowledge of events. This created the potential for gaining deeper understandings of the activities and of their meanings for individual participants, particularly when considered in conjunction with reflective journal entries, trajectory graphs and interview data (Hoepfl, 1997). The organisation and delivery of the class program for science and technology, the structure of the physical setting and the impact of these upon social interaction also were important in observing the possibilities for and constraints on students’ interest development.

The focus of my observations of the whole class context, group work and individual students was guided by previous studies of interest. Theoretically, as discussed earlier in section 2.2, Dewey (1913) made a number of claims in relation to interest that have implications for observable indicators within whole class and small group activities as well as individual participation. The first of these claims is that interest has an emotional aspect or ‘fullness of heart’. Dewey claimed that pleasure, personal satisfaction and wellbeing are associated with interest; as an activity grows and becomes increasingly complex, the associated interest brings happiness to children. To Dewey, interest is evidence of the emotional engagement of the self with objective subject matter. The second claim made by Dewey is that while the object of interest may vary, interest is marked by the way that an individual is absorbed by a course of action, an occupation or a pursuit in a thorough, ongoing way. Thirdly, Dewey distinguished between intellectual interests, practical interests and social interest (interest in persons), the latter of which he claimed as more likely for a child than
adults. Finally, Dewey (1913) claimed that, ‘The strength of the interest in other persons and their activities and aims is a natural source for making activities broad, generous, enlightened in scope; while the physical, manual, and scientific interests in their identification with objects make for a broadening of the self’ (pp. 88-9). Children need to see other people’s interest and action with things in order for those things to become of interest to them, rather than matters of indifference. The implications for classroom observations that can be drawn from Dewey’s theoretical claims are presented in Table 5.1.

Table 5.1

*Indicators of interest drawn from Dewey’s theorising that guided my classroom observations*

<table>
<thead>
<tr>
<th>Dewey’s theoretical claim</th>
<th>Observable indicators of interest that follow from this claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest has emotional aspects</td>
<td>◦ expressions of pleasure and happiness</td>
</tr>
<tr>
<td></td>
<td>◦ expressions of a student’s increasing concern and engagement with a particular topic or activity</td>
</tr>
<tr>
<td>Interest absorbs individuals in an ongoing way</td>
<td>◦ a student’s continuing and developing engagement in activity related to a particular topic or task</td>
</tr>
<tr>
<td>Distinction between intellectual, practical and social interests</td>
<td>◦ expressions of a student’s interest in ideas, tasks and in other people (peers, teacher, guest speaker) as she engages in classroom activities</td>
</tr>
<tr>
<td>Interests in other people and their activities can broaden students’ interests and their sense of self</td>
<td>◦ interaction between a student’s peers, teacher, guest speakers and other experts, which prompts interested engagement in activities</td>
</tr>
<tr>
<td></td>
<td>◦ expressions of a student beginning to identify her sense of self with an object of interest eg. ‘I liked that task because I am a scientific sort of person’</td>
</tr>
</tbody>
</table>
Other indicators of interest more specific to observations of individual participation in an activity were drawn from quantitative studies conducted by Schiefele (1996; Schiefele & Rheinberg, 1997) and Krapp (1992), as well as from a review of interest literature conducted by Bergin (1999). A qualitative study of a student’s interest in the process of classroom interaction conducted by Ainley (2001) also provided guidelines for some observable indicators of the arousal of the state of interest. The indicators of interest relating to individual involvement that have been drawn from these studies is summarised in Table 5.2.

Table 5.2

*Observable indicators of interest drawn from select studies*

<table>
<thead>
<tr>
<th>Observable indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of time spent ‘on-task’ – focused and intense attention, persistence and concentration</td>
</tr>
<tr>
<td>Losing track of time - relatively effortless attention</td>
</tr>
<tr>
<td>Sharing findings or experiences with others, or expression of the desire to do so</td>
</tr>
<tr>
<td>Seeking further opportunities to pursue and learn about topics</td>
</tr>
<tr>
<td>Expressing desire to revisit (ideas/topics/places etc) and elaborate</td>
</tr>
<tr>
<td>Taking notes or sketches (unprompted)</td>
</tr>
<tr>
<td>Posing questions, particularly questions to resolve uncertainty – questions as information seeking, to expand knowledge and understanding, to develop meaning</td>
</tr>
<tr>
<td>Expressing positive affect</td>
</tr>
<tr>
<td>• Feelings of pleasure, involvement and stimulation</td>
</tr>
<tr>
<td>• Feelings of surprise, excitement and enjoyment expressed facially, through gesture and in language eg. Expressive positive exclamations</td>
</tr>
<tr>
<td>Making links between prior knowledge and new experiences</td>
</tr>
<tr>
<td>Experiencing personal significance of a knowledge domain</td>
</tr>
</tbody>
</table>
This prior research highlighted some of the indicators of interest that might be observed in the classroom and was used as a general guide to inform observations rather than to create checklists or limit possibilities for what might be recorded in field notes. The prior empirical studies cited were not conducted from a sociocultural perspective and thus interest was conceptualised within a different framework to that in the present study; as such, field notes needed to capture other aspects of interaction over time to enable consideration of interest development.

5.4.1.2 Strategies used for recording observations

Field notes were made as a record of observations and conversations, without the interpretations of the researcher and in an attempt to closely describe events and capture the exact words of participants as much as possible. Inferential comments also were made in field notes, but were distinguished as such through reflections made following periods of observation. Where relevant, diagrams of the physical layout of the setting were also included in field notes (Maykut & Morehouse, 1994) and still photographs were taken of students’ participation in activities to facilitate analysis of physical contexts. Copies of any handouts to students were gathered and field notes were made of anything written or drawn on the blackboard by the teacher, to provide information about the structuring of the classroom learning environment in relation to affordances and constraints on interest development.

Some whole class activities and interaction of small groups containing one or more focus students were audio and/or video recorded during the main phase of the study. Eleven segments of whole class activity were video recorded, eight video recordings were made of small group interaction and eleven audio recordings were made of small group interaction. Recordings were made at various stages of a lesson or activity sequence, to enable subsequent review of events leading up to the emergence of observable interest. Two small tape recorders were used for audio recording and one mini-cassette tape, hand-held video camera was used to record classroom interaction. In one lesson, an additional camera was borrowed and set up on a tripod at the side of the classroom in an attempt to get a ‘bird’s eye view’ of general class activity, while the other video camera was held by a research assistant and moved to focus on action in relation to particular student groups (Clarke, 2000). As a research assistant was not available for the duration of the study, this was not a regular
part of the data collection. Generally, the audio tapes produced much better quality sound recordings than could be captured by the video camera microphone. This resulted in less frequent video taping in the second term of the project. Both types of recordings were made to enrich observation and to complement field notes, as well as to enable later review and continued analysis.

5.4.2 Strategies for gaining insight into participants’ perspectives

Reflective writing and interest trajectory graphs were gathered from individuals within the class community to gain insight into the learning activities from the point of view of the participants, especially the students. To a lesser extent, two-way postcards sent between the students and teacher or researcher and surveys that students conducted with their parents as family conversations provided further insights into students’ perceptions of their interest development. Interviews were conducted with students and the teacher to complement observation and analysis of students’ reflective writing.

5.4.2.1 Reflective writing: Students, teacher and researcher

The students were prompted to make entries on the left hand pages of their science and technology books, designated for journal-style reflection, during most lessons. Left hand page reflections included both free choice and ‘guided’ reflection using question prompts usually posed by Ms Wheeldon and me or negotiated with the students. Examples of such reflective questions are provided in Table 5.3. The students sometimes discussed responses with a partner or small group but recordings were made individually. These written reflections were related to issues emerging from my observations of the class. Through asking the students to reflect, I sought to track changes and development in individual students’ experiences and perceptions of their interest in learning. For example, many of the students had commented in conversation that they really liked science and technology because of ‘the experiments’. To explore what they meant by this claim, I asked students to use their left hand page reflection to tell me what they thought experiments were and what they liked/disliked about them. Such reflections were also used as a stimulus to discussion during some interviews with focus students.
Table 5.3

Prompts for student reflection recorded on the left hand page of their workbooks

<table>
<thead>
<tr>
<th>Date</th>
<th>Prompts for reflection</th>
<th>Source of prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.2.01</td>
<td>Tell me something about today’s lesson (thinking, feelings, your group, discussion, interests, ideas, what you learnt, what you did).</td>
<td>Researcher</td>
</tr>
<tr>
<td></td>
<td>What is an experiment? What do you like/dislike about them?</td>
<td>Student-suggested points also included (italicised)</td>
</tr>
<tr>
<td>23.3.01</td>
<td>Write about your product.</td>
<td>Suggested by students</td>
</tr>
<tr>
<td></td>
<td>Feeling about making – reasons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What I learnt or discovered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any problems? – how you solved</td>
<td></td>
</tr>
<tr>
<td>4.5.01</td>
<td>What are you thinking and feeling about this term’s science topic? Do you think it will be more or less interesting than last term? Why?</td>
<td>Researcher</td>
</tr>
<tr>
<td>11.5.01</td>
<td>What do you think you will remember from today’s lesson? Why?</td>
<td>Researcher</td>
</tr>
<tr>
<td>1.6.01</td>
<td>Which animal are you studying?</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td>How do you think our excursion was helpful/not helpful in terms of your research?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Why did we visit the zoo?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What did you learn at the zoo that would have been difficult to find in books or on the internet?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Was the daily schedule different or similar</td>
<td></td>
</tr>
</tbody>
</table>
Through access to these written reflections, I sought to gain insight into the students’ understandings of class activities and interaction in the classroom, playground and field study settings. More specifically, the varying self-perceived ‘levels’ of interest amongst individual students in the class could be identifiable in their entries.

Another source of data indicating students’ perceptions of their learning was provided by a class newsletter, written by students and distributed to parents at the end of each term. In these newsletters, the students wrote about their classroom-based learning activities and wider school involvements for the term. As the newsletter items took the form of reflective recounts, they were collected for the two school terms of the main phase of the study.

The teacher also was asked to regularly record her own reflections on science and technology lessons and her observations of students’ participation with a view to interest identification. Ms Wheeldon was more diligent in making journal entries in the first term of the study than in the second, which meant that I increasingly engaged in reflective conversations with her, that I subsequently recorded as field notes. The latter form of reflection took up less of Ms Wheeldon’s time.

As the researcher, I recorded my reflections throughout all phases of the project as well. Entries from this journal, as well as field notes, were sometimes ‘fed back’ to the students and Ms Wheeldon for comment during interviews and informal conversations.
5.4.2.2 Interest trajectories: Charting self-perceptions of interest development retrospectively

Another tool used for gathering reflective data was the use of students’ recording of self-perceptions of their relative interest across activities within lessons across the term. Students were given a numbered list of all of the activities for the first 5 lessons, as well as the guest speaker visit, in term 1 and the first 6 lessons, including the zoo excursion, in term 2 (Appendix F). The students then were given a blank graph, with a 7 point Likert scale of levels of interest on the vertical axis and the numbers of the tasks on the horizontal axis (Appendix G). They were asked to think back to each activity, and retrospectively chart how interested they remembered feeling in comparison to the other activities they had completed. This helped from a ‘recency bias’ perspective, as students were reflecting upon their relative interest in tasks over time and so were not just selecting higher or lower ratings for those activities most recent in their memories. In the case of either term, the students completed the trajectories following the visit from the guest speaker or the zoo field trip, which were respectively in weeks 5 and 6 of the 10 week long school terms. Additionally, in lesson 2 of term 1 and lesson 3 of term 2, each student created a trajectory chart at the time of that lesson, so that these concurrent ratings for tasks could be later compared with those made retrospectively for those same tasks, to consider whether students’ perceptions of their own interest changed over time (see Chapter 6, section 6.3.1).

As well as providing insights into the interest of the individual students, the particular aspects of pedagogical practice with consequences for interest development could be identified in the trajectory patterns across students. These ‘peaks’ and ‘troughs’ in interest trajectories across students were used to identify activities which generated high or low levels of interest within the wider classroom community, which could then be considered in conjunction with observation field notes to gain a rich picture of the context in which interest was emerging and developing. Trajectories also were used as a stimulus for discussion in interviews with focus students to explore their reasons for rating particular activities.

At the time the students completed the retrospective trajectories, they also were given a questionnaire to complete. This comprised five open-ended questions (Table 5.4). The purpose of asking these open-ended questions was to gain insight into the
meanings being made by the students in relation to their learning, so as to provide me with contextual information when subsequently interpreting the graphs they created.

Table 5.4

*Questionnaire completed by students prior to creating their interest trajectory graphs*

<table>
<thead>
<tr>
<th>Open-ended question</th>
<th>Purpose in asking question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe what we’ve been doing in science this term.</td>
<td>To gain insight into what the students regarded as the key elements of their science and technology learning.</td>
</tr>
<tr>
<td>2. When Ms Wheeldon writes on the board that you have science on Friday mornings, what do you think and feel about this? Why?</td>
<td>To ascertain students’ general attitudes towards science and technology lessons and the reasons for them feeling this way. Each day, Ms Wheeldon would write up the schedule of lessons for that day, so that students could make reference to it and know what was planned for their learning.</td>
</tr>
<tr>
<td>3. Some girls have told me that they find science lessons interesting. When is science interesting for you? When is it not interesting? Give reasons and examples.</td>
<td>Directly raised the term ‘interest’ in an attempt to gauge what students considered to be of personal interest, as well as what was not of interest, in relation to science and technology lessons.</td>
</tr>
<tr>
<td>4. If I was watching you learn, how would I know you were interested?</td>
<td>To establish students’ perspectives on possible observable indicators of interest.</td>
</tr>
<tr>
<td>5. Tell me anything else you’d like about your learning this term.</td>
<td>To enable students to raise anything that they thought might be of interest to me.</td>
</tr>
</tbody>
</table>
5.4.2.3 Postcards and family conversations

Two further strategies for reflection were used in the project to a more limited extent. First, a model of a postbox was placed near the classroom door to the playground and a supply of blank ‘two-way’ or interactive postcards were placed on top. The students were encouraged by Ms Wheeldon and me to write to either or both of us about their learning, during any spare time they had, at school or at home. There was space on the reverse side of the postcard for us to reply. The students created a ‘pocket’ inside their learning journals to store these postcards, enabling them to keep them and refer to them in the future. The intention was to allow the students scope to raise issues in their learning that may not have been otherwise considered by me. While some students took the opportunity to write postcards in the first month of the project, interest in using this strategy quickly waned. This may have been due to the unstructured nature of the task and the lack of time specifically allocated for postcard writing.

Secondly, family conversations were used to foster reflection at the end of each term. These conversations were structured around a survey that I had designed to be taken home by students and discussed with one or both parents (Appendix H). The questions probed the parents’ observations of their daughter’s response to the science and technology unit in the context of their interaction at home, as well as trying to elicit an indication of the parents’ perceptions of both their own interest in the science topic and their daughter’s interest.

Each of these strategies was incorporated to provide me with information about students’ perceptions of the broader context of their learning and interest development, in terms of their family and outside-of-school activities. By gathering this information, I glimpsed some of the ways in which family members and family activities canalised students’ interest in science and technology.
5.4.2.4 Interviews

Interviews were used to complement observation and analysis of students’ reflective writing, and to follow up on issues that emerged in classroom activity and interaction. Interviews took two forms: (a) informal, conversational interviews in the field with the students and Ms Wheeldon, and (b) a series of semi-structured interviews with each of the six focus students. Both interview forms were important in exploring participants’ understandings and perceptions of constraints and affordances on interest development across a variety of learning settings.

Informal interviews

In order to gain insight into multiple perspectives, I conducted interviews with the six focus students and in most lessons I had short conversations with various members of small groups who had been working together within the class learning community. Brief researcher notes were made in my research journal following such informal interviews with students in the field. On three occasions, these informal field interviews were audio tape recorded: firstly, while students were in the process of designing and making their electrical products (16 March 2001); secondly, following the zoo excursion (31 May 2001) when interviews were conducted in the bus on return to school; and thirdly, when interviews took place during the time when students were setting up the ‘class zoo’ (29 June 2001). Such informal interviews were brief, ranging from a single question and answer to a conversation of five or so minutes.

Regular reflective conversations with Ms Wheeldon also were recorded as field notes. These conversations frequently took the form of responsive, informal interviews. My questions were framed to gain insight into Ms Wheeldon’s perceptions of students’ involvement and engagement in learning activities and their expressions of interest. I also asked about her own purpose, in structuring classroom tasks in particular ways, such as through small group activity or with access to particular equipment or materials. Questions also related to her own interest in topics of student learning and activities that were a part of the class science and technology program.
Semi-structured interviews with focus students during the main phase of the study

Three pre-arranged semi-structured interviews with each of the focus students were conducted during the main phase of the study. Students were withdrawn from the classroom and the interviews were conducted either in an art room adjacent to the 5W classroom or in the school library. These interviews ranged in duration from 20 minutes to approximately 50 minutes. The initial task was for the student to arrange, in rank order, a set of cards which were labelled with the eight main subjects they studied at school: English, mathematics, science and technology, human society and its environment, art, physical education (sport), computers and music. This task was used to initiate conversation about what they learnt or did in some subjects that made them preferable to others. The guiding question schedules (Appendix I) varied on each occasion, however in each interview, the focus shifted to the observed science and technology lessons. Each interview was audio-recorded and detailed notes subsequently taken or full transcription made.

Although not used extensively, peer interviewing was another strategy employed to facilitate expression of reflective thinking of all of the students in 5W, rather than the specific focus students. I selected four ‘interviewer’ students, who then selected ‘interviewee’ peers to question. The students conducting the interviews created the questions for their peers, within the broad guideline of finding out about their experiences in science and technology for term 1. These interviews were conducted on 6 April 2001 during the lunch break and were only 1 – 2 minutes in length. It was anticipated that the children might be more frank talking with one another in the more informal setting of the playground than in a more formal interview with an adult. It was clear from the audio recordings of the peer interviews that the students enjoyed the process, however as it did not result in particularly insightful data for the purposes of the research, this strategy only was used on one occasion.

Interviews with focus students following the main phase of the study

Following the main phase of the study, semi-structured follow-up interviews were conducted individually with the six focus students. The purpose of the follow-up interviews was to contextualise observations during the research project in a broader time frame and to verify ongoing analysis and interpretation with the participants. The first follow-up interview was held in November, 2001 and the second interview took place in September, 2002. Both interviews again commenced with the subject ranking
activity then continued to explore key themes that had arisen in the main phase of the study. The guiding question schedules are presented in Appendix J. Each interview was audio tape recorded for subsequent analysis. Prior to conducting the 2002 interviews, additional consent was sought and gained from the parents of the six focus students, as well as the school’s principal (Appendix K).

These follow-up interviews were designed with two intentions in mind: (a) to investigate the stability of the students’ interest in science and technology topics and activities, beyond the main phase of the project; and (b) to explore students’ perceptions of processes that support the development of interest. The interviews also provided an opportunity to clarify aspects of data previously gathered from the students by asking questions that were specific to particular participants.

5.5 ANALYSIS AND INTERPRETATION OF DATA

I undertook initial analysis of data concurrently with data collection, so that the process was a continually informing cycle that included coding and categorising, data reduction and display, and conclusion drawing, leading to the formation of theories and possibly generalisations (Delamont, 2002; Miles & Huberman, 1994).

Coding and categorising: This is a process of bringing order to the data collected. Analytic categories were informed and guided by the research questions and the literature reviewed as I analysed the content of the textual data collected. I approached this task by undertaking multiple readings of field notes and reflections, and then categorising segments of text (Table 5.5). I then watched any video tapes that related to the specific lesson as I categorised the field notes, taking notes, generating comments and coding content. Throughout this stage in analysis, I had multiple files open on my computer to facilitate organisation. Consideration was given to the status of the categories within the analysis (Hitchcock & Hughes, 1995). From the generation of these categories, data collected were broken down into meaningful units and coded such that themes and trends emerged and coded segments were abstracted to contribute to displaying the data in a reduced form (Miles & Huberman, 1994), consistent with the study’s research questions.
Table 5.5

*Analytical categories and codes applied to data gathered in field notes and reflections, interviews and notes from video and audio tapes of classroom interaction*

<table>
<thead>
<tr>
<th>Categories</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest development and canalising factors</td>
<td>• Observable indicators (eg body language, emotions such as excitement expressed)</td>
</tr>
<tr>
<td></td>
<td>• Direct statements relating to personal theories of interest</td>
</tr>
<tr>
<td></td>
<td>• Interest in school and outside</td>
</tr>
<tr>
<td></td>
<td>• Learning processes (eg design and make tasks, fair testing, small group problem-solving)</td>
</tr>
<tr>
<td></td>
<td>• Teacher-student interaction</td>
</tr>
<tr>
<td></td>
<td>• Questions (student and teacher)</td>
</tr>
<tr>
<td>Participation of focus students and interest development</td>
<td>• Enjoyment and fun</td>
</tr>
<tr>
<td></td>
<td>• Novelty and the unanticipated</td>
</tr>
<tr>
<td></td>
<td>• Purpose and relevance (including previous learning and future utility)</td>
</tr>
<tr>
<td></td>
<td>• Choices (within and between tasks, topics, group membership)</td>
</tr>
<tr>
<td></td>
<td>• Challenge and success/difficulty</td>
</tr>
<tr>
<td></td>
<td>• Individual or collaborative</td>
</tr>
<tr>
<td></td>
<td>• Active or passive involvement</td>
</tr>
<tr>
<td></td>
<td>• Developing identity (envisaging the future) and self-canalisation (including negative experiences)</td>
</tr>
<tr>
<td></td>
<td>• Relationships with and perceptions of significant others (family, peers, teacher) and participation in communities in and out of school</td>
</tr>
<tr>
<td>Attributes of the classroom community of learners</td>
<td>Evidence supporting:</td>
</tr>
<tr>
<td></td>
<td>• Student choice and options (diversity in participation)</td>
</tr>
<tr>
<td></td>
<td>• Student purpose and ownership of tasks</td>
</tr>
<tr>
<td></td>
<td>• ‘Real life’ issues as focus</td>
</tr>
</tbody>
</table>
- Discussion and activities to promote collective understanding and reflection
- Involvement of experts
- Teacher as a model learner

**Evidence against:**

- Competition amongst groups and students during learning
- Teacher control and teacher authority as dominant

<table>
<thead>
<tr>
<th>Class teacher’s pedagogical decision-making and classroom organisation</th>
<th>Role in class discussions and small group work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interaction with individual students</td>
</tr>
<tr>
<td></td>
<td>Task structure and resources</td>
</tr>
<tr>
<td></td>
<td>Class and group structures</td>
</tr>
<tr>
<td></td>
<td>Physical features of the classroom</td>
</tr>
</tbody>
</table>

| Relationship between the researcher and the teacher³               | Planning for learning and teaching             |
|                                                                  | Collaborative reflection                       |
|                                                                  | Fellow learners                               |
|                                                                  | Friendship                                    |

| Construction of researcher-teacher identity⁴                       | Emerging, negotiating and developing roles in the field |
|                                                                  | Research process                               |
|                                                                  | Relationships with teachers and students       |

To identify key events and episodes amongst the data, the trajectories charted by students were graphed so that trends in where class members perceived greater and lesser interest in tasks could be identified (see Chapter 6, section 6.3). Identification of peaks and troughs in students’ experiences of interest as related to particular tasks enabled selective, focused and more detailed analysis of related

³ The data that was categorised and coded within this field is not the focus of this thesis and has been analysed and discussed in Pressick-Kilborn, Griffin and Weiss (2006).
⁴ As for footnote 2
sources of data gathered from audio tapes of student interaction, audio tapes of interviews, class newsletters, teacher and student reflections, and photographs.

Data reduction and display: Through integrating my field notes and video data, as well as charting the content of audio tapes in relation to focus student participation, it was possible to focus on the contexts for learning in this classroom. A reduced, condensed, focused set of data drawn from a range of data sources, events and processes has been organised and displayed through the construction of a series of matrices (Appendix M), which ‘permit careful comparisons, detection of differences, noting of patterns and themes, seeing trends and so on’ (Miles & Huberman, 1994, p. 92). It is noted that both the steps of coding and categorising and data reduction and display involved revisiting the data for more detailed analysis and re-analysis.

Conclusion drawing: In the process of constructing a conclusive and interpretive description and explanation that forms a summary, attention has been drawn to features of the displayed data, drawing the data features together to ‘make sense’ of them through analytic text (Miles & Huberman, 1994). In seeking to build a logical chain of evidence to support inform a sociocultural theory of interest development, meanings have been drawn from the display, patterns and themes as well as consistencies and exceptions noted. The focus students in the study and critical colleagues, including the participating class teacher, provided different perspectives on meanings that could be drawn from the data following the main phase of the study, in semi-structured interviews (students) and focused conversations (colleagues).

These stages of analysis and interpretation have been followed to avoid misrepresentation of data in the process of selection of vignettes, presented as narrative accounts in these results chapters, and segments of transcripts or observation notes. This enhances trustworthiness, particularly in addressing the issue of credibility of the researcher’s claims and the integrity in selecting and presenting evidence fairly (Brown, 1992; Wellington, 2000). In attempting to understand the situation by looking for the fullest possible explanation and by representing a variety of interpretations, I am providing the reader with access to how the account has been produced (Skeggs, 1999).
The approach to data analysis and interpretation in the present study addressed the basic questions of qualitative data analysis, which concern how it is possible to draw ‘valid’ meaning from the data collected, shifting from description to explanation through discovering and deriving patterns in the data to achieve a sense of understanding (Hitchcock & Hughes, 1995; Miles & Huberman, 1994). Providing rich description of the method, approach to analysis and interpretation and the results of the present study ideally makes it possible for readers to form judgments about transferability, or relevance, of the findings to others contexts (Lincoln & Guba, 1985). The tension between conveying the particular but also the more generalisable elements of design-based research is an issue recognised in the literature (Brown, 1992; Edelson, 2002). There is always the tension between the particularity and complexity of the event or context that is being studied and the ability to generalise from the single case (Bassey, 1999), as a result of the bounded, specific nature of a case (Stake, 1998). As Stake (1998, p. 94) observes, ‘How we may learn from the singular case ultimately derives from how the case is like and not like other cases – yet … direct comparison diminishes opportunity to learn from it’. In considering a case, Stake (1998) claims that generalisations or comparisons cannot be avoided; researchers need to provide sufficient descriptive narrative of the case so that readers are both able to understand the interpretations of the researcher but also make their own interpretations and draw their own conclusions.

5.6 CHAPTER CONCLUSION

The triangulated research design and methodological strategies outlined in this chapter have generated data to enable consideration of the theoretical and methodological consequences of conceptualising interest from a sociocultural perspective. Participant observations were made of the interaction of one grade 5 class and their teacher over 6 months, as they engaged in science and technology lessons designed to support a learning community. The observations provided opportunities over a prolonged time period to investigate the roles that peers, the teacher, wider activities such as contact with experts, and specific tasks including materials available, play in constructing possibilities and constraints for the development of interest. Students’ reflections on their learning and interviews with six focus students allowed for greater consideration of individual participation and intrapsychological processes of interest development through self-canalisation. The reporting of results in the following two chapters of this thesis reflects this dual focus on classroom and personal cultures –
or the interpersonal and personal contextual planes (Rogoff, 1990) – within the study. In chapter 6, consideration is given to the origins of interest and interest development in the social and physical learning context of the grade 5 classroom. Chapter 7 focuses more specifically on the individual participation and interest development of the six focus students.
CHAPTER 6

EXPLORING THE SOCIAL ORIGINS OF INTEREST:
CO-CONSTRUCTING POSSIBILITIES AND
CONSTRAINTS IN THE CLASSROOM-BASED
COMMUNITY OF LEARNERS

6.1 INTRODUCTION

Consistent with the proposed sociocultural theory of interest that emphasises the social origins of development, the first of the two results chapters in this thesis focuses on the broader context for learning, especially interaction amongst participants including the role of the teacher and peers in classroom activities. In Chapter 6, there is particular exploration of the constraints and possibilities, or canalisation processes, for the emergence and development of interest within this context. The emphasis in this chapter is on presenting results that respond to research questions 1 – What roles do students’ peers and the teacher play in co-constructing possibilities and constraints for the development of interest within a classroom-based learning community? – 4 – What evidence emerges of students’ interest in specific topics of study within the classroom that extends beyond this context, to out-of-school settings and other communities of practice in which the students participate? – and 5 – How can teachers help students develop interest in classroom-based learning? More specifically, how do curriculum and organisational decisions made by the teacher contribute to possibilities for social interaction and the physical settings in which students learn, in ways that support the development and sharing of interest?. The second results chapter, Chapter 7, ‘zooms in’ to focus on individual students’ experiences of interest within this classroom context, with results presented that respond to research questions 2 – In what ways do the social and physical contexts of the classroom interact with self-canalisation processes to create possibilities for and constraints on the interest development of individual
students? – 3 – What similarities and differences are evident in the students’ participation in learning community activities and the experience and expression of interest of individual students? – and 4 – What evidence emerges of students’ interest in specific topics of study within the classroom that extends beyond this context, to out-of-school settings and other communities of practice in which the students participate?.

The first section of Chapter 6 focuses on features of the classroom context and students’ interest development. This first section is organised in three subsections. Firstly, brief overviews of key stages in the learning units are presented. Secondly, features of these units that contribute to the development of a community of learners are considered. The third subsection presents detailed narratives to provide evidence of the role of the teacher in processes of interest development as a particular aspect of the classroom context. Key episodes from terms 1 and 2 are presented to illustrate the major themes that emerged during analysis and interpretation. In the second section of the chapter there is continued consideration of interest development in the class context, with this section focused on the students' self-perceived interest trajectories in relation to specific activities within the learning units. Data gathered from participant observation and interviews enable a rich interpretation of the distinctive characteristics of the particular learning activities rated. The third section of the chapter provides rich narrative insights into small group peer interaction in such activities, with illustrative episodes from terms 1 and 2 selected to highlight analytical themes and focus interpretive discussion.

6.2 CREATING THE CLASSROOM LEARNING CONTEXT TOWARDS DEVELOPING INTEREST: THE CONTRIBUTION OF THE UNITS DESIGNED FOR SCIENCE AND TECHNOLOGY LESSONS AND THE TEACHER’S ROLE

Science and technology learning units were co-planned by the two grade 5 class teachers and me at the beginning of each term. Overviews of the intended learning sequence were planned to enable student choice and collaboration within a framework that afforded negotiation and flexibility in certain aspects. While the guiding pedagogical principles, as detailed in Chapter 4, were similar in the two terms of the main phase of the study, the focus topics were quite different. The topics were deliberately selected from different domains within science so that this study could
consider the girls’ learning and interest development in areas for which previous research had established variation in interest in both the topic itself and in the context for learning about it (Folling-Albers & Hartinger, 1998; Haussler & Hoffmann, 1998; Smail, 1987). The term 1 science and technology unit had a physics base and a topic focus on electricity and energy resource conservation (relatively low level of interest for girls as indicated in previous research), while the term 2 unit had a biology base and a topic focus on egg laying animals and the role of zoos in conservation (relatively high level of interest for girls as indicated in previous research). The two different contexts for learning in each unit, in terms of the pedagogical framework, are described briefly in the following sections. The learning unit overviews were designed to provide the class teachers with a guide to the overall structure of the nine lesson sequence for each term but were not viewed as rigid. A flexible approach to implementation allowed for responsiveness to students’ ideas and emerging interests within activities. Science and technology lessons were timetabled weekly for Fridays in the session between morning tea and lunch and lessons were usually one hour and ten minutes in duration. In the weeks when students were engaged in design and make tasks, Ms Wheeldon extended the lessons to the teaching block after lunch as well, which doubled the time for science and technology activities on those days to approximately two and a half hours.

6.2.1 Learning unit 1, term 1: Electricity and energy resource conservation

The framework for the term 1 unit enabled students firstly to become more aware of their prior knowledge and then to experience some more structured exploratory activities to focus, guide and build understanding (lessons 1 to 3). In these lessons, students worked in small groups, for example, to create a simple circuit and had opportunities for play with materials to extend from this. During these initial three lessons, the teachers and I became aware that we would need to revise the remainder of the unit. The students did not have the knowledge or understanding to pose meaningful questions about energy to direct activities in the remainder of the unit, as we had originally intended. We met to redesign the remaining lessons so that students continued to develop their understanding of electricity through engaging in further activities.

Focus students in the present study were asked to retrospectively rank the topics that they had studied in science and technology lessons in grade 5. Three of the six students ranked the eggs unit (biology-based) more highly than the electricity (physics-based) unit. These findings relating to a small sample of students only partially support previous research into gender preferences for particular topics and possibly indicate that the attributes of the tasks when learning about a topic and the wider learning context also need consideration, in addition to the topic itself.
investigations of circuits. Tasks in lessons 4 and 5 therefore focused on consolidation and clarification of understandings about electrical circuits through whole class and small group discussions in which students articulated how a torch worked through drawing, then reflected on an e-mail reply to their questions posed earlier to Russ, the electrician. In lessons 5 to 7, the students further investigated and applied their developing knowledge of electrical circuits in a design, make and appraise task. The students selected a battery-operated model of an electrical ‘product’ – a torch, alarm, doorbell or lighting system – to design and make, with each student choosing to purchase the components so that she could keep her product once completed. In addition to their regular science and technology lesson in week 6, the students participated in activities, demonstrations and discussion with a guest speaker, Alison, from the Sustainable Energy Development Authority (SEDA) (Figures 6.1 and 6.2), a state government organisation. The unit concluded with a culminating activity in lessons 8 and 9 in which students were engaged as school community activists. Their role as activists involved them designing and making a strategy for increasing awareness of conserving non-renewable resources for electricity production and consideration of sustainable practices.

A particular strategy initiated and employed by Ms Wheeldon throughout term 1 was the creation of a fictional context of a derelict historic house in the local area. She began the first science lesson by displaying a large sign at the front of the classroom: *Heathville Manor to be demolished*. Ms Wheeldon believed that this imagined scenario would provide a focus and purpose for completing the prior knowledge activities that we had planned. From this initial lesson and throughout this term 1 unit, Ms Wheeldon was aware that most of the students had limited prior knowledge of and experience with electrical circuits and electricity, other than relying on it in daily life. She thus attempted to provide opportunities for connection and identification with the content, development of problem-solving and design skills, and increased risk-taking by incorporating hands-on, small group work throughout the unit. The imagined context of Heathville Manor was revisited again in the middle section of the unit, when students were told they had successfully saved Heathville Manor and had now been appointed caretakers. They designed and made their electrical products to make life easier until mains electricity could be connected. While this imagined context to some extent

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6 I approached SEDA to become involved in the students’ learning and this was the first primary school presentation that SEDA had made. As such, it was a responsive presentation, rather than one developed for delivery in a broad range of schools.
detracted from the connections that could have been made to authentic problems and real issues in the students’ lives, the students appeared willing to suspend disbelief when Ms Wheeldon incorporated references to the Manor. It was evident through interviews, however, that students generated other meanings and purposes for engagement that related to their own real life personal contexts when relevant, especially in lessons 5 to 7 when they were making electrical products and, for example, students chose to create torches to take on the upcoming Heathville College ‘Dads and Daughters’ camp.

Figure 6.1. Guest speaker, Alison, from SEDA visits Heathville College and presents information about electricity generation and energy sustainability, with opportunities for grade 5 students to respond to and ask questions (week 6, term 1 – 15/3/01).
Figure 6.2. Guest speaker, Alison, from SEDA explains to grade 5 students how a solar panel converts energy from the sun to electricity (week 6, term 1 – 15/3/01). She also showed them a solar-powered model car, which demonstrated the transformation of energy by solar cells.

6.2.2 Learning unit 2, term 2: Eggs, egg-laying animals and the role of zoos in conservation of biodiversity

In the second term, students in 5W learnt about eggs and egg-laying animals, with the broader focus on the role that zoos play in animal and habitat conservation reflective of concern for this issue in the wider community. The structure of the learning
unit was made explicit to students from the outset, so that they knew that they would be exploring their prior understandings of eggs and investigating the features and purpose of eggs in lessons 1 to 3 (for example, Figure 6.3), as a base from which to then select an egg-laying animal to research. Activities in lessons 4 and 5 were designed to facilitate the students’ choice of an egg-laying animal to research, guided by three common negotiated research questions and three personal interest questions. The day trip to Sydney’s Taronga Zoo following lesson 5 provided a resource for students’ research, enabling first hand experiences of the Zoo Education Centre (Figure 6.4), animal enclosures, the role of zoos in breeding programs and their contribution to conservation of biodiversity. 5W was accompanied to the zoo by the other grade 5 class and the two grade 5 teachers, a parent (who also was a teacher in a different school), a resource teacher and me. There was one adult assigned to each group of students, with approximately 11 students in each group. All accompanying adults had been briefed about the underlying approach to the excursion, especially in regard to supporting rather than leading the groups of students, who had planned their respective itineraries to guide the day. This zoo experience and the associated research into their chosen animal assisted students in creating a class database about egg-laying animals in their computer lessons and writing information reports in their English lessons. It also led into the concluding activity of the science and technology unit (lessons 6 to 9; Figure 6.5), which was to individually design and make a model zoo enclosure to meet the breeding and habitat needs of the animal that they had personally researched, to share with the class in the final lesson. This final lesson was promoted as a visit to the 5W class zoo, with the opportunity to ask questions of other enclosure designers and provide them with feedback. The four concluding lessons thus were designed to enable students to evaluate and apply their research about a specific egg-laying animal. Comparatively, this unit had a clearer, more integrated and sequenced structure than that of term 1, which probably resulted from this unit being a refined version of that taught in the previous year during the pilot phase of the research. It also was evident that Ms Wheeldon felt more confident in her own scientific knowledge in this term 2 unit. She was increasingly comfortable with the additional responsibility for learning being given to the students in our guiding pedagogical approach.
Figure 6.3. Exploratory activities at the outset of the term 2 unit included small groups of students carrying out fair tests (experiments) that they collaboratively designed to compare the strength of raw, hard boiled and blown eggs (lesson 2, term 2 – 11/5/01). This meant that each group had choice and control over how they would conduct their strength tests. On the right, some students spontaneously gathered around one group to observe their testing process and results. Interest was created across groups in the ways that other students had devised to compare the strength of the eggs. Students wanted to know about the various tests that others students had designed in response to the same investigable question and to find out whether other groups’ findings were similar to their own (see also section 7.3.2.1).
Figure 6.4. An educator at the Taronga Zoo presents an interactive information session about different egg-laying animals and responds to students’ questions (week 5, term 2 – 31/5/01). The students listen and observe attentively in this photograph, taken just before the educator feeds a dead mouse to a Tawny Frogmouth. Ms Wheeldon had sent the class research questions being investigated by all students to the Education Centre prior to the excursion so that these could be addressed specifically in this presentation. This more formal session began the students’ zoo field trip, followed by more informal movement around the zoo enclosures in smaller groups accompanied by an adult and guided by the students’ own planned route and itinerary.

6.2.3 What are the key features of the learning units that contributed to the development of a community of learners, to create and support interest in science and technology?

Physical features of the classroom context (classroom layout, access to materials), features to support social interaction within and beyond the classroom (grouping structures and strategies, access to experts in the wider community) and pedagogical features (opportunities for hands-on involvement, varying degrees of choice, reflection on learning, interactive noticeboard) are considered in this section.
Previous theorising and research have identified distinguishing elements of classroom-based learning communities, as discussed earlier in Chapter 3. These elements have guided analysis of the 5W class context and interpretive discussion presented in relation to the key features contributing to the creation of a classroom community supportive of interest development. Data gathered through participant observation in the 5W classroom forms the main source that informs this analysis. Ms Wheeldon’s commitment to supporting the development of a classroom learning community is considered in the final subsection.

Figure 6.5. Students sit outside the classroom in peer groups to design and make their own individual model zoo enclosures (top right), then share these with peers at the 5W class zoo (lesson 9, term 2 – 29/6/01). In visiting the class zoo, they had the opportunity to both field and ask questions, and receive or provide feedback from or to other class members.
6.2.3.1 Physical features: Classroom layout

The organisation of students’ desks changed from term 1 to 2. In each term, Ms Wheeldon aimed to structure classroom furniture in a way that both facilitated discussion amongst students and suited small group work. Students also needed to be able to see the front chalkboard from their desk, move freely around the classroom, and sit on the floor for class discussions and hands-on activities. Ms Wheeldon allocated students to tables at the beginning of each term, however this arrangement was flexible in that students often sat at different desks depending on group composition for specific tasks. In each term, the main science and technology noticeboard was at the front of the classroom, adjacent to the chalkboard. This gave it a prominent position as it was clearly visible from students’ desks. The classroom also had a desk-top computer with connection to the school network and Internet access. This computer was used by students as well as Ms Wheeldon and was situated at the back of the classroom, with floor cushions beside it for quiet reading.

In term 1, Ms Wheeldon grouped the individual desks around the perimeter of the classroom, arranged in clusters of 3 to 5 with open floor space in the middle of the room towards the front (Appendix N). This arrangement was especially conducive to small group work, however it was problematic for whole class discussions as students were oriented towards the front of the room. To overcome this problem, most whole class discussions were held in the open floor space with students seated on the floor in a circle. When the students returned to school in term 2, they found that Ms Wheeldon had moved their desks into a different layout, with the classroom arranged in a large horseshoe-style configuration (Appendix O). This new layout created a large empty floor space in the centre of the classroom and also facilitated whole class discussion while students were seated at their desks. When students worked in small groups, they would cluster around a central desk space and face one another by moving their chairs so that some would be in the centre while others would sit on the outside.

Fixed furniture in the classroom included low side benches under the windows along one side of the classroom. These benches were used to store materials for design and make activities, then for display of electrical products in term 1 and model zoo enclosures in term 2. A permanent display space meant that science and technology materials were on display and accessible to students outside of the weekly
timetabled lesson. The classroom was adjacent to a communal art room and had a covered veranda outside that was open to the playground. Students frequently worked in these spaces when conducting fair tests, which involved them in using experimental processes to conduct hands-on investigations. They also used adjoining spaces for designing and creating models, and to plan and practise presentations. Windows and glass doors allowed the teacher and students good visibility and ease of movement between the different spaces and amongst groups.

6.2.3.2 Physical features: Access to materials

In each term, students had access to a range of materials that related to the specific topic focus for the unit and supported their investigations, research, and design and make activities. Ms Wheeldon organised a bulk loan of school library books that related to the focus topics, which were available for students to read in the classroom during science and technology lessons or in daily silent reading sessions. In addition to Internet access from the classroom computer, the students could use computers in the school’s library or computer room during lessons or at lunch time. All of the students had been allocated their own school e-mail address, which they could use for sending messages and receiving information from relevant organisations and individual experts outside the classroom community. The majority of students also had Internet access from home computers, providing them with the opportunity to conduct further research at home, depending on their interest.

Investigations and design and make activities also were supported by materials and equipment that were particular to the focus topics. In learning about electricity and sustainable energy development in term 1, the school purchased basic circuitry components such as batteries, insulated wires and small globes that were manipulated by students in the initial exploratory activities. Students were given the option to either borrow school materials (which they would need to return at the end of term) or purchase their own materials to make their electrical products. All of the students chose to purchase their own materials, taking home their labeled product design from which they created a shopping list. Their enthusiasm for this task was reflected in only one girl forgetting to bring along her materials on the product-making day. Buying the equipment also meant that the students could take it home at the end of the term, continue to ‘play’ with it and in the process make further discoveries that could
contribute to interest development. In term 1, the grade 5 students also visited Heathville College’s Senior School campus to see an actual solar car that was displayed for a day. An opportunity to interact with authentic materials relating to alternative energy resources was provided again when the guest speaker from SEDA visited grade 5. Finally, in the concluding lessons of the unit, the students brainstormed a range of forms that their school community activism could take. Various materials and equipment to support creation of these forms were provided for students, including an audio tape recorder for a radio announcement, a video camera for a television advertisement to be screened in the school assembly and large sheets of cardboard for billboard-style signs.

In learning about eggs, egg-laying animals and the role of zoos in conserving biodiversity, a number of specific materials were made accessible to students in both their classroom and zoo-based learning in term 2. After viewing an age-appropriate video documentary about eggs, the students dissected raw chicken’s eggs and later designed and carried out fair tests to determine whether raw, blown or boiled eggs were the strongest. The field trip to Taronga Zoo gave students the experience of seeing the real thing, in that the majority of the focus egg-laying animals selected for research could be viewed in enclosures designed to meet their specific needs. The more formal presentation at the Zoo Education Centre also highlighted particular reptiles, amphibians and birds. Students were shown unfertilised crocodile eggs that subsequently were cracked to show them the similarities with chicken’s eggs. When the students returned to school to design and make their model enclosures, a range of materials collected from a community industrial and commercial waste recycling cooperative, *Reverse Garbage*, was displayed by the teachers. The materials were then used in model-making by students (Figure 6.6), along with materials that they gathered from home. Many students were excited by some of the more unusual materials provided for this task, asking the teachers where they had purchased them and recording the address in their homework diaries for future reference, perhaps in anticipation of a family visit.
Figure 6.6. Students, making their model zoo enclosures, begin to sort through materials purchased from a community industrial and commercial waste recycling cooperative (lesson 6, term 2 – 8/6/01).

The materials made available to the students by the teachers, as well as those that the students brought to the classroom from home, afforded particular types of interaction amongst the learners and with the concepts and ideas related to the focus topic. The use of such materials was indicative of the teachers’ valuing of hands-on experiences to provide opportunities for students to develop understanding. The way the materials were used also created opportunities for personal involvement in learning and in sharing their relative expertise within the classroom community, such that interest development was being channelled through participation.
6.2.3.3 Features to support social interaction: Grouping structures and strategies

Ms Wheeldon’s class worked in a variety of individual and group structures in science and technology lessons, depending upon the purpose and nature of the task and the stage of the learning unit. Group composition varied during terms 1 and 2 as a result of changing friendships, student or teacher choice of group members, and the duration of different tasks. Whole class activities usually focused on introducing tasks, developing a sense of shared purpose for subsequent group work, or clarifying and sharing understandings and findings. When conducting investigations and fair tests, students usually worked collaboratively in pairs or small groups either of their own or their teacher’s choice. For design and make activities, the students usually worked individually but with encouragement to discuss ideas and progress with peers, so that they sat and worked alongside students who had selected a similar focus product or animal. The students interviewed saw advantages in working in small, peer-selected groups over teacher-selected groups because it was more enjoyable and fun to work with friends whom you knew well, with whom you were familiar and where there was anticipation of a continuing relationship beyond the group task. In particular, one student commented that, ‘you can work a lot better with friends because they’re people you know and get along with. You get along with them and I think that just makes it a lot easier to work with them ‘cause you know what they’re like and you just get to know them more’ (Stephanie, follow-up interview, 2002).

In friendship-based groups, there was a sense of familiarity and the students could immediately focus on the task and develop their participation in the activity in ways that were consistent with their shared and evolving interests. There existed a sociocultural context for their interactions that had been created both inside and beyond the classroom, and reference could easily be made to previously shared activity and anticipated future events. This was not always positive, in that interest development could be canalised by friends to limit possibilities for new and further growth, as narratives included later in this chapter detail. In teacher-selected groups, interest was observed in its emergent stages, however time for negotiation amongst the students was very important in establishing a sense of shared purpose in their activity and working out the status of the different group members in the context of the specific task.
Specific strategies to foster collaboration and cooperation amongst groups of students also were incorporated into the learning units. ‘Jigsaw’ groups, in which students work in groups focused on a particular aspect of a topic or focus before regrouping with peers who have developed expertise in a different aspect, were used, for example, in term 1. Ms Wheeldon created groups of students who had made different products to share how their circuits worked and to reflect on what they perceived as the strengths and limitations of their designs. Another strategy incorporated in term 2 was ‘snowballing’. This strategy involves stages of activity in which individuals combine to form pairs, pairs then combine to form groups of four, four to eight and so on. Effective use of this strategy was made in term 2 when the students generated a common set of questions to guide their research about egg-laying animals (see section 6.4.2).

Students occupied varied roles as group members, depending on respective skills and prior knowledge that could be applied and developed in the context of the specific task and the composition of the group. On occasions, however, the means of recording individually did not capture the learning process and the roles that developed amongst the students. An example of this was in the second lesson in term 1, when Jacqui chose to work with Cathy, Anna and Lisa to complete exploratory tasks in the electricity unit. They had spent approximately half an hour together at two other activity stations (static electricity and energy transformation in common household electrical appliances) before arriving at the electrical circuit station. At this station there were insulated wires, C-sized cells and small light globes. The teacher-created task directions indicated that the students should try different ways of connecting these circuitry components so that the globe would light up. The task card also directed students to record their unsuccessful and successful attempts by drawing labeled diagrams in their science workbooks. After completing these activities, they were asked to derive a set of ‘rules’ for creating a simple electrical circuit. When Jacqui became the first member of her group to successfully connect the circuitry components, her peers acknowledged her, and as a result, her role in the group emerged as one of relative expert. This encouraged Jacqui to enthusiastically pursue her investigation of different ways of combining components, which positioned her as a leader within her group. Anna, Lisa and Cathy were more diligent in documenting their experimentation however, and when Ms Wheeldon announced that it was time to pack the equipment away, there was no evidence of Jacqui’s leadership and understanding reflected in her bookwork. If her interaction in the group had not been video recorded, the teacher may
have concluded from Jacqui’s lack of written records that she had not engaged in this task or contributed to, and much less *initiated*, the group’s work. In this case, while varying roles of group members had emerged productively through engagement in the task, the individual recordings made by group members did not reflect the processes of interaction or diversity of roles and certainly did not indicate the enthusiasm with which Jacqui had participated.

Group work was not always collaborative or supportive of shared learning amongst all community members, either within or across groups. Elements of competition were evident, particularly in the term 1 unit, when Ms Wheeldon and I also were developing our roles in the classroom learning community. An example of competition between groups of students emerged in lesson 3 when students were engaged in station tasks. Ms Wheeldon discouraged a group of students from holding up a successful example in order to encourage other groups to problem-solve independently; however, this communicated a sense of between-group competition rather than an expectation of all groups supporting one another’s learning. This sense of competition was reinforced when in the same lesson, I combined two groups that had not succeeded in the same problem-solving task. More supportive of the creation of a classroom community would have been the matching of an unsuccessful group with a successful group, after a period of time for investigation, so that their understanding could be shared and developed. These competitive elements earlier in the year were indicative of the *gradual* process of building a supportive classroom culture, in which students shared a sense of responsibility for their own learning and the learning and development of other community members. The teachers’ expectations were consistently encouraging towards this goal.

### 6.2.3.4 Features to support social interaction: Access to experts in the wider community

Interaction with members of the wider community beyond the classroom included conversations with other Heathville College teachers and students’ own family members. Encouragement was given by Ms Wheeldon and me to 5W students to share their ideas, questions and findings with these familiar adults. Significantly, however, both the term 1 and 2 science and technology units were designed to
incorporate conversations with topic experts within the domain, so that the learning community was extended beyond the walls of the classroom. This included both virtual and face-to-face contact. Russ, an electrician in a local community outside of Sydney, agreed to be the class’ on-line expert during the term 1 unit and students agreed on questions to send him from the class, to which his replies were shared. In the term 2 unit, students sent e-mail messages to the Zoo Education Centre containing personal research questions which they were finding difficult to answer. Again, great excitement was shared amongst class members when replies were received. A visit from a guest speaker in term 1 and the excursion to Taronga Zoo in term 2 provided students with further opportunities to interact face-to-face with topic domain experts. In particular, the guest speaker from SEDA provided the students with a female role model in a career related to the focus topic. Such face-to-face interaction with experts was perceived as very interesting (section 6.3) and also appeared to make a lasting impression on some students. Cathy subsequently recognised on television at home the particular zoo educator who had spoken with 5W class members and recalled this over a year after the zoo field trip.

6.2.3.5 Pedagogical features: Opportunities for hands-on involvement

Effective teaching and learning in science and technology provides opportunities for hands-on involvement (Goodrum, Hackling, & Rennie, 2001) through direct observation tasks (Figure 6.7), fair testing and design and make activities. This was supported in the 5W classroom community through access to relevant and varied materials in the classroom, as discussed previously in this chapter. In interviews with focus students over the duration of the research, hands-on activities were mentioned frequently as an aspect of science and technology lessons to which they looked forward and enjoyed. As Jalongo (2007) noted, hands-on activities are characterised by social structures that afford active participation and support the learner’s sense of agency.

A hands-on activity that created particular excitement amongst students was the fair testing of egg strength (lesson 2, term 2; see also Chapter 7, section 7.3.2.2 for detailed narrative and analysis of this task). The opportunity to work in novel ways with a familiar and potentially messy object actively engaged the students. There were
Figure 6.7. A cardboard egg carton with 4 upright raw eggs in each corner has been placed under this laminated shelf to demonstrate egg strength to students, who are seated around this demonstration in a circle (lesson 2, term 2 – 11/5/01). The strength of the pressure points on each egg should support the weight of a student. The Principal had told Ms Wheeldon and me about this demonstration, which we then shared with the students in lesson 2. Some students were understandably doubtful when predicting the outcome, even though the student voted as strongest in the class had not succeeded in breaking an egg squeezed at either ‘narrow’ end. Their engagement and anticipation are evident in the looks on the students’ faces in this photograph, including the hovering student being held by me. This is capturing the moment just before this student was lowered onto the shelf, resulting in the students, Ms Wheeldon and me spontaneously erupting into laughter when the demonstration failed and the eggs broke in a splatter!
multiple paths for completion of the task, as students worked in groups to devise their own fair test. The different tests undertaken by students created a desire to observe and later hear about the testing processes and findings of other groups. Design and make activities provided further opportunities for hands-on involvement. These activities also supported students’ development of problem-solving skills and this contributed to maintaining a focus in the units on problems rather than categories of knowledge.

### 6.2.3.6 Pedagogical features: Varying degrees of choice

There were varying degrees of student choice built into tasks designed by the teacher. These choices related to the specific topic focus of students’ learning, the processes by which they would respond to a particular design brief, whether or not they would work with peers, and the materials and tools they would use to support the learning process. Choices were sometimes given to groups of students (for example, designing a route and itinerary for the zoo field trip) but on other occasions were offered to individuals (for example, what egg-laying animal to research, as later discussed in section 6.4.2). The degree of student choice afforded by the classroom structures created by the teacher was often dependant on the perceived purpose of the activity and its timing in the unit. Specifically, more restricted choices were offered in exploratory activities in the initial lessons of a unit, such as the selection of one from two possible electrical circuit tasks in term 1. In an initial lesson in term 2, small groups of students worked together to design and conduct a fair test; however, the question guiding the investigation, to determine the relative strength of raw, blown and boiled eggs, was posed by Ms Wheeldon. These limited choices reflect the perceived purpose of the initial lessons in providing all class members with a common set of experiences and shared knowledge to which they could later refer and base their decisions in research tasks (term 2) and design and make activities (terms 1 and 2). It was in the context of these applied activities in the middle and later sections of units that expanded possibilities for student choice were built into the unit frameworks. For example in term 1, students could choose which electrical products to make, then they designed the products and decided on the resources they would need. In the same unit, they could also choose the form that their energy resource conservation activism would take; for example, a playground protest march or a billboard poster. Student negotiation of guiding research questions (including class and personal interest
questions) and Taronga Zoo excursion route, along with choice of focus animals and enclosure design and display, were strong elements of the teacher-designed framework for the term 2 unit. These choices allowed students to select activities and topics of interest, which then provided opportunities for existing and new interests to develop and be shared with other members of the classroom-based community.

6.2.3.7 Pedagogical features: Reflection on learning

Strategies for reflection were built into the science and technology units by Ms Wheeldon in developing the classroom as a learning community, as well as by me for the purposes of gaining insights into participants’ perspectives, as described in the previous chapter (section 5.4.2). The data successfully gathered using these reflective strategies have been analysed and drawn on to support field notes and other data sources. In utilising reflective strategies in this project, Ms Wheeldon and I did not assume that the students already knew how to reflect upon their learning. Reflection as a more formalised, explicit process was introduced to the students in the first week of term 1 by reading an extract from John Marsden’s (1987) novel, *So Much to Tell You*, which is written in the form of a girl’s journal. A discussion ensued shortly afterward, identifying what the class thought journal writing and reflection involved. This was recorded by me on a poster to be displayed in the classroom (Table 6.1, column 1). The class then jointly wrote a reflection about their first week in year 5 (Table 6.1, column 2). Although the students were explicitly taught about the process of writing reflectively, it soon became apparent that there were some class members who were more ‘natural’ reflectors and others who found the process more difficult. This was evident in entries which were brief and which commented on superficial aspects of the learning process.

Reflective strategies used with students were designed to focus on both their experiences of the learning process, including their experiences of interest in learning, and to reveal their conceptual understandings of the science content. The most detailed and lengthy reflection came when students were allocated class time and it was strongly scaffolded by questions (for example, Table 6.2), either oral or written, regardless of whether the prompts were devised by students, teacher or researcher. Reflection was used in a variety of ways and at different times. Sometimes the students
were asked to reflect at the beginning of lessons, while at other times they recorded reflections periodically throughout a lesson or at the lesson's conclusion. Reflection enabled the students to link new experiences with prior knowledge and with their out-of-school experiences. It provided scheduled thinking time to assist students in making connections during problem-based investigations and supported them to self-regulate. Consequently, reflective writing provided students with opportunities to better develop personal scientific theories and associated discussion enabled them to test these ideas with peers.

Table 6.1

*Record of researcher-directed class discussion about reflective writing from 2/2/01, subsequently displayed as a poster on a classroom noticeboard*

<table>
<thead>
<tr>
<th>5W’s thoughts about journal writing</th>
<th>5W jointly written class reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Free to write</td>
<td>My first week in Year 5 has been great. It’s all new so it’s not boring. People have made a lot of friends. We’ve met a lot of new people. We did a lot of new activities and fun things, such as sport, our title pages, learning Chinese. I wonder if Year 5 will stay this fun? BYE!</td>
</tr>
<tr>
<td>• Writing about yourself and what happens to you</td>
<td></td>
</tr>
<tr>
<td>• Sharing your thinking</td>
<td></td>
</tr>
<tr>
<td>• Writing about feelings</td>
<td></td>
</tr>
<tr>
<td>• Asking questions</td>
<td></td>
</tr>
<tr>
<td>• Writing to explain why you do or don’t like something</td>
<td></td>
</tr>
<tr>
<td>• Report about what is happening and your own comments about this</td>
<td></td>
</tr>
</tbody>
</table>
Reflection also was prompted outside of class time, with varying degrees of success. The majority of students returned completed family conversation questionnaires for each term, which provided insights into students’ out-of-school learning that related to the science and technology topics studied during the research project’s main phase. With other strategies that utilised their own time, however, the students did not choose to engage in written reflection. In particular, they did not make extensive use of postcards over the duration of the research project, once the novelty of writing them had worn off in the first few weeks of term 1. The peer interviews in the playground requested by the researcher also provided evidence that the students did not usually question one another in this way, as indicated by the silly voices used in Shalini and Philippa’s interview and Jacqui’s instruction to her interviewer not to ask her ‘why’ questions. Spontaneous reflection or requests from the students to use strategies for written reflection in other subject areas did not occur.

Table 6.2

Examples of students’ written reflections

<table>
<thead>
<tr>
<th>Sample student reflection</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>In circuit (sic) problem B, I felt fairly interested (sic). I was only fairly interested because it wasn’t very hard. I loved challenge problem B because that had my mind going. I feel I’ve learnt alot (sic) about how switches work today. Stephanie, 23/2/01</td>
<td>Stephanie wrote this reflection when the class was given time at the end of lesson 3, term 1, to record their thoughts on the left hand side of the page in their science workbooks. The reflection was in response to researcher question prompts, which asked them to indicate the extent of their interest in the tasks they selected and why and to state what they had learnt during the lesson. Stephanie provides an explanation for why she experienced different degrees of interest in the two tasks, relating interest to a sense of challenge. She also clearly identifies the content of her learning.</td>
</tr>
</tbody>
</table>
My current thoughts and feelings about this Science and Technology unit is (sic) good. I think science and technology lessons are really fun and I think that they will always (sic) stay that way. I think science is really fun because we always do experiments and I really like doing experiments. Whenever we have science I allways get really excited because I wonder what are we gonna (sic) do this lesson. I hope its (sic) another experiment. Whenever we have science we allways learn something new.

Cathy, 27/2/01

Cathy wrote this reflection in response to the researcher question prompt, ‘What are your current thoughts and feelings about this term’s science and technology unit?’ The reflection provides insights into Cathy’s positive feelings towards science and technology lessons. It reveals Cathy’s excitement ahead of these lessons and her particular liking of experiments. An appreciation of novelty in her learning is also emphasised in her reflection.

I really don’t know how I feel. It’s just my first lesson about eggs. But it does apeal (sic) to me. I don’t know why, it just does. I think it will probably be MORE interesting. Because while learning about electricity, I realised it wasn’t that intresting (sic), besides there were no excursions. Stephanie, 4/5/01

This was the first lesson in term 2, when students were asked to write about their initial response to the eggs topic and whether they expected it to be more or less interesting than the previous term’s electricity unit. Stephanie’s reasoning is behind her claim that she expects the eggs unit to be more interesting than learning about electricity is not particularly well developed. She does, however, highlight that her experience of interest is heightened when excursions are a part of her learning.
Reflection tasks contrasted on a number of characteristics when compared with the investigatory, design and make, guest speaker and excursion activities for which students rated their experience of interest more highly (section 6.3). Written reflection usually was completed individually and quietly, and often was recorded following an activity that had engaged students through hands-on involvement, which perhaps made the contrast even greater in the students’ experience. While the students had choice in what they might write, participation in reflection was perhaps unexciting when compared with participation in the task on which students were reflecting.

6.2.3.8 Pedagogical features: Interactive noticeboard

While there were numerous pin boards in the 5W classroom, these were all teacher-arranged displays of students’ work or teacher-designed posters conveying information useful to students’ learning. The exception was an interactive noticeboard for science and technology. We came to refer to this noticeboard as interactive because of the way in which this classroom pin board was used to promote interaction amongst students in the exchange of their ideas about key questions and concepts in the unit. This noticeboard was continually changing throughout the term as students added their contributions, whereas other noticeboards tended to be fixed displays that stayed the same until Ms Wheeldon chose to replace them with other content.

The interactive nature of this noticeboard developed as such largely in response to student input and the emerging need to make changes to ideas on display. In lesson 1 of term 1, Ms Wheeldon asked pairs of students to brainstorm what they already knew about electricity and then to record a ‘fact’ on a piece of coloured cardboard in the shape of a light bulb. Some of these facts recorded in the initial lesson were contestable as facts. Activities and research in which students subsequently engaged revealed inaccuracies in what had been previously displayed as fact. At this point, the students began to post a new light bulb on the noticeboard. The new light bulb presented more factually accurate information and was positioned overlapping the statement that it corrected (Figure 6.8).
Figure 6.8. To the left of the chalkboard on the red pinboard, pairs of students recorded a ‘fact’ about electricity on a light bulb-shaped piece of cardboard. Some of these ‘facts’ recorded in the initial lesson of the unit were later revealed as inaccurate and students recorded a factually accurate statement to replace an earlier idea. An example of this can be seen in the top left hand corner of the noticeboard. In this lesson (lesson 5, term 1 – 9/3/01), Ms Wheeldon has a display of the students’ questions about electricity on coloured circles (right hand side of the chalkboard) and the focus is on class discussion of Russ the electrician’s responses to the students’ questions sent to him by email (pasted on pink, blue and green rectangles with corresponding students’ question on attached coloured circle).

In term 2, Ms Wheeldon designed another level of interaction within the noticeboard by students recording a fact about eggs in the initial lesson of the unit. In addition, she asked them to record a question about eggs to which they would like to find the answer. Statements and questions were recorded on different coloured cardboard eggs and displayed on the noticeboard (Figure 6.9). Throughout the unit, the students could add challenges to the facts recorded in the initial lesson if contradictory or additional information came to light. They could also add answers to the questions posed and were encouraged to source this information. In this way, the noticeboard was built over the course of the term through student contributions, as evident in Figure 6.9.
The interactive nature of the science and technology noticeboard promoted student engagement in an ongoing, visually represented ‘conversation’ about the focus topic, accessible to all students as they worked in the space of the classroom. In each term, the content of the noticeboard reflected the aspects of the focus topic that the students themselves considered significant and interesting, whether this was expressed as statements, questions or responses. Importantly in developing a classroom community, the noticeboard promoted student ownership of their learning, reflected the collective change in understandings and knowledge in the course of the unit and mirrored the dynamic nature of the learning process.

6.2.3.9 Ms Wheeldon’s commitment to developing a classroom-based learning community

Ms Wheeldon’s commitment to developing a classroom-based learning community was evident in two main areas; first, in the ways in which she provided a model of an interested, more expert learner and second, in the longer term changes that she incorporated in her pedagogical approach beyond the main phase of this study.

In her interaction with the students during science and technology lessons, Ms Wheeldon contributed to creating a community of learners through providing students with a model of an interested and more expert learner. In term 1, this was particularly evident during the SEDA guest speaker presentation (prior to lesson 6, term 1). Ms Wheeldon’s interest was apparent through her own genuine questions to Alison, which related to the energy used by the classroom computer and printer being left on standby and her comments on the suitability of their classroom roof for the potential installation of solar panels. These questions and comments contributed to developing the wider discussion with the guest speaker by relating some of the challenging content to the students’ familiar context. Ms Wheeldon’s involvement also indicated her personal engagement with the topic of presentation. In her interaction with the guest speaker and students, she also provided a model as a more expert learner through making explicit connections between the solar panels they were looking at and the
Figure 6.9. The interactive noticeboard builds up over term 2. Students could add to the noticeboard whenever they wished, not only during science lessons. These contributions were both encouraged by Ms Wheeldon and initiated by the students themselves.

Top: Ms Wheeldon created the framework for the noticeboard, which afforded student interaction.

Middle: Students’ initial statements of what they knew were presented inside the large egg (yellow eggs) while questions to which they wanted to find answers were displayed outside the egg (pink eggs).

Bottom: Green eggs were used to challenge knowledge claims, while yellow eggs placed adjacent to pink question eggs were answers to those questions. Blank green eggs were kept on the shelf below the noticeboard for easy access by students.
students’ experience of seeing a solar-powered car earlier in the term. Ms Wheeldon was modeling how effective learners make connections between their experiences to make sense of broader concepts and her reference to this earlier shared experience further contributed to the creation of a classroom community of learners.

In term 2, a lesson in which Ms Wheeldon’s example of being an interested and more expert learner was particularly apparent when she was introducing the eggs and egg-laying animals topic to the class and, subsequently, students were brainstorming ideas and questions about eggs (lesson 1, term 2). Her own enthusiasm for the new topic of study was evident in her animated voice and body language (for example, leaning forward, eye contact with a range of class members) as she read the students a picture book and subsequently posed questions that directed the students to focus on relevant aspects of the text and illustrations. This approach encouraged students to share their own ideas and resulted in many class members raising their hands to respond. In her model of an effective learner, Ms Wheeldon indicated when she did not know the answer to questions that the students were recording and sometimes responded emotively, with comments like, ‘Wow! That’s an interesting one’ (researcher field notes, 4/5/01). She also led a class discussion of how they might go about generating answers that were supported by evidence through fair testing (experimentation) and research using books or the Internet. Such collaborative discussion made explicit Ms Wheeldon’s expectations for students to participate purposefully and with ownership of their learning, thus contributing to the sense of community within the classroom.

Ms Wheeldon’s commitment to developing a classroom learning community also was reflected in the longer term changes in her pedagogical approach that emerged beyond the main phase of the study. E-mail messages that we exchanged in the year following the project provided evidence that Ms Wheeldon’s subsequent design of units and activities incorporated increased student direction and choice. A further example was when, in week 2 of term 1 in the year following the project, I dropped into Ms Wheeldon’s classroom unannounced one morning when her Grade 2 students were engaged in a science and technology lesson. It was evident that she was using a Learners’ Questions Approach aimed at fostering a classroom-based learning community, as she was leading students in posing and recording questions through a whole class discussion. Ms Wheeldon’s participation in the main phase of the
study contributed to her professional learning about learning communities and subsequently resulted in her independently designing learning units with features that would contribute to creating such communities.

Consideration of Ms Wheeldon’s role in the classroom-based community during the project’s main phase is continued in section 6.2.4, focusing more specifically on her participation in activities which canalised students’ interest development.

6.2.4 The role of the class teacher in canalising students' interest development in on-going activities

In previous sections of this chapter, I have highlighted physical features of the classroom context, features that supported social interaction within and beyond the classroom and pedagogical features that contributed to creating a classroom-based learning community in which interest development was studied. This section shifts to focus on Ms Wheeldon’s role in canalising students’ interest within this learning community. More specifically, narrative accounts informed by a range of data sources are presented, followed by analytical and interpretive discussion. The narratives and discussion highlight particular aspects of Ms Wheeldon’s interaction with students, her responsiveness to perceived student engagement and motivation in the course of activities and her contribution to lesson design and selection of resources in relation to canalisation of interest development. Analytical and interpretive discussion is framed in relation to key notions of a sociocultural theory of interest introduced previously in the thesis, including ZFM/ZPA systems, internalisation and externalisation, and intersubjectivity.

The key episodes on which narrative accounts are based were selected by considering students' self-reports of interest in the form of trajectory graphs that students individually charted. The ratings of interest were subsequently collated to create a class mean trajectory graph for each term (as discussed in section 6.3). There was a dual purpose in creating a class graph: firstly, to enable a broader understanding of students’ perceived interest within the classroom community as a whole, which would then enable individual students’ trajectory graphs to be considered in relation to
the interest of the class more broadly; and secondly, to identify key episodes on which
narrative accounts could be based. These episodes were activities or lessons in which
students’ interest appeared to peak or trough, or that were identified as pivotal in the
process of the students’ learning, when considered in conjunction with the classroom
observation data. Pivotal tasks or lessons were ones in which the activity focus shifted
to a new stage, such as when the exploratory tasks were completed and students now
needed to draw on knowledge and experiences from that phase in the learning unit to
pose questions or apply their learning in a design and make task. By considering both
trajectory graphs and classroom observation data, a number of key episodes from each
term were identified. The key episodes recounted in sections 6.2.4.1 and 6.2.4.2 that
follow were both design and make activities. These episodes have been written as
narrative accounts, and are analysed and discussed to illustrate and refine various
aspects of a sociocultural theory of interest development. Data from the full range of
sources included in the project are drawn upon in the analysis and discussion of each
narrative.

6.2.4.1 Term 1 key episode: Ms Wheeldon interacting with students and
restructuring the lesson in response to her perceptions of the students’
engagement and interest in learning

This key episode has been selected as an illustration of the teacher’s
responsive restructuring of a lesson when her interactions with the students revealed
the difficulties being encountered by many in completing a task and the waning
externalised interest of some students. The lesson in which the key episode occurred
was during the week in which the students were making the electrical products of their
choice, such as alarms or torches. Prior to this lesson, the students had explored
electrical circuits and had individually selected and designed the product that they were
now making.

The narrative account

During the grade 5 science and technology lesson in week 6, the classroom
was a hive of activity. Wires, cells (batteries), clips, bulbs, tape and scissors were
spread around the floor and there was a productive buzz of conversation amongst the
girls. The students had time both before lunch (one hour) and after lunch (one hour and
ten minutes) to focus on constructing their products. This clearly was a problem-solving task. In the time made available to them, the students needed to work out how to successfully construct their circuits based on their knowledge of basic circuits developed in previous lessons and, in most cases, incorporate a switch or switches. For most students, this process involved a considerable degree of trial and error. Students were clustered in focused small groups of three or four in the classroom itself, on the veranda just outside and in the adjoining art room. Although working in a group with peers who were creating a similar product, each student was creating her own individual product, having brought to school the required materials that had been purchased or found at home. Ms Wheeldon had explicitly told the girls at the beginning of this lesson that they were only to seek her or my help if they had first tried to resolve the difficulty in their collaborative peer group.

As the first hour progressed, some of the students were becoming frustrated by their lack of success. Ms Wheeldon and I had been circulating amongst the groups as they worked. In response to the sense of frustration that was emerging, we began to engage more in conversation rather than just observation of groups, posing questions to lead students to ‘discovering’ a solution or responding to students’ questions. Three of the students making doorbells as their products had purchased a kit from an electronics shop. There were pieces in the kit with which they could not resolve what to do, and as I observed them working, I assessed that this was unproductive use of their time. I decided to intervene and I brought them over a paper clip, two thumb tacks and some cardboard. I posed a question, asking them whether they could make a simple switch from what I had just given them, as well as using the wires, connected to the buzzer and battery, to test the switch. Meanwhile, Ms Wheeldon also was in demand from students who had begun to ask for help. Just as she stood up after talking with Lori about her lighting system, another student, Lisa, called loudly from across the room, with desperation evident in her voice, ‘Please can you help me next, Ms Wheeldon?’

As Ms Wheeldon and I left the classroom at lunchtime, she said to me, ‘I think we’re losing some of them.’ She was evidently concerned that lack of success was dampening the excitement and engagement shown initially in the task. She then talked about responding to this immediately after lunch by providing time for the whole class
to group together again for a discussion focused on sharing progress, discoveries and frustrations.

When the class came back into the room after the lunch break, Ms Wheeldon asked them to sit on the floor in a circle. She and I sat in the circle also, alongside the students. She then opened up the discussion in the group by asking the girls to share their progress and problems encountered. The discussion that followed was the most ‘natural’ conversation amongst the class members as a whole that I had observed to date. The students really took up the opportunity to share their difficulties and others actively participated in suggesting possible solutions. The exchanges between students were genuine and purposeful, with students applying their current understanding to identify possible solutions to other students’ real and pressing problems. Rather than Ms Wheeldon or me being ‘gatekeepers’ in the discussion, the girls decided who would speak after them, choosing from peers who had hands raised. The role that either Ms Wheeldon or I played was in structuring the conversation, trying to sum up what had been suggested and bringing an issue to a close before the next one was raised. For example, Shalini had the problem of a switch doing the opposite – supposedly when it was open, it made her doorbell sound. Eleni put up her hand urgently and said that she had the same problem with her alarm. At that point, I entered the discussion and suggested that following this whole class discussion time, these two students should meet together to try to solve their common problem. The class discussion continued for approximately fifteen minutes and ended once students no longer wanted to raise issues. When Ms Wheeldon told the girls that they now had the remainder of the afternoon to continue working on their products, a collective, ‘Yesss!’ was enthusiastically heard from the class.

*Analysis and interpretive discussion*

Three stages are evident in this key episode. Firstly, the students were beginning to make their electrical products which led secondly to the frustration experienced as many of them encountered difficulties. The frustration was addressed in the third stage of the episode, when Ms Wheeldon restructured the lesson to include a collaborative problem-solving discussion before the students continued to work on making their product. Focusing on the teacher and interpreting her role in canalising
interest development during this classroom-based lesson, it becomes clear that Ms Wheeldon was responding to perceived levels of motivation, as well as understanding, as she interacted with students. She made an ‘on the spot’ decision to adjust the plan for the lesson when she thought there was a risk of ‘losing’ some of them, in terms of task engagement, involvement and enjoyment. As I recorded in my reflective journal following this lesson,

Ms Wheeldon was aware of the role the group discussion would potentially play in focusing and engaging those students who were frustrated – opening up some new possibilities. She also spent time with Lori and her group after the discussion after lunch, to help support progress. To me, this episode is all about scaffolding motivation – the teacher was sensitive to this student’s growing frustration and potential for losing interest/disengagement. She then provided opportunities to adjust the level of challenge through collaboration, with both peers and teacher, so that the student remained engaged/involved in the task – persistence worthwhile because Lori met with some success and a sense of achievement before she left to go home that afternoon. When I look at Lori’s reflection tasks from today, she has stated that science is her favourite subject and her perceived level of interest was high for this task. This may have impacted positively on Lori’s persistence.
(researcher field notes, 17/3/01)

This step was an overt attempt to scaffold the students’ motivation, with Ms Wheeldon intervening to restructure the lesson so that it provided the potential to support students’ continued engagement in the activity. Ms Wheeldon perceived that some students’ interest in the task was at stake because of the problems being encountered in completing the activity successfully. By regrouping the class as one for a discussion, she was providing a collaborative opportunity to resolve the difficulties being faced by some students, thus aiming to bring the challenging task within the students’ zones of proximal development. From the keen response of the girls to continue making their products, it appeared as though the discussion had achieved Ms Wheeldon’s goal of scaffolding student engagement and productive collaborative problem-solving, which in turn was potentially promoting the development of students’ interest in positive ways.
The narrative account thus provides an example of how Ms Wheeldon's decisions about the structure of an activity for the class could contribute to canalisation of students' interest development. The teacher's response to students' body language, conversations and requests for assistance effectively expanded the ZFM/ZPA system by creating an opportunity for collaborative problem-solving through a class discussion. The students subsequently returned to making their electrical products with new ideas as to how to tackle the challenges they had faced. The intersubjectivity evident between the teacher and students enabled this responsive stage in the lesson to effectively renew students' interest in the task and their eagerness to reengage in making their electrical products following the discussion was apparent.

6.2.4.2 Term 2 key episode: Teacher structuring of a lesson sequence to foster increasing possibilities for student choice, and direction guided by emerging and established interests

This key episode occurred during the sixth lesson in the term 2 unit. The science and technology lesson was the first that the students had participated in since their excursion to Taronga Zoo, although there had been an excursion debriefing discussion prior to the lesson. The episode recounted in the narrative that follows is presented in two stages, with analysis and interpretive discussion following each stage.

The narrative account, stage 1 - Synthesising students’ findings about egg-laying animals

There was a buzzing excitement as the students entered the classroom after their morning tea break. They knew that today they would be beginning to design their model animal enclosures. Many girls seemed pleased that there was science and technology for the remainder of the day, with the first half of the lesson between morning tea and lunch designated by Ms Wheeldon for completion of research about egg-laying animals. The second half of the lesson, following lunch, would be for designing and making enclosures. This latter task was what the students appeared really looking forward to starting! On the chalkboard, Ms Wheeldon had written a list of three tasks to be completed in the first lesson before lunch: (a) sharing (from research notes), (b) further research and (c) Can you answer any noticeboard questions?
For the first 15 minutes after entering the room, there was a whole class orientation to the lesson, guided by Ms Wheeldon. The girls then moved into their animal research groups. Cathy joined two other students who also were researching snakes, while Eleni found Josephine, who also had chosen to research echidnas. Michaela approached Ms Wheeldon as the groups moved into areas in the classroom and the adjoining artroom to work. She pointed out that there were no other frog researchers, or even amphibians, so she was wondering with whom she could work. Ms Wheeldon suggested that she might like to work by herself on the Internet, but Michaela had brought books to class that she wanted to use. Kira then came over to Ms Wheeldon to say that she was the only crocodile researcher, so she joined with Michaela and the pair contentedly worked side by side.

During the lesson, Ms Wheeldon and I circulated amongst the student groups. Michaela was feeling excited about her research task because her parents had told her that they could visit a pet shop on the weekend to see if she could find an answer to her personal interest question about whether toads’ eggs are different from frogs’ eggs. So far, her research using books and the Internet had not been fruitful. I told her that I might be able to help her find an answer, and she agreed that I could have a look on the weekend. During the lesson, she also left the classroom to seek help from the librarian, who said that she too would look for relevant information and that Michaela should return to see her at the end of this lesson. Michaela was pleased about this and she later ran eagerly from the classroom to return to the library. At the end of the day, as she left the classroom, she reminded me of my earlier offer to assist her as well.

Cathy’s group members were working cooperatively together, helping one another to find information relevant to their questions. They had visited the library at lunchtime to look for information about their egg laying animals and had electronically scanned this information from a reference book that they had found, then brought this to class.

Eleni and her research partner, Josephine, finished the questions-based research before the end of the time allocated by Ms Wheeldon for this task. They referred to the chalkboard and joined some other students clustered near the interactive noticeboard in the classroom.
‘Let’s get some books and try and find our own one,’ Eleni said to Josephine as she tried to respond to someone else’s contribution. Then Eleni decided to challenge my claim that ‘Eggs are strong’ and approached me to tell me this, asking me to recount my proof. In discussion, we agreed that the case might be different if we applied pressure at points different to the ends of the egg, such as the sides. She skipped away to record her challenge to my claim.

During this lesson, there were students constantly moving around the classroom, taking turns to use the computer for Internet access, as well as interacting with the noticeboard and moving to their desks to gather materials. Some students had visited their local council libraries to borrow books, while others had printed information from websites at home and brought this to class. Some students also left the classroom during this lesson, with Michaela going to the school library and other students going to the computer room. Sasha returned excitedly from the computer room with a response to her e-mail to Taronga Zoo experts.

Ten minutes before lunchtime, Ms Wheeldon asked all of the students to gather in circle formation on the floor and to bring just their research notes made in response to their questions.

‘Many girls have now answered their questions, but some of you still have tricky questions that you’re having trouble finding answers to,’ she said after everyone was settled. At this point, time was dedicated to putting unanswered questions to the class, to see whether other students could suggest useful leads for locating relevant information. The format that developed was similar to that in the previous term’s electrical product problem-solving (section 6.2.4.1), in that a student would pose a question, then that same student would select someone with a raised hand to respond. Often, students would preface their responses with, ‘This is just an idea, but…’ and would continue by drawing on their own research or what they had seen and heard at Taronga Zoo to explain their reasoning. Ms Wheeldon provided structural support for this conversation, asking for clarification or elaboration, and verifying with the question poser whether they were ready to move on to another student’s question after they had heard a variety of responses to their own. The bell for the beginning of lunch had rung and the students appeared not to notice, with discussion continuing. When the
responses to the current question were exhausted, Ms Wheeldon pointed out that it was in fact time for lunch.

‘Does anyone else have any burning, burning questions?’ she asked. One of the students had suggested earlier to the class that any ‘leftover’ questions could be added to the interactive noticeboard for later consideration. Ms Wheeldon adopted this student’s idea, suggesting that students with unanswered questions might indeed do this.

Analysis and interpretive discussion

The framework for and timing of this lesson was established by Ms Wheeldon such that it created a ZFM/ZPA system that fostered many possibilities for negotiation and student choice. As a result, interest in learning could be created and developed by the students along a variety of possible pathways. In their research groups, the students chose whether they wanted to raise certain questions with peers, pool resources and select the processes by which they would share findings and engage in further research. Once seated in their research groups, they chose the extent to which they interacted with others in completing their research task. The ZFM was extended beyond the classroom so that students could visit the school library or the computer room, which created possibilities for interacting with the librarian and with Zoo experts via e-mail. Students also could choose whether they wanted to use books, the Internet or information gathered from home. A further affordance was that they could move around the classroom as they desired, so that it was possible to visit other groups and thus to share ideas. Their teacher and the researcher also were available as resources with whom to share and test ideas and developing theories. Additionally, the interactive noticeboard was an affordance to students’ developing interest as it created opportunities for choice and was controlled by the students, in that they could contribute to this evolving exchange of questions, ideas and information whenever they chose and in ways that they perceived were meaningful in the classroom learning community. The students appeared focused on the tasks at hand throughout this episode, with levels of engagement likely to have been increased by the fact that they had selected both the egg-laying animal and the focus questions for research. The task thus was based on the students’ existing genuine interests and provided opportunities for those interests to deepen.
The framework provided by Ms Wheeldon at the end of the lesson was taken over by the students, as evidenced by the sincere nature of the exchanges amongst the girls during the class discussion. This discussion was meaningful and purposeful in that students were putting forward for discussion what currently was not known. They shared authentic problems and unanswered questions, rather than reporting what had been found and thus was already established knowledge. The students were responsible for the focus of the discussion and the choice to become involved, while Ms Wheeldon scaffolded the structure of the conversation. The deep engagement of the students in the discussion was apparent when they did not show signs of wanting to finish, despite the lunch bell having rung.

Ms Wheeldon’s expectation that students would work in collaborative groups to complete the research tasks created possibilities for the development of intersubjectivity amongst the students. As all of the students sought answers to their individual research questions, they talked to peers about resources they were using, interesting facts they had read about and any difficulties in locating information. Such discussion contributed to a sense of shared purpose amongst the students. Although they were conducting their own individual research, each student was engaged in a similar process and could support or receive assistance from others. There also was evidence of intersubjectivity being developed between Michaela and both Ms Wheeldon and the researcher, with their interaction indicating an openness to negotiate possible courses of action. Ms Wheeldon demonstrated her willingness to be directed by students’ suggestions at the conclusion of the class discussion when she made the announcement that any remaining questions could be added to the interactive noticeboard, thus expanding the ZPA and developing the practices of the classroom through her uptake of a student’s idea.

The narrative account, stage 2 - Initiating students’ engagement in the task of designing and making model enclosures

Before the end of lunch, a group of girls was gathered around the classroom door, waiting excitedly for the bell to ring so that they could return to the classroom. Eleni was amongst these students. When the bell finally did ring about five minutes later, Ms Wheeldon invited the students to sit in the floor space, facing where she was
seated at the front of the classroom. Michaela positioned herself near the front of the students.

Ms Wheeldon sat on a chair and leaned towards the students, drawing their attention to a book.

‘Some of you may have noticed this book, *Zoo You Later* (Cheng, 2000) which has been at the front of the classroom this term.’ She told them that it was written by someone who had worked as an educator at Taronga Zoo, which they had visited on their excursion. Ms Wheeldon indicated that it was my book, and the students glanced around to the back of the classroom, where I was sitting at a student’s desk. Many smiled in acknowledgment. Ms Wheeldon then read the blurb on the back of the book and told the students that she only would be reading the introduction today, not the stories about zoo escapes. There was a disappointed, ‘Ohh’ from some students at this point. Ms Wheeldon told them that if they wanted to read more, they could borrow it during free reading time. At the conclusion of this initial lesson time on the floor, Michaela asked Ms Wheeldon what would happen if more than one student wanted to read the book during free reading time. She clearly wanted to read more. Ms Wheeldon replied that they could start a list.

In introducing the passage that she was going to read, Ms Wheeldon made links to the zoo excursion in the previous week. She asked the girls for whom the excursion had been their first visit to Taronga Zoo to share their impressions and to comment on whether it had matched their expectations. Eleni was one of the students who contributed that she had really enjoyed seeing all of the animals. Using questioning, Ms Wheeldon led the class discussion to focus on the ways that zoos had changed over time. Michaela contributed her response and Natasha built on this to recall our excursion group’s ‘alternate’ route past some older style cages that were no longer in use.

Ms Wheeldon then started reading from the book. At one point, she stumbled over her pronunciation of *zoological* and some of the girls spontaneously joined in to help her pronounce it correctly. She smiled at them. As Ms Wheeldon showed them some of the humorous line drawings in the book, the students laughed and pointed out
funny parts to no one in particular. When Ms Wheeldon recommenced reading, the chatter stopped. Lori put her hand up at one point while Ms Wheeldon was reading, but rather than disrupt the flow of the text, Ms Wheeldon winked subtly at Lori as an aside. Lori put her hand down.

At the end of the reading, Ms Wheeldon posed a question to the students.

‘Why do you think zoos have changed?’ she asked. Many of the students raised their hands in response, including Eleni, Cathy and Michaela, and Ms Wheeldon chose students to share their ideas. Eleni contributed a response relating to the role of zoos in protecting wildlife from becoming extinct, and Ms Wheeldon responded, using the term ‘conservation’ and further developing Eleni’s response. Michaela was focused during this floor time, more so than in some previous lessons. She was not distracted by anyone around her, especially Jacqui who was absent from school on this day. Michaela was not fiddling with anything or talking privately to peers, as I had observed in other lessons. She appeared totally involved in listening to Ms Wheeldon reading and the subsequent class discussion.

Michaela and Eleni both were selected by Ms Wheeldon to respond to her next question, ‘If enclosures no longer have bars, how do the animals stay inside?’ Each of them referred specifically to their own research animals, a white-lipped green tree frog and an echidna, in their replies, drawing on the design of the enclosures that they had seen at the zoo.

Twenty minutes into this lesson, Ms Wheeldon told the students that it was now time for them to start thinking about their own model enclosures (as if they hadn’t already!). Stephanie was sitting at the back of the class group and she soundlessly punched her fist excitedly into the air, accompanied by a positive grimace. None of the other students spoke or made any noise. They were directed to move back to their desks, which were organised in a horseshoe formation, creating a central space in the middle of the classroom. Ms Wheeldon and I then emptied some sacks of materials which could be used for model making onto the floor in this central space. This created obvious excitement amongst the students, with conversations breaking out as we pulled different objects from the sacks and displayed these for everyone to see. There
were many different sized containers, shapes of adhesive foam, cushion stuffing, coloured paper strips, cardboard tubes and more. The materials had been purchased from a community cooperative for recycled materials, *Reverse Garbage*, and the address of this cooperative was written on the chalkboard during the afternoon’s lesson. Some students chose to record the details in their homework diaries for future reference, including Eleni and Michaela.

‘Oh wow!’ was exclaimed by students a number of times as the materials were revealed. The girls appeared very excited by the range of materials we had gathered. Philippa was unable to sit still and she was stomping her feet excitedly as she sat at her desk. As I continued to group the materials on the floor, Ms Wheeldon initiated a class discussion, asking the students to suggest some possible uses for these objects in their model enclosures. Aphrodite’s hand shot up with a gasp, and as she did so she bumped her elbow noisily on her desk, prompting some laughter from the other girls and from Aphrodite herself. She was so eager to share her idea! From the buzzing atmosphere in the room, it seemed as though the students couldn’t wait to get started on this design and make task. And at last it was time to begin.

*Analysis and interpretive discussion*

In the second stage of this key episode, there was a very limited ZFM/ZPA system available to the students at the beginning of this lesson and the system was strongly controlled by the teacher. Ms Wheeldon determined how the students were seated and chose to organise these stages of the lesson in a whole class grouping. This organisation established the constraint that all students were required to do the same thing at the same time. The options for student participation were limited by the teacher-directed nature of the initial read-aloud activity and the control of the teacher and researcher over the display of the materials. Ms Wheeldon had a specific purpose for sharing this passage at the outset of the lesson. Although the students would have liked to hear more of the book she had selected and, as a result, attempted to expand the ZPA boundary, this request was rejected by Ms Wheeldon as it did not contribute to her specific focus on establishing a context for considering enclosure design. Her questioning enabled more active participation and elicited contributions from the students, however Ms Wheeldon remained in control, selecting whether she would allow interruptions, who could respond to her questions and developing students’
responses in ways that advanced the lesson towards her own goals. Her goals remained implicit to the students, although they were aware that they would be beginning to design their enclosures during this lesson. Teacher control was maintained later in the lesson by seating students at their desks as the materials for making enclosures were displayed. This enabled the students to see the materials but restricted their interaction with them at this stage. Ms Wheeldon wanted the students to consider carefully the potential uses of the materials and to engage in design that reflected their research findings, rather than rushing into actually making the enclosures. This channelled the possibilities for students’ engagement during this lesson and limited their actions to designing rather than making; this did, however, create a process that more accurately reflects practices engaged in by designers in contexts beyond the classroom.

Despite this high degree of teacher control and limited scope for negotiation within the ZFM/ZPA system, there is evidence that the students were engaged and interested. A number of students would have chosen to finish their lunch break early to return to the classroom and begin work on their enclosure designs, however the constraints of the school’s bell times meant that they could not begin the task when they desired. The students’ interest was further demonstrated by their willingness to respond to the teacher’s questions, their attentiveness during the reading, signs of excitement in their body language such as a victorious punch of the fist and stomping feet, as well as exclamations of wonder. The students’ attention during the reading could have been because they were eager to begin the enclosure design task, which they knew would follow this lesson introduction and they were keen to see how the reading related to this anticipated task. However, this introductory reading activity also was meaningful in itself as it linked with their previous excursion to Taronga Zoo. Additionally, the book belonged to me and a sense of connection was revealed through the smiles that the students exchanged with me. There appeared to be an element of trust in me as the researcher to provide a resource that was relevant and interesting because I was a participant in their science and technology classes. The students’ anticipation regarding the contents of the sacks and the suspense created as Ms Wheeldon and I gradually revealed the materials and displayed these on the floor for the students to see also served to build the students’ interest in possible uses for the different objects in their own designs. The ZFM/ZPA system was being expanded gradually as the potential for increased student choice and decision-making grew with the subsequent task of actually engaging in the design of a specific animal’s enclosure.
There were opportunities for more free conversation amongst students as the lesson progressed.

There were also signs of maintenance and development of intersubjectivity between Ms Wheeldon and class members in this episode, through the ways in which Ms Wheeldon directed the lesson both verbally and non-verbally towards establishing a sense of shared purpose and connectedness. For example, the episode was strongly directed by the teacher but the students responded to the moves made by Ms Wheeldon within the structure that she established. Ms Wheeldon showed that she was interested in understanding the students’ perceptions of Taronga Zoo and that she was willing to address Michaela’s concern that a system might be needed for borrowing the book during free reading time. Michaela’s confidence in approaching Ms Wheeldon to address this issue also indicates that she was aware that Ms Wheeldon was likely to respond. Ms Wheeldon drew on the relationship that the students had established with me to create a link with the passage she was about to share. There was also non-verbal communication that contributed to her relationship with the students. For example, Ms Wheeldon leant forward to engage them in the reading and smiled appreciatively when the students joined in to assist her pronunciation of *zoological*. Ms Wheeldon built on students’ responses to her questions following the shared reading, showing that she valued their ideas. Her questions also allowed them scope to draw on their own animal research, which had personal meaning, so that again she was fostering relatedness to the ideas in which she was attempting to scaffold interest. Intersubjectivity was fostered through Ms Wheeldon’s actions and responsiveness to the students.

The two stages of this key episode from term 2 of the study have revealed some of the ways in which Ms Wheeldon contributed to canalising students’ interest development. Her decisions about the structures within the classroom environment and for particular learning activities both promoted and limited the possibilities for student engagement and interaction. Negotiation of intersubjectivity between Ms Wheeldon and the students also contributed to their classroom experience and the potential for interest to develop. The next major section of this chapter shifts the focus from the role of the teacher in supporting interest development to students’ self-perceived interest as they engaged in the activities of the grade 5 classroom-based learning community.
6.3 EVIDENCE OF INTEREST DEVELOPMENT AMONGST 5W CLASS MEMBERS: WHAT IS REVEALED BY RETROSPECTIVE TRAJECTORY GRAPHS CHARTING SELF-PERCEIVED INTEREST?

A key strategy used in the research project to gain insight into students’ self-perceptions of their interest development was the individual, retrospective charting of the degree of interest experienced when participating in particular activities (previously described in Chapter 5, section 5.4.2.2). This section of the chapter considers how the strategy was used in the project and how the collation of the class members’ individual graphs reveals patterns of interest more generally within the learning community. Consideration of the peaks and troughs in the class interest graph combined with analysis of the features of the tasks in which the students were engaged provides more detailed information about the types of learning experiences that interested the students in this study. While the collated class trajectory graphs for each term are the focus of this section, Chapter 7 will consider more specifically the trajectory graphs of individual focus students.

6.3.1 Charting interest trajectories as a retrospective process

A class discussion prior to charting trajectories for the first time revealed that the students considered themselves to be interested when they were ‘into it’, ‘when it gets your attention’ and ‘you like it’; in each case, it appears to refer to an object, topic or activity process and students’ notion of interest appears clearly related to its affective dimension. I asked the students to chart the extent of their interest in relation to specific tasks on a 7 point Likert scale, with the lowest rating of 1 if not at all interested to the highest rating of 7 if very interested in a particular activity. A rating of 4 was possible if the students felt a neutral response to a task. I found that in reflecting on their experience of interest, many of the students extended the scale, placing their ratings above and below the extremes – very interested and not at all interested – so that the coding of their ratings expanded in response. The number of students who expanded their ratings is evident when considering the most popular ratings, as indicated in Figures 6.12 and 6.13, where the modes are reported.
Both the students’ use of the scale and the way in which I used the trajectories as a strategy for data collection created limitations for the study and the ways in which the associated data can be considered. Firstly, as many of the students used the 7 point scale as given, it is uncertain as to whether these students may have rated their interest more highly or lower if they had been given a 9 point scale. In effect, I have combined the ratings for all students, regardless of whether they used a 7 point, 8 point or 9 point scale. I believe that this is valid because of the way in which I subsequently have used the graphs to describe patterns of interest qualitatively, as a tool to give insight into relative degrees of interest experienced by students rather than considering levels of interest in absolute terms. What one student may have perceived as a little interested may have felt like very interested to another student, so it is the patterns that emerge, both individually and collectively, that are of interest in this study. Secondly, a limitation of trajectories as a source of data in the present study is that I only collected retrospective ratings at time points six weeks into each of the units. At the time of the study, I considered interviews conducted with focus students at the end of each term to provide similar, and potentially more detailed, data to that gathered through the trajectory graphs. In hindsight, I now have partial data for each term, in each case to the point prior to when the students engaged in the design and make task associated with the two respective topics. As a result, I can only consider this data within this more limited range of activities and must rely on classroom observations and self-report data collected through interviews for the remaining three weeks of each learning unit.

In addressing the potential for recency bias, the students created interest trajectory graphs concurrently in two investigation-focused lessons – lesson 2 of term 1 and lesson 3 of term 2 – which enabled consideration of consistency or otherwise of the process of retrospectively charting interest. Figures 6.10 and 6.11 compare students’ ratings of interest made at the time of completing the tasks with ratings made retrospectively at the end of the sixth lesson of each term. For each of the activities, concurrent ratings are similar to retrospective ratings of interest and there appears not to be a recency bias effect. Such similarities also indicate the relative stability of the students’ perceptions of their interest during the data collection period in each term.
Figure 6.10. Comparison interest ratings created at the time of lesson 2, and retrospectively for lesson 2, both in term 1, specifically for activities 5 (experiment about static electricity), 6 (experimenting with circuits) and 7 (investigating changes in energy forms). $n = 13$ (activities 5 and 6)/ 12 (activity 7) (concurrent rating), $n = 25$ (activities 5 and 7)/ 26 (activity 6) (retrospective rating)
Figure 6.11. Comparison interest ratings created at the time of lesson 3, and retrospectively for lesson 3, both in term 2, specifically for activities 8 (watching a video) and 9 (dissecting a chicken's egg). n = 23 (concurrent rating), n = 24 (retrospective rating)
6.3.2 Collating individual ratings to create a class mean trajectory of interest development: What is revealed about patterns of interest in this classroom learning community?

Students generally reported their experience of interest in positive terms, evident in the mean ratings for most activities recorded as greater than 4.5\(^7\) (Figures 6.12 and 6.13; Tables 6.3 and 6.4). These positive mean ratings indicate that in participating in classroom-based activities, the learning community was at least *a little interested* and interest strengthened during participation in particular activities within particular lessons. When considered as a class group, the students reported their interest as peaking during investigatory activities such as when they were asked to investigate electrical circuits, to design and make an electrical product, to design and conduct fair tests (experiments) on features of eggs and when they were given the task of designing and making a model zoo enclosure to meet the needs of an egg-laying animal (Tables 6.3 and 6.4, high mean ratings indicated in red). Key features of these investigatory and design activities were that the tasks had multiple pathways for completion in addressing the criteria for the task, which gave the students choice and responsibility for their own learning, whether working in a group with peers to complete the task or individually. The possibilities for negotiation of focus within tasks, either individually or in peer groups, also created opportunities for interest to emerge and develop, as students were given support to take responsibility for their learning. The collaborative nature of many of the tasks allowed students to observe their peers’ interaction with objects and engagement in activities, as well as providing opportunities to co-create ways of participating in the task that both supported and allowed for new lines of inquiry to develop. This in turn enabled students to pursue their interest and made it possible for new interests within the task, topic and domain to emerge. A more open ZFM/ZPA system allowed for greater choice and student control; a more limited ZFM/ZPA system was evident when there was a high level of teacher control and rigid task parameters.

\(^7\) Mean ratings falling between 4 and 4.4 were considered as *neutral*, in the sense that students did not experience interest positively or negatively but were ambivalent towards their experience of interest as they participated in the task.
Also noticeable is that strong interest was experienced and reported by students when guest speakers visited the school or experts made presentations, and during excursions to sites related to classroom-based learning. Such experiences provided opportunities for students to interact with the real thing – solar panels and model cars during the SEDA presentation, animals and their enclosures at Taronga Zoo – and created new possibilities for participation within a different community of practice that had real world significance. The adults with whom the students interacted provided new insights into focus topics and, in the process, created possibilities for learning. Learning in activities related to guest speakers or excursions often afforded different physical contexts for learning as well, with different artifacts and tools available to students.

Mean ratings of interest experienced by the class were recorded in the negative range for only one task over the total of twelve lessons, with this task occurring in term 1 (Table 6.3, lower mean rating indicated in blue). This rating was given to the class discussion activity at the conclusion of the first lesson in the term, when the teacher’s aim was to gain insight into the prior knowledge of class members and gather students’ questions about what they wanted to learn in the unit. It is possible that for most of this discussion time, many of the students were more passively engaged in listening to peers’ contributions. Class discussions usually offered more limited possibilities for participation, in that students needed to be selected to take a turn, and greater teacher control was evident in directing the opportunities for students to contribute.
Figure 6.12 Term 1 class interest trajectory, Number of students = 26, Average of means 5.4
### Table 6.3

**Term 1 task characteristics (lessons 1 – 6)**

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Activity number and description</th>
<th>Characteristics</th>
<th>Class mean interest rating (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Hearing about Heathville Manor</td>
<td>1. Teacher presentation</td>
<td>5.7 (0.9)</td>
</tr>
<tr>
<td></td>
<td>2. Writing down what you know about electricity and drawing a torch</td>
<td>2. Individual activity, problem-solving task</td>
<td>5.2 (1.5)</td>
</tr>
<tr>
<td></td>
<td>3. Talking to friends about what you already know about electricity</td>
<td>3. Small group task</td>
<td>4.3 (1.6)</td>
</tr>
<tr>
<td></td>
<td>4. Posing questions about electricity and teacher writing these down</td>
<td>4. Class discussion, problem-solving task</td>
<td>3.9 (1.4)</td>
</tr>
<tr>
<td>2</td>
<td>5. Doing the experiment about static electricity with balloons</td>
<td>5. Small group, hands-on</td>
<td>5.9 (1.8)</td>
</tr>
<tr>
<td></td>
<td>6. Experimenting with globes, batteries and wires to make an electrical circuit</td>
<td>6. Small group, hands-on, problem-solving task</td>
<td>6.7 (0.8)</td>
</tr>
<tr>
<td></td>
<td>7. Investigating changes in energy in a CD player and toaster</td>
<td>7. Small group, hands-on</td>
<td>4.7 (1.9)</td>
</tr>
<tr>
<td></td>
<td>8. Homework task – Drawing a plan of switches and powerpoints in your home</td>
<td>8. Individual observation</td>
<td>5.7 (1.6)</td>
</tr>
<tr>
<td></td>
<td>9. In class time prior to lesson 3</td>
<td>9. Class discussion,</td>
<td>6.0 (1.5)</td>
</tr>
</tbody>
</table>
- Going to the Senior School excursion to see the solar car

| 3  | 10. Doing two tasks – circuit task and challenge task (lemons) | 10. Small group, hands-on | 5.8  | (1.8) |
| 11. Talking with the whole class about experiments with circuits in the hall | 11. Class discussion | 4.1  | (1.7) |
| 12. In class time prior to lesson 4 – Reading books about energy and electricity with Ms Wheeldon | 12. Teacher presentation, class discussion | 5.1  | (1.6) |

| 4  | 13. Finding out what people now know about electricity in a class discussion. | 13. Class discussion | 4.5  | (1.9) |
| 15. Writing to Russ, the electrician, using email | 15. Contact with expert | 4.6  | (2.2) |

| 5  | 16. Talking about Russ' answers to girls' questions | 16. Teacher presentation, class discussion, expert | 4.4  | (2.2) |
| 17. Starting to design a product (torch, alarm etc) for Heathville Manor | 17. Small group, individual, designing and making, problem-solving | 6.8  | (1.0) |

<p>| 6  | Special guest visit from Alison from SEDA |
| 18. Hearing Alison talk about electricity and the Greenhouse effect | 18. Guest speaker | 6.3  | (1.6) |</p>
<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Type</th>
<th>Value</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Calculating electricity use in the classroom</td>
<td>Small group, individual, problem-solving task</td>
<td>5.4</td>
<td>(2.0)</td>
</tr>
<tr>
<td>20</td>
<td>Seeing and hearing about solar energy and the solar panels in the playground</td>
<td>Guest speaker, observation task</td>
<td>6.6</td>
<td>(1.8)</td>
</tr>
</tbody>
</table>
Figure 6.13. Term 2 class interest trajectory, Number of students = 26, Average of means 5.7
Table 6.4

Term 2 task characteristics (lessons 1 – 6)

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Activity number and description</th>
<th>Characteristics</th>
<th>Class mean interest rating (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Listening to Ms Wheeldon read <em>Wilfrid Gordon McDonald Partridge</em> (Fox &amp; Vivas, 1984) picture book and discussing it</td>
<td>1. Teacher presentation, class discussion</td>
<td>4.4 (1.6)</td>
</tr>
<tr>
<td></td>
<td>2. Writing down what you knew about eggs already and drawing an egg cross-section</td>
<td>2. Individual activity, prior knowledge task</td>
<td>4.7 (1.8)</td>
</tr>
<tr>
<td></td>
<td>3. Talking to friends about what you already knew about eggs and choosing a fact to write on a yellow egg</td>
<td>3. Small group task, prior knowledge task</td>
<td>4.9 (1.9)</td>
</tr>
<tr>
<td></td>
<td>4. Posing questions about eggs and Ms Wheeldon and Ms Pressick writing these down on pink eggs for the noticeboard</td>
<td>4. Class discussion</td>
<td>5.1 (1.8)</td>
</tr>
<tr>
<td>2</td>
<td>5. Testing the strength of eggs with a demonstration of Josephine standing on the shelf</td>
<td>5. Teacher presentation, class discussion, fair test, observation</td>
<td>6.3 (1.2)</td>
</tr>
<tr>
<td></td>
<td>6. Designing and doing</td>
<td>6. Small group task, fair</td>
<td>6.3 (1.3)</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>Type</td>
<td>Grade</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>1</td>
<td>your own fair tests to test the strength of a raw egg, hard boiled egg and blown egg</td>
<td>test, hands-on</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Writing up your results and drawing a picture to show your findings from your test</td>
<td>Individual activity</td>
<td>5.2</td>
</tr>
<tr>
<td>3</td>
<td>Watching a video about eggs</td>
<td>Observation</td>
<td>5.7</td>
</tr>
<tr>
<td>4</td>
<td>Doing your own egg dissection</td>
<td>Small group task, individual, hands-on</td>
<td>6.9</td>
</tr>
<tr>
<td>5</td>
<td>Drawing what’s inside an egg and labeling it</td>
<td>Individual activity</td>
<td>5.4</td>
</tr>
<tr>
<td>6</td>
<td>In class time prior to lesson 4 – Reading books about eggs and egg-laying animals in silent reading time</td>
<td>Individual activity, research task</td>
<td>3.9</td>
</tr>
<tr>
<td>7</td>
<td>Prior to lesson 4 – Choosing an egg-laying animal to research and become an expert about</td>
<td>Individual activity, research task, class discussion</td>
<td>6.3</td>
</tr>
<tr>
<td>8</td>
<td>Choosing 3 class questions to research about egg-laying animals</td>
<td>Small group task, class discussion</td>
<td>4.9</td>
</tr>
<tr>
<td>9</td>
<td>Choosing 2 personal interest questions to research about your animal</td>
<td>Individual activity</td>
<td>5.2</td>
</tr>
<tr>
<td>10</td>
<td>Getting your own data</td>
<td>Individual activity</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Activity Description</td>
<td>Task Type</td>
<td>Duration (in hours)</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>5</td>
<td><strong>Zoo excursion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Planning your group’s route and itinerary for the zoo excursion</td>
<td>Small group task</td>
<td>5.9 (2.1)</td>
</tr>
<tr>
<td>17</td>
<td>Going to the Education Centre at the zoo</td>
<td>Expert presentation, class discussion</td>
<td>7.0 (1.3)</td>
</tr>
<tr>
<td>18</td>
<td>Spending time looking at different animals and enclosures with your group</td>
<td>Excursion, small group</td>
<td>6.7 (1.9)</td>
</tr>
<tr>
<td></td>
<td><strong>Science Day at School</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Going to the computer room and working in the classroom for animal research</td>
<td>Individual activity, research task</td>
<td>5.8 (2.2)</td>
</tr>
<tr>
<td>20</td>
<td>Seeing the shows <em>Lab on Wheels</em> and <em>Skydome</em></td>
<td>Expert presentations</td>
<td>6.4 (2.0)</td>
</tr>
<tr>
<td>21</td>
<td>Paper aeroplane flying competition</td>
<td>Design and make task</td>
<td>6.6 (2.1)</td>
</tr>
<tr>
<td>6</td>
<td><strong>Designing your zoo enclosure for an egg-laying animal</strong></td>
<td>Design and make task, individual</td>
<td>6.8 (1.8)</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Thinking about materials and looking at objects from <em>Reverse Garbage</em></td>
<td>Design and make task</td>
<td>6.2 (2.2)</td>
</tr>
<tr>
<td>24</td>
<td>Writing reflections on the Left Hand Page and in your journal</td>
<td>Individual activity</td>
<td>4.8 (2.3)</td>
</tr>
</tbody>
</table>
6.4 WORKING COLLABORATIVELY AND THE ROLE OF PEERS IN INTEREST CANALISATION OF INDIVIDUAL STUDENTS

Where section 6.2.4 focused on the role of the teacher in interest canalisation and section 6.3 focused more broadly on the students’ reports of interest in relation to classroom-based tasks, this section of the chapter considers collaborative class and group activities, more specifically the ways in which interaction with peers both limits and affords the interest development of individual students. In analysing and discussing the narratives, the focus is on illustrating canalisation processes. To a lesser extent, self-canalisation, internalisation and externalisation processes and the negotiation of intersubjectivity in relation to interest development also are discussed. As previously, analysis and interpretive discussion incorporates data gathered from audio and video tapes, my field notes as a participant observer and students’ interest trajectories.

6.4.1 Term 1 key episode: The emergence and development of interest through argumentation in a shared activity

This key episode from term 1 highlights the social nature of interest in learning as it is created and canalised in small group interaction between three students, Michaela, Eleni and Josephine. The episode is taken from the third lesson in the unit. This lesson developed ideas introduced in the previous week’s science and technology lesson, when students worked in small groups to complete tasks focusing on energy more broadly, and electrical circuits and electricity more specifically.

6.4.1.1 The narrative account: From disparate views to a shared focus of investigation motivated by negotiated interest

Michaela, Eleni and Josephine had been selected by Ms Wheeldon to work together to complete two electrical circuit tasks, which they chose from four options presented by the teacher. Ms Wheeldon allocated the initial section of the lesson to task clarification and instructed the small groups of students to discuss their predicted findings in the absence of the circuit materials. Eleni and Michaela were particularly argumentative during this time, disagreeing in their predictions of how electricity moves in a circuit from one terminal of a cell (battery) to the other. While Eleni attempted to
engage Michaela and Josephine in focused discussion, Michaela interrupted Eleni’s explanations several times. Initially she dismissed and mocked Eleni’s ideas, then she began to disagree with Eleni’s predictions. At this point, Michaela did not present her own arguments for alternative predictions, which limited the development of a constructive conversation. It was clear, however, that each student believed her own predictions to be accurate. Now Eleni appeared willing to move on to discussion of the second task, however Michaela persisted in focusing on how electricity moves in a circuit and started to draw a diagram to illustrate her own ideas in her science book. Eleni voiced some disagreement but observed Michaela drawing. Eleni subsequently drew a diagram in her own science book after Michaela blocked Eleni’s request to draw an alternative explanation alongside the one Michaela had already drawn. This process resulted in a sense of agreement about electricity flow in circuits, to Eleni’s apparent relief. Throughout this comparison of drawings, Josephine chose not to intervene, but appeared to actively listen and observe.

Ms Wheeldon stopped the small group discussion at this point and directed the groups to gather the circuit materials required for their investigations. She had organised the components in *task buckets* that she had placed in the centre of the room. Eleni’s group chose to begin with the contentious circuit task. The girls completed the problem defined on the task card within the first 30 seconds, successfully lighting two bulbs in a circuit. Observing the group’s rapid completion of the task, I approached to probe their thinking about the movement of electricity in the circuit. This again created disagreement between Eleni and Michaela, and I left the group during their discussion, which continued and remained unresolved. After a few minutes, Eleni posed the question, ‘So what will we write in our journals?’, which shifted the focus onto the final step on their task card. Unlike the initial stage of the lesson when Michaela rejected Eleni’s attempt to direct the group, here she accepted it. They each began individually recording their ideas about the circuit, while Josephine independently continued to play with the equipment, without intervention or comment from Eleni or Michaela. The three students silently continued working in this way, until Eleni interrupted the individual activities by saying, ‘Let me show you something’.

Michaela and Josephine gave Eleni their attention almost immediately and watched her demonstrate the way her pen acted as a conductor in the electrical circuit they had created together earlier. Michaela responded positively to Eleni’s suggested
line of inquiry and they tested another pen, which also worked. Michaela and Eleni began to bounce up and down in excitement while Josephine looked on, smiling. Michaela called me over excitedly and Eleni ran to bring me over to their group to share what they had found. This attracted the attention of Stephanie’s group, working adjacent to Eleni’s, and Stephanie asked them what was going on. My question, ‘What else can you test?’, encouraged their continued exploration. Michaela and Eleni were obviously excited by this challenge, urgently calling me over a few minutes later after they had tested other objects. Eleni exclaimed, ‘We’ve discovered something new. Something new!’ They asked to test my necklace, then Josephine became more actively involved when the other girls suggested testing her school badge. At this point, all three students shared a common focus and their experimentation further developed to include the same object in a different position within the circuit. As they tested, Eleni exclaimed, ‘Oh my gosh!’, and this time called Ms Wheeldon over. The teacher further encouraged the group’s innovations, but with reference to what was required on their task card by asking what they were recording. She then told Michaela she could record her findings in any form she chose. As Ms Wheeldon left the group and the lesson time allowed for this task drew to an end, Eleni and Michaela returned to documenting their findings in their workbooks while Josephine played with the equipment.

6.4.1.2 Analysis and interpretive discussion

There are three stages evident in the students’ activity in the episode presented: (a) task clarification and argumentation amongst group members during the prediction phase, (b) completion of the circuit task set by the teacher and (c) the development of a shared problem initiated by Eleni and collaboratively explored through play with materials available. These stages will be discussed with a focus on the students’ shared interest in relation to the key sociocultural notions of canalisation, including through tool use and scaffolding processes, intersubjectivity, and internalisation and externalisation.

The first stage: Recognition of contested knowledge and argumentation prompted by a teacher-initiated problem

In this stage of the episode, the tension that arose through focused argumentation began to create interest for this small group in the teacher-designed
task. The context appears to canalise the development of interest by two significant processes. Firstly, the teacher’s choice to structure the lesson to restrict access to physical materials served to channel student interactions in directions which relied on the elicitation of prior knowledge and experience. Consequently, opinions could not be substantiated, in this phase, by recourse to evidence through experimentation. This resulted in Michaela’s persistence in communicating her understandings to her peers and her initiative in drawing upon the tools that were available to her to draw a diagram. Secondly, the rather tense relationship already existing between Eleni and Michaela further canalised the development of interest through an apparent desire by both girls to be ‘right’. The uneasy social dynamic between Eleni and Michaela was evident and a sense of competition dominated the students’ interaction, at this point making it difficult to determine their interest in the content of the topic or the nature of the task at hand. While a sense of agreement as to how electricity moves in a circuit was reached at the conclusion of this stage, a lack of intersubjectivity remained, evident in Michaela’s blocking of Eleni’s request to draw a diagram alongside her own. Michaela’s dominance in directing the activities, and therefore the possibilities for paths of interest development, is evident in this stage of the activity.

The second stage: Completion of the task set by Ms Wheeldon

It is possible that the canalisation which occurred in the previous stage may have focused the girls’ attention on achieving the ‘correct’ solution to the task as a means of demonstrating intellectual superiority. While the students were focused in their participation, their interest in the task at this point appeared to be in finding out whether their prediction was right. The researcher’s intervention served to modify the interest trajectory by stimulating disagreement between Michaela and Eleni, thus re-establishing a competitive situation.

The third stage: Development of a student-initiated shared problem and exploration of possibilities

Eleni’s suggestion to test conductivity re-established a common focus for all group members and Michaela particularly responded in ways that further canalised the possibilities for their shared investigation by directing them to look for other objects to test. The context also was created by the open-endedness of the teacher-designed task and components, which provided a starting point for the further discovery in this
stage. The time available created the opportunity for student-initiated play with the materials, promoting Eleni’s suggestion for exploration, which developed from her extensive prior knowledge (she owned and frequently played with electronics kits at home and also owned a documentary video about electricity) and relatively high interest in science, as previously expressed. Her suggestion proved to be critical not only in canalising interest development within her small group, but also in influencing the wider classroom context. The group began to develop a common activity focus so that Josephine also was drawn into more active participation. In this stage, involvement of the researcher and class teacher was initiated by the students in a desire to share their findings, and canalised the students’ participation and developing interest in response to their innovations. Valuing of the students’ initiatives was evident in both adults’ feedback, which encouraged continued development of their shared activity and interest. The students’ respective contributions to the group’s activities suggest some internalisation of the co-created interest in the activity, which when externalised served to scaffold the path of investigation. All of these aspects of the context – both physical and social – contributed to canalising the students’ developing interest.

It was evident that Eleni and Michaela had developed a degree of intersubjectivity in the process of completing this interest-driven activity, and that a shared interest was negotiated through their increasingly interactive exploration of electrical circuits. The sense of competition that had initially existed between these students had diminished considerably in the course of their shared activity, although it appeared to have been an important initial canalising factor which contributed to the final outcome. Differences observed in the nature of participation of each of the three students also were reflected in the retrospective ratings of their self-perceived interest during this activity. Eleni, who initiated the development of the group’s focus in the third stage, reported feeling very interested, while Michaela, who actively engaged in debate and experimentation with Eleni, said that she felt interested. Josephine’s participation in the discussion and collaborative exploration of conductors in the circuits was observed to be more peripheral. Her experimentation with the circuit components had been mainly independent of her peers, when Eleni and Michaela were recording their findings. Josephine reported that she was a little interested in this circuit activity. Her more peripheral participation could have been the result of lower initial interest in the activity, which led to self-created constraints on her perceived possibilities for engagement. The two more dominant students in her group also limited Josephine’s opportunities for participation. However, an alternative interpretation is that Josephine’s
minimal interaction with her peers reduced the possibility for development of her interest, which is consistent with a sociocultural theory of interest which emphasises the social origins of development.

The analytical discussion of this episode has emphasised the development of a line of inquiry by a small group of students as they created and developed a shared focus of interest. Aspects of the social and physical context for the students' exploration have been highlighted to enable consideration of the canalising processes as shared interest was negotiated. Scaffolding through interaction with peers, teacher, researcher and materials both created and limited the possibilities for the development of the students’ activities, and thus the paths along which their interest in learning might develop and the ways in which interest is internalised and externalised.

6.4.2 Term 2 key episode: Developing shared interest as a class, towards small group negotiation of investigation guided by interest

The key lesson shared below is the fourth of ten science and technology lessons in the learning unit focusing on eggs and egg-laying animals. Prior to this lesson, the students participated in an initial session which engaged and focused them on the broader teacher-selected topic through a shared reading of a picture book. They then completed a brainstorming activity designed to provide the teacher with insights into their prior knowledge of the topic. The second and third lessons engaged the students in hands-on tasks, involving them working in small groups to design and conduct tests to assess egg strength (section 7.3.2.2) and to dissect a chicken's egg after viewing a video about eggs. During class time between lessons 3 and 4, the students had been encouraged to read books and search the Internet for information about egg-laying animals, to help to make a personal decision about which animal to conduct research on and become a class expert. In the lesson following the one recounted in the narrative, the students went on an excursion to Sydney's Taronga Zoo to find out more about egg-laying animals and their habitats.

This key lesson was selected because it played a pivotal role in the class members moving from more exploratory activities to being given increased responsibility to negotiate the focus and content of their learning. A peak in the class’s
interest trajectory graph is evident for the activity of choosing their own egg-laying animal to research (task 12, term 2), a task in which personal responsibility for learning was evident for each student.

6.4.2.1 The narrative account: Selecting a focus animal and generating questions to guide research

I took the teaching role at the outset of today's lesson, explaining to the girls that we would be having a double lesson today for science. In the first lesson, the girls would be sharing their choice of egg-laying animal and generating questions to guide their research about that animal. In the second lesson, the students would decide upon two additional personal interest questions to research as well as meeting in their excursion groups to plan the route for their trip to Taronga Zoo in the following week. I linked these activities to them becoming class experts about an egg-laying animal and highlighted that the zoo visit would help them learn more about their animal in particular and other egg-laying animals more generally. Ms Wheeldon also pointed out later that the girls needed to particularly notice the enclosures of the animals when they visited Taronga Zoo, as this would be important in the design and make task they were to complete back at school. I let the girls know that they would be taking their questions with them on the excursion, as well as some note paper on which to draw and write any other information they chose to record. I told them that we would not be giving them teacher-made worksheets, that they would be planning their own day in their groups and that they would be taking an adult with them. The adult would be being led by the girls. There were some smiles around the room as I spoke and some students established eye contact with one another in a way that communicated excitement at this prospect. Ms Wheeldon and I talked later about how she thinks this is the first time they have ever done anything like this, in terms of being given responsibility for choosing focus questions for an excursion and collaborative control over the focus for the day.

After I had spoken to the students for about five minutes, Ms Wheeldon took over the teaching role. She asked the girls to take turns around the room to state the name of the animal that they had selected for research. The girls sitting closest to the board turned their chairs around so that they were all facing one another. Ms Wheeldon leant against the front ledge under the blackboard and recorded the girls’ animal
choices, while I stood at the back corner. There was total silence and concentration from the girls as we went around the square, in what appeared to be genuine interest in hearing what focus animals their peers had chosen. The students’ animal choices ranged from different types of reptiles (taipan, cobra, crocodile) and various birds (ostrich, budgerigar, penguin) to monotremes (echidna, platypus) and frogs (white-lipped green tree frog).

Once the girls had finished sharing their animal choices, I asked Ms Wheeldon what she would choose if she was researching an animal. I think she was a little taken aback, and hadn’t really given this thought, but tentatively answered a crocodile. She then asked me the same question. I answered that I would select the gastric brooding frog and explained why.

It was then time to focus specifically on generating the questions that would guide all class members’ research. On the blackboard, Ms Wheeldon had stuck five sheets of paper with headings, Our questions and Groups 1 – 4 (although there only ended up being three groups). It was now about 11:50am, twenty minutes into the lesson. I explained the snowballing process to form groups and narrow down questions for consideration by the class. Ms Wheeldon emphasised that the broad questions needed to focus on eggs and the habitat of egg-laying animals, to inform students’ subsequent enclosure design and make task. I emphasised the need for the questions to be broad enough for them to be answered by everyone; that is, not specific to a particular animal. I then gave an example. The girls were now quite keen to start the task and Ms Wheeldon asked them to choose a partner to work with.

The girls worked in pairs in the art room, classroom and just outside the classroom. For about 15 minutes there was focused pair discussion, as the girls brainstormed as many questions as they could and then selected three from these to put forward in the next group formed. The exception was Jacqui and Michaela, who were slow to settle. Michaela appeared to be in a silly mood, being a bit giggly and making silly jokes. She obviously had not been attentive when the task was being explained and approached me to clarify what they needed to do. Jacqui had a runny nose and was up and down getting tissues. By the end, they had recorded some
questions on their note pads, but this was not through focused, on-task effort during the time available.

Ms Wheeldon circulated during this pair time, stopping at some groups to clarify the need for broad questions by asking, ‘If I was researching …, would I be able to answer that question?’ Philippa and Lori also approached me during this time, to ask me about how they might phrase a question about animals and their ‘groups’. The example they gave was that they knew that an ostrich is a bird, but it also belongs to a sub-group of birds known as ratites. Angela and her partner moved away from Eleni and Josephine during this time, claiming that Eleni and Josephine were copying their ideas. They came and sat quite close to where I was sitting writing my observation notes, and I heard them deciding upon questions to record and discussing whether or not they knew the answers. It appeared a little as though they were quite absorbed in the number of questions they could come up with, rather than the quality of the questions and whether it would be challenging to find answers. There were a couple of questions that they recorded to which they definitely knew answers and discussed these.

During the next group time, as pairs joined to form groups of four, the conversation was certainly focused in all student groups. Ms Wheeldon and I became quite redundant. We sat at some students’ desks near the art room, watched the girls working and discussed our observations of the students. Ms Wheeldon said that she felt that this was really what establishing a learning community is about, in relation to the responsibility and sense of purpose the girls were demonstrating.

At about 12:10 pm, the girls joined with another group of four to form groups of eight. This was the final small group discussion before moving to the class decision. As they moved into these groups, Philippa started talking about question survival and I overheard her saying to Lori, ‘I think this question is a good one and will survive the next stage’. There was animated, focused discussion again and problem-solving was evident as attempts were made to incorporate different ideas by forming new questions. This appeared to really challenge bright students such as Philippa. The task was certainly being taken seriously.
By 12:20pm, decisions had been made. Each group of eight students had three questions to put forward for the class’s consideration, which they recorded on a piece of cardboard in bold writing. These pieces of card were then stuck back onto the chalkboard at the front of the room so that everyone could read them.

The groups disbanded and the girls were all back in their seats at their desks by 12:30pm. The final ten minutes of the lesson was spent with Ms Wheeldon at the front of the classroom, negotiating the final research questions with the class. She was structuring the discussion, but the content of it was being determined by the girls, who focused the class conversation with their suggestions. Stephanie, Cathy and Michaela all put up their hands to respond to Ms Wheeldon’s questions relating to which questions should be chosen, while Philippa, who had been quite interested in the task of combining questions during the smaller group discussions, made a suggestion as to how two questions could be combined. Michaela put up her hand again urgently to contribute and when Ms Wheeldon did not choose her, she made her disappointment obvious with a sigh, frown and a dramatic slump. Ms Wheeldon acknowledged this, saying, ‘It’s okay Michaela, I will come back to you later’, which she did and Michaela also suggested a way to combine. Ms Wheeldon acted as a negotiator amongst the girls, asking them to, ‘Put up your hands to show if you’re happy to answer that question’.

The guiding class research questions, that all students would answer, emerged as:

1. Who are the egg’s predators and how are they protected?
2. If something goes wrong with a human, the baby gets cut out. Does that happen with an egg-laying animal? How?
3. Where and when does the egg hatch and how does the baby get out?

The first question was clearly a popular choice, with ‘Yesss!’ being exclaimed excitedly by several girls as it was pretty much unanimously voted in. I heard Philippa comment jubilantly, ‘It survived!’, as this was one of the questions that she and Lori had originally posed.
The second question appeared an odd choice to Ms Wheeldon and me, but one which obviously intrigued the girls, as again this was almost unanimously chosen. Ms Wheeldon gave me a funny look as she wrote it down, which to me seemed obviously communicated to the girls as well, so I explained to them that the reason Miss Wheeldon had just given me that look was because the question was very different to any that last year's grade 5 girls had posed. As I'd intended, this seemed to be interpreted positively by the girls, who appeared unruffled, and as I looked at them, I hoped that they caught onto the idea that they were a bit different, with the implication of creativity, rather than oddity. I didn't want them to think that we disapproved or disagreed with a question, as this was their choice and we needed to allow them that, given that this was the point of selecting questions this way. Ms Wheeldon later commented that she wasn't sure whether it was researchable, and we talked about how with slightly different wording, it might be able to be answered by the experts at Taronga Zoo. It appeared most unlikely that the students could find the answer in a book, which was not necessarily negative.

In the process of the third question being selected, I intervened to assist in the process of narrowing down the choice. There was some debate between students engaged in the class discussion in regard to the questions, 'How many eggs does your animal lay in a year, week or month?' (Group 3) and 'What season do they lay their eggs in or do they just lay them at any time?' (Group 1). Prefacing my input with, 'Some of you might disagree with me,' I pointed out that perhaps Group 2’s question, 'Where and when does the egg hatch and how does the baby get out?' might be sufficiently broad for both of these other questions to be answered in response to it. Ms Wheeldon put this to the class, and there was majority support. I just hope that they didn't do this just because it was suggested by an adult and so the perception was that this must be the 'right' thing to do.

The question generation and selection process seemed to have been very involving and Ms Wheeldon said to the girls at this point, 'Well, it’s actually lunchtime.' I looked up at the clock, a little surprised, and many of the girls appeared likewise surprised by the passing of time. Ms Wheeldon dismissed the class, commenting that science and technology would continue after lunch.
6.4.2.2 Analysis and interpretive discussion

Three stages are evident in the classroom-based activities in this key lesson: (a) teacher orientation to the lesson content, (b) student sharing of the animals selected for research focus, and (c) question generation by students in small group and whole class discussion. As the purpose of this section of the chapter is to focus on the role of peers in the canalisation of interest development, emphasis is placed on stages 2 and 3 of the episode in the following analytical discussion.

The first stage: Teacher orientation

The initial stage of the lesson was characterised by the researcher and classroom teacher at different times taking the role of the teacher to orient the students to the activities in which they were expected to participate. In this stage, the teacher was emphasising her perceptions of the meaning and value of this task in relation to previous and future activities. Lessons prior to this one had developed a range of shared experiences to build students’ knowledge and understanding of eggs and egg-laying animals. In stage 1 of the lesson, the teacher aimed to clearly communicate to students that their choice of an egg-laying animal to research and the guiding questions generated would contribute to the nature of their learning during the zoo excursion, as well as classroom-based research and a design and make activity.

The initial explanation that the researcher and teacher gave to the students thus conveyed their plan to actively engage the students in making choices in and taking responsibility for their learning. The adults sought to communicate to the students that they respected and valued the children’s abilities in becoming class experts about egg-laying animals and in planning the route for their zoo excursion. Communicating this regard for the students contributed to the negotiation of intersubjectivity amongst the teacher, researcher and the students. The adults were providing an explanation for how the learning could be purposeful and the students then could make a decision whether to accept these goals for learning and how they might adapt or modify the goals to contribute to their own identity and sense of connectedness within the classroom community. This teacher-directed lesson introduction also established the adults’ expectation that the students would take this task seriously as it related to their learning in prior lessons as well as in activities that were to follow. An opportunity thus was provided for the students to internalise the values related to the intended learning.
process that the teacher and researcher were sharing. From their subsequent participation, it would become evident as to how the students had internalised these values which the adults were espousing for the learning community.

At this stage, the teacher was focusing the attention of the students by making reference to previous and future shared experiences to engage them in the activities of this lesson. She was making reference to the students’ participation in on-going activities related to their wider learning in the eggs unit. The students were passively involved as the teacher spoke to them, however they communicated their excitement, both with the teacher and one another, through their body language. These externalised expressions of emotion can be linked to students experiencing interest at this point in the lesson. The teacher was providing considerable support for interest to develop, through highlighting relevance and opportunities for personal involvement and collaboration in task completion.

*The second stage: Sharing choice of animals selected for research*

The students appeared keen to share their choice of egg-laying animals and were attentive to one another’s input. All of the students were specialising within the classroom community, yet as members of that community, the choices of others would also contribute to and in effect canalise the possibilities for interest development through the chosen focus of each individual student’s learning. The teacher and researcher also shared their hypothetical choices, which gave the students insight into the interests of the adults in the focus topic. This process of sharing their focus animals contributed to developing intersubjectivity amongst the participants in the classroom community and provided a model for the students in relation to their own developing interest. The students’ varying animal choices demonstrated to all of the class members that this learning community supported a wide range of interests. Each student’s research focus had the potential to make a valued, legitimate contribution to the learning and possibilities for interest development of the class.

Ms Wheeldon’s decision to structure this research task so that different students became relative experts for different animals was enabling of individual interest development. The process of animal selection fostered value for researching a
particular egg-laying animal and each student’s choice was guided by both her existing and developing personal interest in that animal. Identification with the broader topic was being canalised through the opportunity to specialise and build deeper knowledge of a particular egg-laying animal. In time, within the classroom community, the students became identified with the animal that they had selected for research. Self-canalisation processes were evident here, in the way in which the student selection of a particular animal would both promote and limit opportunities for their own interest development.

The third stage: Question generation through small group and whole class discussion

While the teacher developed the framework for this stage in this lesson, in terms of choosing a snowballing technique, the students had considerable scope within this framework for making decisions as to the focus and content of their conversation to decide on research questions. The pedagogical decisions made by Ms Wheeldon and the ways in which the students then participated in the activity thus canalised the possibilities for interest development along particular pathways. Self-canalisation processes also both limited and afforded possibilities for development through students’ decisions about which questions were more personally interesting to research than others. The development of students’ interest was actively supported through the structure of the activity by encouraging students’ curiosity questions and making these central to their learning about egg-laying animals.

Ms Wheeldon had a distinct role in planning the question generation process prior to the lesson, then she actively guided the students as they engaged in this process in the initial pair grouping. She gradually withdrew her involvement and the degree of scaffolding as it became evident that the students were highly motivated and able to independently complete the task. Ms Wheeldon’s facilitation of the class discussion to select the final three questions was responsive to the students and once again served to frame their activity. Overall, there was a sense of shared purpose amongst the teacher, researcher and students in the final stage of the lesson. This decision-making process, however, was characterised by the teacher’s handover of responsibility to the students for posing, refining and selecting the questions.
The process of generating the questions seemed to be engaging in itself for the students. The process afforded the development of students' interest through giving them the opportunity to collaboratively pose and refine curiosity questions that would focus their subsequent learning. They knew that engaging in their own research, partly guided by these common questions, would lead to them becoming an expert about their egg-laying animal of choice within the classroom-based learning community. The structure of the activity therefore provided the chance for the students to develop their interest in the focus content but at the same time to be interested in the process of learning.

The students were seriously and personally engaged in this task within the framework that Ms Wheeldon had established for question generation. Small group conversations amongst students were completely focused on question choice, justification to peers, and the challenge of combining or modifying questions to form new ones. Participation was indicative of strong personal interest. With the exception of Michaela and Jacqui during the initial pair time, the students' investment in and value for the task seemed apparent. They clearly wanted their own questions taken to the next stage. Canalising and self-canalising processes therefore were evident here also, in the ways in which both peer and individual choices of the questions put forward would promote and limit opportunities for interest to develop along particular pathways.

An unintended outcome of using this framework was that a sense of competition also emerged, particularly evident in the participation of Angela and her partner, and to a lesser extent, Philippa and Lori. A difference between the two pairs was that Angela and her partner were concerned with having a large number of questions in comparison to others, possibly reflective of performance/ego goals, whereas Philippa and Lori were keen that their question would progress through the stages because they believed it to be of good quality, perhaps reflective of mastery goals. The canalising effects of working in a particular pair, with peers interacting to co-create certain possibilities for participation, are apparent in these examples. Also apparent is a sense of identification with the questions generated within a particular group. Such an identification appears to be an externalisation of personal interest in the question generation process, but it also became a source of competition with other groups of students.
The question generation process, however, also created some intersubjectivity amongst the students, as they collaborated initially with a partner of choice, then in groups of four and eight, then as a whole class with the teacher and researcher participating. Opportunities to discuss questions of interest, to refine these questions and to agree on a subset of questions to put forward in each stage of the process contributed to a sense of shared meaning within the community of learners. This process would ultimately establish a set of shared focus questions that all students, regardless of their choice of animal, would use to partly guide their research. The students themselves were in control of determining the level of challenge in their learning through their choice of questions. The empowering nature of this process of question choice was threatened only at one stage when Ms Wheeldon gave the look that said, ‘How bizarre!’ in relation to the second question agreed upon by the class. The researcher thought that this look was noticed by the students so she stepped in to attempt to smooth over any negative impact this may have had on their view of the question selected. This effort to repair a sense of shared purpose also attempted to maintain respect for the students’ ideas and contribute to the positive social atmosphere evident in the class community. It was important to the integrity and intent of the process that questions about which the students were genuinely curious were accepted, including questions which might not necessarily have a clear path as to how they might be answered.

6.5 CHAPTER CONCLUSION

The focus of Chapter 6 has been on the broader classroom context, highlighting the features of the classroom learning community that developed and the roles of the teacher and peers in canalising interest. The students’ self-perceptions of their interest in the learning activities were considered at a whole class level and the results were discussed in relation to the characteristics of the tasks. Chapter 7, the second of the two results chapters, zooms in to focus on six individual students’ participation within this same classroom-based community and their interest in learning.
7.1 INTRODUCTION

The previous chapter reported results from my study that focused on the social origins of interest within a classroom community of practice. Emphasis was placed on the social interaction, activities, practices and values within the class that contributed to canalising students' interest development. This second of the two results chapters focuses on my observations of the ways in which specific students participated in science and technology lessons, and draws on interview and self-report data to consider particular students’ experiences of interest in learning. The focus thus shifts from the community plane to the interpersonal plane and, to a greater extent, the personal plane of participation, while keeping the community plane in view (Rogoff, 1998).

The purpose of Chapter 7, therefore, is to report the results of the research in relation to the experiences of six individual students in the classroom community. These individual students, Cathy, Eleni, Jacqui, Michaela, Stephanie and Philippa, were not selected with the intention that they be representative of the class. They were chosen in consultation with Ms Wheeldon, based on our limited observations of students’ participation and expressions of interest, or lack of interest, in the first two weeks of the school year, which were also the first two weeks of the main phase of the research. From our observations, the students selected appeared to be interesting cases in themselves because of the varying degrees of interest that they expressed in the early days of the project. I wanted to focus on students with different expectations...
of their learning in science and technology, given the focus of the research project on investigating interest in learning in a classroom community.

In this chapter, analysis of the specific participation and perceptions of each focus student is presented, in the context of the canalising processes of the classroom learning community as discussed in the previous chapter. The main sources of data from which this analysis is drawn are interviews with focus students and observations of student participation as recorded in my field notes and through video and audio tapes of interaction during learning activities within each term. Students' reflections on their learning as recorded in their science books, on Family Conversation surveys at the end of each unit, and through trajectory graphs of their perceived interest also inform the analysis presented in this chapter. The analysis identifies common themes across students’ participation, as well as patterns of interaction and meaning-making that are particular to certain students in contributing to their experiences of interest in learning. The structure of the chapter reflects the categories that emerged during data analysis and key themes within these categories are reported in each section.

In the first section of this chapter, section 7.2, there is a brief introduction to each student that incorporates a rationale for selection as a focus participant. The two subsequent sections form the body of the chapter, focusing on the ways in which the social and physical contexts of the classroom interact with self-canalising processes to create possibilities for and constraints on the interest development of individual children (research question 2). Similarities and differences in the students' participation in learning community activities are examined to analyse how interest is experienced and expressed by the individual children (research question 3). Finally, the children's participation in out-of-school settings, including the context of their families, is considered and related to their interest in specific topics of study within the classroom community (research question 4).

In considering patterns of similarity and difference in the individual students' experiences of interest in learning about science and technology (section 7.3), the students' self-reports of interest in and enjoyment of, classroom-based learning provide the focus. This focus enables consideration of the canalising processes in the classroom in relation to ZFM/ZPA systems, the self-canalising processes that limited and promoted interest in learning, and the ways that individual students internalised
and externalised their interest. Self-report data are triangulated with field notes and other observational data. Factors considered include the peaks and troughs in each student’s retrospective interest trajectory and the characteristics of the associated tasks. In this way, interest as experienced by individual students is considered in terms of the characteristics of their participation and the negotiation of their learner identity in relation to tasks, topics and the domain of science more broadly. The students’ preferences for working collaboratively or individually and their perceptions of the teacher’s interest also emerged as factors relating to their experience of interest. Finally, evidence of what interest in learning appears to mean to the individual students is considered, in terms of an emerging tacit ‘personal theory’ of interest.

In section 7.4 of the chapter, I present findings and analysis that relate the focus students’ present classroom learning to experiences beyond the classroom. For each student, their participation in the activities of other communities of practice in contexts beyond the classroom impacted on their grade 5 class-based learning experiences. Firstly, I consider the students’ experiences of excursions and guest speakers, as these were experiences that related to the classroom and involved learning with class peers but extended possibilities and created other constraints because of the different physical and sociocultural environments. Secondly, what was revealed in the data relating to family and experiences outside-of-school is considered. While the focus of the research was on students’ participation in the classroom, the students made reference to other people and experiences in their family groups outside of school. These experiences also played an important role in canalising students’ interest and in their self-canalisation processes, in relation to meanings and values that had been internalised. The third and final factor considered in this section is the students’ relationships of their current science and technology classroom learning community to their anticipated year 6 and secondary school contexts for learning science.

7.2 INTRODUCING THE FOCUS STUDENTS

The focus students were featured in some of the narratives in the previous results chapter in the context of their involvement in the classroom community more broadly. In this chapter, these students are considered more specifically as individuals as the plane of focus shifts to considering personal and intrapersonal processes in relation to experiences of interest in learning. In this section, a brief introduction is given to each of the focus students. While all in grade 5, the students varied
considerably in age at the time of the research. Eleni was 8, Cathy and Stephanie were 9 and turned 10 in the final month of the project’s main phase, Philippa was 9 and turned 10 half way through the main phase, and Michaela and Jacqui were 10.

7.2.1 Cathy: ‘Science is interesting for me when it’s something fun or something I want to know about…I love the experiments we do in science.’

Cathy was a capable student and a talented athlete who had attended Heathville College since kindergarten. She actively and enthusiastically participated in class activities and could be relied upon to be ‘doing the right thing at the right time’. As a result of her usually being on task and working independently, Cathy was the type of student who could sometimes go unnoticed by the teacher because she rarely demanded attention. It was for these reasons that I decided to select her as a focus student in my study, as her enthusiasm and on-task participation appeared to reflect her interest in classroom-based learning. Cathy was the third child of four in a family of Lebanese descent. Her dad was a medical doctor and her mum cared for the children full-time, having previously worked as a secretary and in a bank. Cathy was popular amongst the students in grade 5. She played with either of two broader friendship groups in the playground and she was elected by her peers as the Class Captain in term 2.

7.2.2 Eleni: ‘I think science is fun!’

As she took her workbook out from under her desk ahead of the first science and technology lesson for term 1, I overheard Eleni saying to the girls seated near her, ‘I love science. I love everything!’ (researcher field notes, 9/2/01). This comment immediately helped me to identify Eleni as a participant in my research project, because of the positive feelings that she had expressed towards the focus subject. Eleni was an exceptionally bright student. She had been identified as academically gifted at a young age and had been an early entrant to school, commencing

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8 The quotes included in the subheadings 7.2.1 to 7.2.6 are from the students’ written reflections on 16 March 2001, written in conjunction with creating their term 1 retrospective interest trajectory graph.
When Eleni was aged 3, she could read and write and had advanced numeracy skills. Eleni tended to be socially isolated from her peers, despite having been at Heathville College since kindergarten, although during the research project her friendship with Josephine strengthened. She had one younger brother who also was exceptionally gifted. From a Greek background, Eleni lived with both of her parents, who were doctors in the medical profession. Eleni had an evident love of learning across all subjects at school, was an active participant in class discussions and tended to bounce into the classroom with boundless enthusiasm.

7.2.3 Jacqui: ‘I think science is very interesting because you do experiments’

Jacqui greeted me at the door of the classroom when I arrived for my second visit, telling me that she loved science so much. The reason that she gave was that she liked the experiments. While she shared a positive view of science with most of the other focus students, Jacqui’s literacy and numeracy skills were much weaker than her grade peers’. She worked on an individualised program with assistance from a support teacher during most English and mathematics lessons and she also had help from a tutor outside of school. Jacqui was selected as a focus student because of her enthusiastic participation in hands-on activities in the classroom. I also observed, however, that she ‘finds concentrating difficult and evidently can be disruptive in class. The music teacher’s response when I asked whether I could withdraw Jacqui for 20 minutes from a music lesson to interview her was “Keep her for the whole lesson, if you’d like!”’ (researcher field notes, 23/2/01). At times, Jacqui’s weaker literacy skills, both spoken and written, resulted in more limited data being obtained from her as her conversation during interviews would often suddenly diverge in her responses to the focus questions (for example, remarking that a magpie in the playground was her friend during a discussion about electrical products, November 2001 interview). Her parents had divorced and both had remarried, and she had one much younger half brother in her dad’s second family by the end of the project.
7.2.4 Michaela: ‘It interests me when we are doing experiments and fun things but all the rest is boring’

I made a decision to include Michaela as a focus student in the study when, prior to the first science lesson, she responded to Eleni’s enthusiastic exclamation about her love of science. Unlike Eleni, however, Michaela claimed that she was ‘the total opposite’ - ‘I don’t like science, I just like it when I’m interested in what I’m doing’ (researcher field notes, 9/2/01). I had previously taught Michaela for philosophy lessons when she was in grade two. I recalled that she had had an air of disengagement about her on many occasions, almost as though she often didn’t care about what she was learning in the classroom. This contrasted, however, with a high level of involvement in classroom discussion and activities when she was interested in the topic or task. I noted in my reflections on my field notes that, ‘I think that Michaela is quite bright, but also stubborn and likes to do her own thing. I would like to include her as a focus student in the study because she appears to be a bit ‘different’ from the other girls and is prepared to express an opinion that challenges the authority of the teacher. She is spirited and a little subversive’ (researcher field notes, 13/2/01). Michaela appeared to be more resistant to classroom participation than her peers. She saw herself as being like an only child, as her siblings were adults and no longer lived at home with her parents. Her dad was an engineer and her mum worked in a management role in a national utilities organisation.

7.2.5 Stephanie: ‘Science is interesting when we are involved’

Stephanie was a new student at Heathville College in grade 5, having previously attended her local co-educational public school. Confident, articulate and expressive, Stephanie was comfortable in being ‘different’ from her peers and on days when the students did not have to wear school uniform, she took the opportunity to dress creatively to express her difference. Stephanie was an only child born to older parents. Her father worked as a private investigator while her mum worked as a producer in the television industry. Stephanie did point out to me that although she had no siblings, she had many imaginary friends and pets! She made friends relatively easily when she started grade 5 and although she initially played mainly with the other
new girls in the class, she soon formed friendships with other students who had been at the school for longer.

Stephanie indicated her own interest in participating as a focus student in my research when she approached me at the end of morning tea on my second visit to her class. She asked me whether she was going to be interviewed, as she hoped that she would be because she loved science and she liked being interviewed. Stephanie told me about science experiments that she had enjoyed doing at her previous school and later it emerged that she also had been to holiday science workshops run through a local shop specialising in science materials for children. These factors contributed to her selection as a focus student in my research, as she clearly had an interest in science and technology which she wished to share with me through my study.

7.2.6 Philippa: ‘It is interesting for me when we do strange and fun experiments’

Philippa was a very bright student who was accelerated to grade 6 in mathematics and she was a member of a small group that completed enrichment activities for English. Like Stephanie, she was an articulate and confident participant in the classroom and she frequently became involved in class discussions. She displayed a high level of engagement in class tasks and was usually on-task. From these early observations of her participation, I identified Philippa as a focus student for the study, as she appeared to be an active contributor to the classroom community and I considered this to be potentially reflective of her broad interest in learning. Early in the project I noted that Philippa appeared to be ‘very well-behaved’ and ‘conforming’ (researcher field notes, 23/2/01), however as the study progressed, I observed Philippa also to be creative and innovative in her thinking, especially during open-ended tasks. She had a best friend who was in the other grade 5 class but they did not appear to be a part of a broader friendship group. Philippa was the second of four children in a family of Vietnamese descent. Her mother was a pharmacist and her dad was a medical doctor. In the year following this project, Philippa was elected by her peers and the staff as the School Captain.
The data gathered in relation to these six students varied in depth and nature throughout the project. Variations in data gathered for each focus student were partly the result of practical constraints – for example, two tape recorders for making audio recordings and focus students spread across more than two small groups within a lesson – but also due to some of these students emerging as more interesting cases, given the research questions guiding the study. As a result, more detailed field notes were recorded in relation to those students. While data is drawn upon from each of the six students in the following two sections of this chapter, illustrative examples given for different themes have been selected for their pertinence to explaining aspects of a sociocultural theory of interest development, rather than to evenly represent each of the focus students.

7.3 EXPERIENCES OF INTEREST IN LEARNING ABOUT SCIENCE AND TECHNOLOGY: PATTERNS OF SIMILARITY AND DIFFERENCE AMONGST THE FOCUS STUDENTS

In the previous chapter, I presented the class mean interest trajectory graphs in section 6.3. I highlighted the tasks in which the students’ interest as a class peaked and troughed and discussed the characteristics of these tasks more broadly in relation to canalisation and the constraints and affordances within the ZFM/ZPA system. In this section of the present chapter, I zoom in to focus on individual students’ retrospective interest trajectories and more specifically on their participation in particular tasks as documented in field notes and through video and audio recordings of classroom interaction. Drawing on multiple sources of data provides a more complete picture of particular students’ involvement in tasks and the extent of their interest reported. Analysis relating to key aspects of a sociocultural theory of interest, in terms of canalisation and self-canalisation, internalisation and externalisation processes and negotiation of identity, within ZFM/ZPA systems, also is presented.
In considering the focus students’ perceptions of their interest in particular tasks relating to their learning about electricity (Figure 7.1), three clear observations can be made. Firstly, it becomes apparent that while the intensity of interest in a particular task may have varied amongst the students, for some tasks there is a relative peak or trough for most of the students. Examples in Figure 7.1 where this is apparent include tasks 6 (experimenting with globes, batteries and wires to make an electrical circuit) and 17 (starting to design an electrical product, such as a torch or alarm) where there were peaks, and tasks 7 (investigating changes in energy form in a CD player and a toaster) and 19 (calculating electricity use in the classroom) where there were relative troughs. Such patterns and the features of the tasks that afforded or constrained possibilities for interest to develop were previously discussed in section 6.3.2. Secondly, the variations in the students’ patterns of experiencing interest are evident. Michaela, for example, reported her interest as fluctuating wildly from task to task, sometimes within the same lesson and her ratings were frequently at the extremes; she was either very interested in a task or not at all interested. Some students’ interest, such as Jacqui’s and Eleni’s, however, remained almost wholly positive throughout their learning of this topic (ratings of 5 to 8). Thirdly, for some activities, students’ perceptions of their interest cluster around a particular rating but for other activities, their perceptions of interest are more widely dispersed. Task 14 (individually drawing torches again after investigation tasks with circuits) is an example of an activity for which five of the focus students rated their interest as ranging between neutral and a little interested. On the other hand, task 16 (talking about the expert electrician’s answers to girls’ questions) provides an example of an activity for which the students’ interest was widely dispersed. This latter task is selected for discussion in the following section of the chapter, to allow consideration of the variation in students’ participation, so that greater insight can be gained into why such difference in the intensity of interest may have been experienced.
Figure 7.1. Term 1 Focus students' interest trajectories
7.3.1.1 Zooming in to focus on participation in a particular task: Class discussion about Russ the electrician’s email response

The grade 5 students engaged in a class discussion as one of two activities in the fifth lesson of the term 1 unit (task 16, Figure 7.1). This section of the chapter, along with section 7.3.2.1 which follows, is presented in a similar style to some sections of Chapter 6. Following a narrative account of the task, analysis and interpretive discussion are presented. The features of this specific activity are considered, participation of the focus students is analysed, and their retrospective interest ratings are discussed.

The narrative account

Today’s lesson had two main focus areas. The first was to highlight Russ’s responses to the three questions sent to him by e-mail in the previous lesson. The second focus was to introduce the design and make task that the girls would undertake in subsequent lessons, to provide them with time to decide upon an object that they would like to make, such as a torch or alarm, and to form small groups to discuss ideas and begin their designs. The girls also were given time to compile a shopping list for equipment required. Today’s lesson took place in the classroom, with one group working in the art room adjoining the classroom and another pair working outside the classroom during the small group planning.

The lesson began with the girls in their seats at their desks and with Ms Wheeldon at the front of the classroom. She had pasted segments of Russ’s e-mail response on brightly coloured sheets of paper and these were stuck to the blackboard at the front of the room, with the three questions asked by the girls attached (Figure 6.8 in the previous chapter). Ms Wheeldon co-ordinated a class discussion around these questions and the responses that Russ had written, with girls who previously had posed the questions (Eleni, Marie) moving to the front of the room to either read Russ’s answer or summarise his response. The subsequent class discussion built upon Russ’s responses. Ms Wheeldon began by asking who had read the e-mail reply already, which had been printed and displayed in the classroom after being received during the
week. Only Eleni, Philippa and Stephanie put up their hands. Eleni then moved out the front of the classroom to relay the answer to her question about why blackouts occur. She firstly answered without referring to the e-mail message, giving a summary of the response and it was evident that she had already read and understood the reply. At Ms Wheeldon’s request, she then directly read the response.

Eleni sat down and then Marie got up from her seat to discuss the reply to her question ‘Will electricity ever stop?’ Before reading Russ’s reply, Ms Wheeldon asked the class to predict what they thought the answer would be. Michaela put up her hand and said that it might if we used too much. Sanushka then made a contribution about wind, water and sunlight being renewable resources for electricity production. Rebecca, Lori and Eleni also contributed responses, with hands raised to indicate their desire to speak. These students were subsequently chosen by Ms Wheeldon to add their comments to the discussion. During the discussion, Michaela interjected and engaged in a direct conversation with Ms Wheeldon without putting her hand up. This was not discouraged by the teacher. The class discussion continued. The term fossil fuels was used by Ms Wheeldon, and she contrasted coal and gas with wind, water and sunlight as renewable resources, which Sanushka had mentioned earlier. Michaela, Adriana and Eleni also responded when off peak electricity was mentioned, and my research assistant, Julia, also contributed to this discussion, as with her architecture background, she was knowledgeable about energy efficiency and participated as an expert at this point. Cathy and Anna each had their hands up during this discussion at different points but were not chosen by Ms Wheeldon to respond. Michaela continued to ask probing questions in relation to off peak electricity, keen to understand the answer, and I also engaged in an exchange with her about the operation of natural gas versus electric water heaters. Michaela seemed concerned with practicalities, asking me about costs.

The final question the class discussed was in relation to the difference between regular batteries, that can go flat, and rechargeable batteries. Russ’s response introduced the term distilled water, and Eleni chose to volunteer a definition that related to knowing that methylated spirits is made at a distillery. I attempted to explain distillation to the girls – process to purify the water – and Philippa, who was seated quite close to me, leaned over when I had finished addressing the class from my position at the back of the room, to comment that her mum uses distilled water when
she is making her cream (I understood this to be a cosmetic cream). The discussion continued for the first 20 minutes of the lesson. The students appeared to be listening to one another and to the adults who contributed to the discussion at different points.

Continuing from this class discussion, the girls were then asked by Ms Wheeldon to discuss the questions posed and recorded for display on the interactive noticeboard in the first lesson of this unit. These questions were different from those sent to Russ, however some of the issues raised during the class discussion related to the questions that the students had posed previously. The girls formed small groups with their peers who sat at the same table and the questions were displayed on a poster that had been moved from the side of the room to the blackboard for this part of the lesson. The students were asked to identify questions to which they now knew the answers, to discuss their responses and to highlight those that they still could not answer. The small group discussions took place for 5 minutes, during which time Ms Wheeldon circulated and engaged with groups. The discussion appeared focused and the room was productively noisy. Ms Wheeldon signaled for the small group discussion to end and she invited the girls to sit on the floor space at the front of the room to begin another whole class discussion focused on the second stage of the lesson.

This marked the end of the first section of the lesson. In hindsight, Ms Wheeldon commented in a brief conversation with me following the lesson that she thought she spent too much time on this first stage. If teaching the lesson again, she said that she would spend more time introducing the design and make task.

Features of the task

The class discussion format of this task offered the students a very limited ZFM/ZPA system. Ms Wheeldon was clearly in control of the discussion, choosing the format for participation, limiting the focus of the discussion and moderating the discussion through deciding who could contribute and for how long. Opportunities for active student engagement were limited, as only one person could speak at any one time. Ms Wheeldon created opportunities, however, for student engagement through probing responses and by posing the question about what they thought the answer to the electricity running out question might be. She attempted to elicit their ideas about
the process of distillation through directing another question to students. There also
was a short time for small group discussion created by Ms Wheeldon at the conclusion
of the class discussion, however the small groups did not seem to have a clear sense
of purpose as it was not explicit how questions identified as unanswered would be
followed up by students. The structure of the class discussion canalised possibilities for
interest development through limiting the topics of focus to those related to Russ’s
responses, through Ms Wheeldon establishing her role as ‘gatekeeper’ for students’
participation in the discussion, and through the teacher promoting students’ active
contributions to the discussion through posing questions to which they were expected
to volunteer responses. Ms Wheeldon, the other adults present, and students’ peers
developed ideas raised by particular students in their responses, and such
contributions indicated the ways in which the participants were actively listening,
interpreting and building their own understandings within the context of the class
discussion.

Ms Wheeldon had created an attractive, colourful visual display of the students’
questions sent to Russ and the responses that he had returned. These were clearly
displayed at the front of the classroom on the blackboard and reference was made to
the display during the discussion. The display also was a permanent record of the
focus of the discussion, which remained in the classroom for ongoing reference by the
students if they were interested in reading the responses more closely after this lesson.
The display thus created possibilities for continued engagement with the ideas raised in
the class discussion, which could contribute to students’ developing interest in these
particular issues related to electricity. The display also reflected Ms Wheeldon’s valuing
of expert input to their classroom-based community and promoted communication with
experts as an important activity in increasing shared knowledge and understanding.
The learning community was extended beyond the classroom through e-mail contact
with Russ the electrician, and the discussion of his response to the students’ questions
also incorporated Julia, the research assistant, as another expert in this lesson. The
girls had previously been told that Julia was an architect and it appeared positive in
terms of their learning during this lesson to have access to another expert, reinforcing
the notion of being part of a wider community of learners.
Participation of individual students and discussion of retrospective interest ratings

The format of this class discussion offered limited opportunities for active contributions from individual students, because only one person could speak at any one time. Participation through listening to peers and adults was evident amongst the students, however clearly this was a much more passive form of involvement in a classroom activity than was offered by many of the other activities in the learning unit. Eleni was given the opportunity to actively participate in the discussion by Ms Wheeldon and to contribute her relative expertise. Michaela was the other focus student whose genuine engagement during the class discussion about electricity resources and off peak electricity was apparent. She was excited to contribute and the real-life application of the content of the discussion may have motivated her participation.

Table 7.1

Students’ retrospective ratings of interest in a class discussion about an email response from an expert, Russ the electrician

<table>
<thead>
<tr>
<th>Focus student</th>
<th>Rating of perceived interest in class discussion about email from Russ the electrician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eleni</td>
<td>Very interested</td>
</tr>
<tr>
<td>Jacqui</td>
<td>Interested</td>
</tr>
<tr>
<td>Cathy</td>
<td></td>
</tr>
<tr>
<td>Stephanie</td>
<td>A little interested</td>
</tr>
<tr>
<td>Philippa</td>
<td>A little not interested</td>
</tr>
<tr>
<td>Michaela</td>
<td>Not interested at all</td>
</tr>
</tbody>
</table>

Note. Class mean rating for this task was neutral (Table 6.3).
The ratings of the focus students, in retrospectively considering their interest in the class discussion, are presented in Table 7.1. It does not seem surprising that Eleni rated herself as being very interested given her high level of participation in the discussion, her responsibility for one of the questions, and the status of relative expert that she was afforded by the teacher within the classroom community. Eleni’s identity as a knowledgeable participant in science and technology lessons was being negotiated and reinforced through this classroom activity.

Less consistent with her participation is Michaela’s rating as being not interested at all. Michaela actively contributed to the class discussion, both through responding to and asking questions, and her participation was not constrained by Ms Wheeldon when she failed to follow the convention of raising her hand for selection by the teacher to contribute. Ms Wheeldon appeared to be encouraging Michaela to participate positively in the discussion and overlooked her interjection to the discussion, possibly in an attempt to negotiate intersubjectivity. Michaela’s participation in class activities was variable, ranging from keen and on-task involvement to obstructive contributions when working in a small group or refusal to participate. It is therefore unsurprising that Ms Wheeldon responded positively to Michaela’s on-task contributions to the discussion and sought to include her responses in the establishment of shared understanding and purpose amongst the class members. Michaela’s subsequent retrospective low interest rating (Table 7.1) was not a reflection of her high level of engagement in this particular task, as observed in her participation in the discussion. It appears as though her interest rating may have been an attempt to contribute to her identity as a resistant student in the classroom community, to maintain her status as someone who was not always willing to participate in ways promoted by the teacher or agreed upon by her peers.

While Philippa and Stephanie had been interested in reading Russ’s responses displayed in the classroom prior to the lesson, neither student made any contributions to the class discussion although they did appear to be listening to their peers and the adults who spoke. Philippa also engaged in a focused side conversation with me, indicating that she was attending to the class discussion. Their lack of active involvement in contributing to the discussion was indicative of, or possibly also the cause of, their relatively low level of interest in this task. Their personal decision not to volunteer contributions to the class discussion may have had a self-canalising effect on
the possibilities for their experience of interest. It also may have been the case for both Philippa and Stephanie that their previous independent reading of Russ’s responses meant that these students had already independently considered the issues raised, and that the discussion was ‘more of the same’ rather than providing a sense of novelty, as later discussed in section 7.3.6.

By contrast to Eleni’s and Michaela’s active contributions to the discussion, Cathy’s attempts to participate were constrained, with her hand raised without being selected by Ms Wheeldon. Her attempts to contribute, however, appear to have been indicative of her desire to engage in the class discussion and her interest in the issues being discussed, as reflected in her positive retrospective interest rating. Like Cathy, Jacqui reported feeling interested in this task. While she was observed to be listening, Jacqui did not indicate that she wished to contribute to the discussion by raising her hand. It is possible that a lot of her energy was directed towards understanding the ideas raised by her peers and teacher, and that being able to follow the discussion was interesting to her. Jacqui’s experience of interest during the discussion also was probably related to the fact that the task did not require her to write, something that she found difficult and disliked (see section 7.3.3.4).

It is also worth noting that the second focus activity of this lesson, the initial design and planning for the design and make task (task 17, Figure 7.1), was retrospectively rated as more interesting than the class discussion by all of the students except Eleni, who rated her interest as equally high for both tasks. The actual rating of interest for the class discussion may have been comparative for students. In retrospectively reflecting on their generally lower degree of interest in the class discussion, it may have been that they decreased their rating when compared with the excitement and anticipation they experienced in beginning to design an electrical product, which would be a hands-on, creative task.
7.3.2 Students’ self-reports of interest in learning about eggs and egg-laying animals

Similar observations about students’ perceptions of their interest in term 2 (Figure 7.2) can be made when compared to those discussed previously in term 1 (section 7.3.1). For some tasks there is a relative peak or trough for most of the students. Examples in Figure 7.2 where this is apparent include tasks 5 (class demonstration to test the strength of eggs) and 17 (going to the Zoo Education Centre) where there were peaks, and tasks 7 (writing up results following egg fair testing) and 24 (writing reflections on learning) where there were relative troughs. Similarly to term 1 (Figure 7.1), Michaela continued to experience extreme variations in her interest in term 2 but with more frequent reports of being less than not interested at all (Figure 7.2). In contrast, Eleni’s and Philippa’s interest remained relatively high as they engaged in the various tasks related to learning about eggs and egg-laying animals. It is possible that Eleni’s increased knowledge of electricity led her to experience a relatively lower degree of interest in her classroom-based learning about this topic, when compared with learning about eggs and egg-laying animals, for which she frequently reported herself as being beyond very interested. Eleni’s higher ratings for this second science and technology topic also are consistent with her expression of interest in learning more about animals in the future (Table 7.3, section 7.4.3). Also similar to term 1 is the clustering of students’ interest ratings for some tasks (for example, task 9, dissecting an egg) and the wider dispersal of interest ratings for others (for example, task 11, which involved reading books about eggs and egg-laying animals during silent reading time). Task 6, which engaged students in working collaboratively in small groups to design an investigation to test egg strength, also received varying ratings of perceived interest and is discussed in greater detail in the following section.

9 The rating of less than not interested at all is explained in Chapter 6 in section 6.3.1.
Figure 7.2. Term 2 Focus students' interest trajectories
7.3.2.1 Zooming in to focus on participation in a particular task: Designing and conducting fair tests to investigate egg strength

The grade 5 students engaged in a fair testing task as the focus of the second lesson of the term 2 unit (task 6, Figure 7.2). Following a narrative account of the task, analysis and interpretive discussion are presented. The features of this specific activity are considered, participation of the focus students is analysed and their retrospective interest ratings are discussed.

The narrative account

Today’s lesson began with me in the role of the teacher, with the girls seated on the floor in the centre of the classroom. I introduced the context for today’s lesson, explaining that the focus would be on designing and conducting a fair test. I explained the concept of a fair test using a demonstration with two girls, Michaela and Danielle. I posed the question, ‘Can girls with brown hair touch the ceiling more easily?’ We discussed how to make the investigation of our question fair. We discussed the notion that the only thing, or variable, we wanted to change in investigating this question was the hair colour of the girl; all other variables, such as the height of the ceiling and the height of the girl, needed to be kept the same. I then made the transition to the focus of today’s fair test. I took the statement, ‘Eggs are fragile’, recorded by one of the students, from the interactive noticeboard in the classroom and created a challenge to it by presenting the statement, ‘Eggs are strong’. I put up my challenge and remarked to the girls, ‘Some of you are probably thinking “Ms Pressick’s gone a bit crazy!”’. They laughed and I then asked them to respond to my challenge. Some of them suggested that different animals’ eggs were stronger than others or that different parts of the egg were stronger. I said that we would need to test it and showed them how I could squeeze an egg as hard as I could at its pointy tips and it wouldn’t break. I asked them where they cracked eggs to break them open for cooking and they said on the side. We raised the question whether this was because they were weaker there. I commented that I wouldn’t squeeze there just now.

After a class demonstration to test the strength of a raw egg (task 5, Figure 7.2; Figure 6.7 in the previous chapter), Ms Wheeldon started explaining the strength test
that the students were to engage in during this lesson. Ms Wheeldon explained that they would be working in their table groups of three or four students to design a fair test of strength of their own. Each group would be given a boiled egg, a raw egg and blown egg to test, needing to design and undertake the same test for each egg to find out which was the strongest. As Ms Wheeldon explained the process of blowing an egg, Jacqui and Anita made eye contact across the circle and Jacqui said, ‘You know’, apparently referring to a shared experience that they had had elsewhere.

At this point in the lesson, the girls formed their small groups around the room and began to plan. There was an excited, anticipatory tone to the conversations. As they decided upon the design of their test, they shared that with either Ms Wheeldon or me and then returned to their desks to record their ideas. Ms Wheeldon wrote the following on the board so as to provide a structure for the girls’ written records in their books:

Aim: To test whether a boiled egg, raw egg or a blown egg is the strongest

What we need:

What we’ll do:

The girls had to complete the second and third sections depending on what their group had decided. They spoke a little between their groups as they recorded their intended testing procedure, with Philippa interjecting to exclaim to the group adjacent to hers as she overheard their discussion, ‘That’s not fair though!’. On the whole, however, they worked within their own groups during this time. As each group finished recording, they moved to gather the equipment they needed, collecting the three eggs from Ms Wheeldon in the classroom and then moving outside to the playground to commence their testing.

About 45 minutes into the lesson, all groups were outside conducting their fair tests (Figure 7.3; see also Figure 6.3, Chapter 6). The girls did not stay in their own group areas, but moved about freely, crowding around to watch other groups and with lots of laughter breaking out as testing proceeded. Ms Wheeldon and I circulated amongst the groups during this time. The different groups had designed different ways
Figure 7.3. Students work in small groups to design, conduct and record the results of fair tests to investigate the relative strength of raw, hard-boiled and blown eggs. The group above decides to place a weight on each egg, the group to the left drops each egg from a specific height onto a hard surface and the group below rolls each egg from a chair onto the ground. (Task 6, week 2, term 2 – 11/5/01)
of testing and so there was much to see and compare as the students watched other groups’ tests. There was an accidental dropping of an egg by Anna, who was moving near some girls from the other grade 5 class in the art room. Anna and her group members were disappointed, especially because it was the raw egg that she dropped and we had no spares. Michaela delighted in cleaning the dropped egg up with her bare hands for Anna, although she was not in her group.

As the girls completed their testing, they moved back into the classroom and settled down to record their findings (Task 7, Figure 7.2). Approximately 15 minutes after the testing had commenced, all girls had returned to their desks and were writing in their books to complete the following:

What happened?:
Our theory:

They also had a focus question for which they were asked to write a reflective response on the left hand side of the page in their science workbooks: ‘What do you think you will remember from today’s lesson? Why?’ The lesson concluded with the students individually writing their reflections.

Following the lesson, Ms Wheeldon commented to me that she had really enjoyed today’s lesson. She talked about the way there had been ‘organised chaos’ for a while, when the girls were testing their eggs, but that this had been balanced with quiet seat work when the students were recording their method for testing and their results, conclusion and reflection.

Features of the task

A structured degree of choice was evident in the fair testing task, effectively guiding the possibilities for the students’ participation in this activity. The parameters for the testing were established by Ms Wheeldon in the form of the focus question for investigation and the three types of eggs – raw, blown and boiled – that would be compared. There were also choices within that structure, and each group of girls owned their test in that they decided how they would test egg strength; for example, by
dropping each egg from an increasing height or by placing increasing weight on each egg until its shell cracked. Within their groups, which had been chosen by the teacher, the girls had responsibility for recording the procedure that they had designed for testing egg strength.

There was small group discussion focused on predicting outcomes and theorising, which contributed to possibilities for the development of interest in the task as each student negotiated her understanding with her peers. The girls appeared highly engaged in conducting their tests and spontaneously sought to watch the testing of others, to see what test designs other groups had developed to assess the strength of the eggs (see Figure 6.3, Chapter 6). Their eagerness to observe other groups’ testing procedures and the outcomes appears to be an externalisation of their interest in this task. The task itself created a sense of drama and novelty with a familiar object, a chicken’s egg.

While the recording of results and reflection following the fair testing are reported in the narrative, it is noted that this was retrospectively rated as a separate task to the fair test that is the focus of this section of the chapter. All students rated the recording of their results as less interesting than the conduct of the fair tests. This lower rating of interest does not seem surprising, given the high levels of excitement observed during the collaborative hands-on activity of fair testing followed by the consequential and more procedural, routine task of recording the results, which was much less engaging than the actual test.

*Participation of individual students and discussion of retrospective interest ratings*

Each of the focus students was observed participating actively in their small groups to complete the fair testing task. Jacqui appeared to have had a previous experience blowing an egg, which she had shared with Anita, and which may have contributed to her experience of being *very interested* in this task (Table 7.2), as the task was linked to a prior experience. In addition, the features of the task – a hands-on activity in a small group – were those which Jacqui associated with experiences of interest (see sections 7.3.3.1 and 7.3.4). Philippa had contributed not only to her own group’s test design but had also had input into the adjacent group’s design. Combined
with the potential for novelty and drama inherent in the task of fair testing, it is perhaps not surprising that Philippa rated herself as *interested/very interested* in the activity. Eleni, Stephanie and Cathy also reported positive experiences of interest during the fair testing, however Michaela perceived her interest as somewhere between *neutral* and a *little not interested*. Unlike Eleni, Michaela disliked being placed in groups by the teacher (section 7.3.4) and this may have impacted on her experience of interest in the fair testing, as she was placed with two fairly strong peers whom she would have had difficulty dominating.

Table 7.2

*Students' retrospective ratings of interest in designing and conducting a fair test to investigate the strength of raw, hard-boiled and blown eggs*

<table>
<thead>
<tr>
<th>Focus student</th>
<th>Rating of perceived interest in testing egg strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eleni</td>
<td>Beyond very interested</td>
</tr>
<tr>
<td>Jacqui</td>
<td>Very interested</td>
</tr>
<tr>
<td>Philippa</td>
<td>Between <em>interested</em> and <em>very interested</em></td>
</tr>
<tr>
<td>Stephanie</td>
<td><em>Interested</em></td>
</tr>
<tr>
<td>Cathy</td>
<td></td>
</tr>
<tr>
<td>Michaela</td>
<td>Between <em>neutral</em> and a <em>little not interested</em></td>
</tr>
</tbody>
</table>

Note. Class mean rating for this task was *interested* (Table 6.4).
7.3.3 Interest in the task, interest in the topic, interest in the domain

The students’ retrospective ratings of their interest in the different tasks as they learnt about the electricity and eggs topics in science and technology lessons each term reveal insights into their interest specific to tasks, topics, and the domain of science and technology more broadly. In this section of the chapter, I consider the individual trajectory graphs in conjunction with observational and interview data to develop an emerging story of the students’ experience of interest. For some of the focus students, their interest in specific tasks characterised the nature of their interest in science and technology learning. For other students, their interest as they learnt more broadly about particular topics was more apparent. Some of the students’ interest in science and technology seemed more closely related to identification with the domain. One student’s interest in learning was most strongly characterised by her ability to participate in classroom-based activities with understanding.

7.3.3.1 Interest in the task

For Philippa and Cathy, interest in science and technology at school was related primarily to the types of tasks in science, and less so to the topics or the subject matter. Tasks were interesting if they were new and actively engaging, such as experiments and investigations. For both of these students, it did not matter with whom they worked in a group or whether they worked individually, as to their enjoyment and learning from a task; it was the characteristics of the task itself which led to them experiencing interest.

Michaela’s interest trajectory graphs even more specifically indicated that her interest was in particular tasks that were associated with particular aspects of a topic. She appeared to strongly enjoy or dislike tasks mainly depending on how she could identify them with her life outside school, her perception of her relationship with Ms Wheeldon, which she considered had changed over the course of grade 5 (November 2001 interview), and her preference for working individually or being able to choose the other group members (term 2 trajectory reflection). As a general subject domain, she
projected a negative overall perception of science during the main phase of the project however this contradicted with her proposed career choices, which were science-based (see section 7.4.3).

Interest trajectory graph ratings (Figures 7.1 and 7.2), as well as observations and interviews, indicated that particular tasks in classroom-based science and technology lessons were especially engaging for all of the focus students. Such tasks could broadly be characterised as hands-on and included investigations and design and make activities. An example of such a hands-on task in term 2 was when students designed and made an enclosure for the egg-laying animal that they had chosen to research. This task emerged as a highlight of the eggs and egg-laying animals unit for Eleni, Cathy and Michaela. Eleni commented that she particularly liked making her model enclosure because, ‘I’m into arts and crafts and that sort of thing’ (informal interview in the classroom, 29/6/01). The task seemed to reinforce Eleni’s perception of her identity as a learner who enjoyed creative activities. Cathy also mentioned that making the enclosures had made science ‘fun’ (informal interviews in the classroom, 29/6/01). She wrote in a reflection, ‘I always think, ‘When are we going to do our enclosure?’ because I get really excited because I really want to make it’ (reflection, 15/6/01). Cathy was not simply meeting her teacher’s expectations that students would participate in the activity, as she implies that she may do for other classroom tasks; designing an enclosure was exciting, interesting and personally meaningful to her. If her teacher had not placed constraints on times when enclosures could be worked on in class, Cathy apparently would have chosen to engage in this task more often. Michaela especially liked making the enclosures because she actually got to make it. She stated that it really was the only thing that she liked about the eggs and egg-laying animals unit. ‘It’s fun making things. You don’t have teachers saying, ‘Blah, blah’ (ie what to do), you get to do what you want to do’ (informal interview in the classroom, 29/6/01). For Michaela, the autonomy associated with making choices about how she would design and make her enclosure increased her positive affect towards the task.
Figure 7.4. Students create their model enclosures for the egg-laying animal about which they have conducted research. There was a definite sense of focus amongst the students and a buzz of excitement as they worked on their models. They were working individually but in close proximity to others. The students noticed and commented on what others were doing, especially as they moved around to collect materials such as paint, paint brushes, glue and sticky tape. (Lesson 7, term 2, 15/6/01)

7.3.3.2 Interest in the topic

Each of the focus students made discriminating comments about their enjoyment of the topics studied in grade 5 when they reflected on their learning at the end of the year (November 2001 interviews). Stephanie and Philippa indicated that they enjoyed learning about eggs more than electricity, while Cathy, Jacqui and Eleni all preferred learning about electricity. There appear to be some contradictions between Eleni’s overall higher ratings of interest for the eggs topic, as indicated through her trajectory graphs (Figures 7.1 and 7.2), and her stated preference for learning about electricity in this later interview. A possible explanation is her relative expertise in the topic of electricity and her association of ongoing interest with this topic at the time of her retrospective ranking of topic preference. It appears as though Eleni
had a sense of identification with the topic of electricity within the domain of science and technology more broadly; her identity as someone with an interest in science and technology was strongly linked to her enjoyment and understanding of activities related to electricity and electronics.

In reflecting on her interest in the grade 5 topics, Michaela stated that she preferred learning about the two topics that followed the main phase of the study – SPECTRA \(^{10}\) (see section 7.3.6) and bridges – and she ranked eggs and electricity as equally the least interesting topics. In each of the interviews conducted during the study’s main phase, the focus students were asked to rank the subjects they learnt at school in order of preference at that particular time. Michaela’s subject rankings were noticeably topic-based, strongly related to the topic she was learning about in class at the time of completing the ranking task.

### 7.3.3.3 Interest in the domain

For Stephanie and Eleni, their interest appeared most closely related to the subject of science and technology in itself. Stephanie was passionate about science generally, and she identified herself as having a history of enjoying science through statements in interviews such as ‘I’ve always really sort of liked science’ (November 2001 interview). Eleni reported strong interest in all of the topics and tasks, particularly evident in her consistently high interest trajectory ratings in both terms of the project. When Eleni did not achieve a strong result in an externally run science competition in grade 6, her mum approached her teacher to clarify why this was the case, as she regarded science as ‘Eleni’s thing’ (note added to researcher journal, 22/8/02). Both Stephanie and Eleni engaged in science-related activities outside of school, and they identified science-related topics of interest (section 7.4), appearing to associate an enjoyment of science with their identities as interested learners. This appears to have had a self-canalising effect on their interest in their classroom-based learning experiences.

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\(^{10}\) SPECTRA is an acronym for Science Program Exciting Children Through Research Activities. The program is organised by the Australian Science Teachers’ Association.
7.3.3.4 Interest as a result of understanding the task requirements to enable participation

For Jacqui, interest in school-based learning related to her ability to participate with understanding and success in specific tasks, whether working in a group or individually. She preferred hands-on tasks to written tasks, as her weaker literacy skills often limited her involvement and she sometimes became off-task. Jacqui preferred to work in a group if she perceived the task as difficult because then she could receive help from her peers. These preferences seemed to be the case for Jacqui regardless of the subject, as she did not seem to make distinctions between subjects. During interviews, she often appeared uncertain as to which topics were being studied as part of which subject area, and I frequently needed to clarify the topics that she was studying that related specifically to science and technology to elicit relevant responses.

7.3.4 Experiences of interest when working individually or with peers

The focus students varied in their preference for working collaboratively with peers, or working individually. Interview data gathered in the course of the main phase of the project reflected a general preference for small group work (Jacqui, Stephanie and Eleni), a preference for group or individual work depending on the task (Philippa and Cathy) or a preference for working individually (Michaela). The reasons that students gave for their preferences which specifically related to their experience of interest in learning are reported in this section. The potential canalising effects on interest when working with a particular student also are discussed, and I conclude this section by focusing on the experiences of students interacting in a group in which Michaela was a member.

Working in groups with peers to complete science and technology activities was preferred by Jacqui, Stephanie and Eleni. All three students expressed their appreciation of the opportunity to talk about their ideas with peers. For Jacqui, working in a group enabled her to clarify any areas of misunderstanding and receive help if needed (February and November 2001 interviews), as well as being more fun (November 2001 interview). Stephanie indicated her enjoyment of talking about
science and technology when working with peers in the classroom, explaining that she
did not usually talk in the playground with her friends about science and technology, a
subject about which she claimed she was passionate (February 2001 interview). She
distinguished between fun in the classroom and fun in the playground, relating the
former to the opportunity to think more about what you are doing (February 2001
interview). Eleni also liked talking with others during group tasks because it provided an
opportunity to discuss something you may have missed (February 2001 interview) and
‘You find some stuff interesting about the topic that the other person’s found out but
you haven’t’ (November 2001 interview). Both Eleni and Stephanie preferred working
with peers whom they had selected, rather than in teacher-chosen groups (February
and November 2001 interviews). Stephanie found that working with friends increased
both levels of fun and agreement when completing the task, while Eleni indicated that
when she had the choice, she would choose to work with other ‘smart kids’ whom she
named, including Philippa. As Eleni was experiencing some friendship difficulties at the
beginning of grade 5, her Dad had suggested seeking out other capable students to
befriend as a strategy, which Eleni seemed to have adopted (February 2001 interview).
Jacqui also was experiencing some tumultuous friendships with Michaela and Anita
during grade 5 and indicated that while sometimes she enjoyed working with these
friends (February 2001 interview), the group dynamic and power relations could be
uneasy on occasions (interview, 16/3/01).

Philippa and Cathy both expressed a liking for working either in a group or
individually, depending on the task (February and November 2001 interviews). Similarly
to the students who expressed a preference for working in a group, Cathy indicated
that working in a group could be more fun and provided an opportunity for help,
especially when the task was difficult. She saw a disadvantage of group work as
sometimes leading to a situation where other people take over and she did not have an
opportunity to contribute in the way that she would like. Cathy’s preference for working
individually related to her desire to express her own thoughts and she particularly
mentioned her enjoyment of quiet, individual activities such as literature contracts in
English lessons. The aspect of working in a group that Philippa nominated as enjoyable
was that ‘lots of ideas shoot out’ (November 2001 interview), including ideas that she
might not have thought about on her own. She also liked working with peers because it
provided an opportunity to collectively answer questions. An aspect of group work that
she disliked was the frustration created by people arguing. Philippa’s enjoyment of
individual work related to the potential to complete a task more quickly or to achieve
more in the same period of time, however she acknowledged that this may also depend on the activity. Both Philippa and Cathy indicated that they were happy to work with any peers during class activities and did not mind whether they were placed in groups by the teacher, providing exposure to ‘different ideas’ (Philippa, February 2001 interview), or given a choice of with whom to work.

Michaela expressed a preference for working individually for a number of reasons. She indicated that in science and technology, some tasks require the design and creation of a product and if such tasks are completed individually, there is no dispute as to who will take the completed product home (February 2001 interview). Her other reasons related less to practical issues and more to social-emotional factors. When working by herself, Michaela commented that she could get her own way and did not have to accommodate the feelings and opinions of others. The example that she gave was of the conflict that arose during the zoo excursion as members of a relatively large group of ten students negotiated which exhibits to visit (November 2001 interview). Michaela claimed that if she had to work in a group, her preference was to work with ‘people who cooperate’ such as Philippa and Rebecca (February 2001 interview). She also expressed a preference for working in a pair or group of 3, rather than a larger group (November 2001 interview).

Working with particular students to complete group tasks could have had a canalising effect on the experience of interest in learning, as appears to have been the case for some students when working with Michaela. On many occasions, Michaela was observed as a dominant, obstructive, uncooperative and argumentative group member (for example, see Chapter 6, section 6.4.1). This particularly was apparent during the term 2 lesson when groups of students were given a map to plan their route for the zoo excursion (researcher field notes, 25/5/01). This was the only task during the project for which all six of the focus students were in the same group, with four additional class members also placed in this group. In her retrospective interest trajectory, Michaela indicated that she was less than *not at all interested* in planning the zoo route (activity 16, Figure 7.2). Jacqui’s reported interest also dipped for this task and I observed that ‘Jacqui was tending to follow Michaela’ (researcher field notes, 25/5/01) as Michaela obstructed decision-making in the group by resisting ideas put forth by others. Interestingly, Philippa and Eleni reported feeling beyond *very interested* in this same task; while Eleni was observed to be finding it difficult to have her voice
heard and appeared to withdraw as the time passed, Philippa’s body language conveyed a sense of frustration as, along with Cathy, she attempted to organise the group, make decisions and be heard. Philippa in particular was standing up to Michaela. I noted that ‘Frustration was evident, but I think that overall, the excitement of being able to plan the day was not totally dampened’ (researcher field notes, 25/5/01).

The positive but varying interest trajectory ratings of Philippa, Eleni, Cathy and Stephanie support this latter observation. Such positive experiences of interest also suggest that the characteristics of the route planning task, in promoting choice and decision-making in a meaningful and authentic context, in conjunction with self-canalising factors, can overcome the potentially negative effect of working with a resistant group member. While attempting to establish intersubjectivity amongst the group members was a frustrating process, this did not seem to negatively impact upon the interest of Philippa, Eleni, Cathy and Stephanie in the task of planning their zoo route. The students remained focused on decision-making within the planning task. The opportunity to make choices about their excursion route, and their desire to engage in this process, seemed more dominant canalising factors on their interest than Michaela’s efforts to obstruct the decision-making process.

7.3.5 Focus students’ perceptions of the teacher’s interest

Interviews conducted with the focus students revealed that Ms Wheeldon’s own interest in science and technology was generally positively perceived (November interviews, 2001). Stephanie highlighted Ms Wheeldon’s involvement with the students during science and technology lessons as evidence of her being ‘really interested’. In addition, Philippa considered Ms Wheeldon’s planning for and organisation of their learning as reflective of her effort and interest in the domain. Stephanie made a further distinction between Ms Wheeldon’s apparent preference for the eggs topic (term 2) over the bridges topic (term 4), based on her observations of her teacher’s enthusiasm during science and technology lessons.

The affective feedback from Ms Wheeldon, particularly through her body language and facial expressions, clearly contributed to the students’ perceptions of her interest. Eleni commented that Ms Wheeldon looked happy during science and technology lessons and Stephanie enjoyed describing Ms Wheeldon’s enthusiasm
when teaching science and technology topics that she particularly liked (November 2001 interview):

Stephanie: I don’t know whether anyone else has noticed but her eyes sort of light up and they go ‘whoo’, really big!

KP-K: OK (smiling), so you’ve noticed that.

Stephanie: And she puts on a nice smile and she shows all her teeth.

KP-K: (laughs) Also, that would show she was enjoying it.

Stephanie: And her eyebrows raise often, she goes (demonstrates), like when she finds out something and it’s really cool.

KP-K: Yeah. You like it when you see her doing that?

Stephanie: Yeah. It makes me feel good.

KP-K: Oh good. Oh, that’s good. When she comes over and works with you

Stephanie: Yeah.

KP-K: and you tell her something and she reacts in that way.

Stephanie: Yep.

The emotional intersubjectivity and sense of connection established between Stephanie and her teacher through Ms Wheeldon’s expressive responses to Stephanie’s learning is revealed through these observations. Ms Wheeldon’s expressions of her own interest in learning appeared to scaffold Stephanie’s interest and positive feelings about learning science and technology. Jacqui was another student who made links between her own feelings of enjoyment and interest in science lessons and Ms Wheeldon being ‘impressed’ with her, which she appeared to further relate to Ms Wheeldon being a fun teacher and loving science herself. For both Jacqui and Stephanie, Ms Wheeldon’s responses to their learning contributed to the enjoyment and interest that they experienced, thus having a canalising effect.
Michaela was the only student who made a negative comment in relation to her perceptions of Ms Wheeldon’s own interest in science and technology (November 2001 interview). Unlike the other students, for whom the teacher’s affect and involvement contributed positively to their own interest and enjoyment, Michaela perceived Ms Wheeldon as bored and not really attentive. She saw her teacher as lacking knowledge in her responses to what the students shared with her. Interestingly, Michaela seemed to change her perceptions of her class teacher over the course of the year, and commented in term 4 that Ms Wheeldon now seemed to like her and talked to her more (November 2001 interview). Certainly, the relationship between Ms Wheeldon and Michaela was observed to be tense on occasions. My field notes following my first classroom visit for term 2, half way through the project’s main phase, include the following reflection (researcher field notes, 4/5/01):

I’ve been thinking further about the ways in which my research might be contributing to Michaela’s construction of herself as not being interested in science and technology (when so many of her classroom interactions seem to contradict this). To what extent is her perception of the need for maintenance of this identity affecting what she tells me in interviews?

Also, Ms Wheeldon and I spoke in the holidays about Michaela’s resistance, and also agreed upon her ability to manipulate others - very unpredictable relationship with Anita and Jacqui. I find Michaela quite fascinating and challenging, if at times frustrating - I think Ms Wheeldon may be responding somewhat negatively to some of her behaviours, and resisting in return, such as in the almost-denial of Michaela’s question today and in her confrontational tone with Michaela when she was inattentive in a class discussion (Lesson 8, term 1, 30/3/01). A battle of wills? However, Ms Wheeldon is also remarkably patient, in terms of giving Michaela the space to resist and not participate in the science and social studies activities she chose not to engage in at the end of last term.
Michaela's expression of her increased enjoyment of science and technology in terms 3 and 4, following the project’s main phase (November 2001 interview), indicate that it was possibly the topics that were studied during the period of my research observations, rather than my involvement in the classroom, that may have been central factors to her resistance. Additionally, to further contextualise my reflections above, Ms Wheeldon subsequently commented during a conversation in late 2001 that Michaela reminded her a little of herself and the way that she interacted in her family context when she was younger. Possibly, her own identification with Michaela contributed to her approach to negotiating Michaela’s participation in the classroom. At times, Ms Wheeldon’s approach to Michaela provided a generous and affording ZFM/ZPA system, such as during the class discussion recounted in the narrative in section 7.3.1.2 and when she allowed non-participation in an activity as a valid possibility for Michaela’s participation (see researcher field notes above). At other times, Ms Wheeldon’s interactions with Michaela appeared to overly - and on the surface perhaps unfairly, given her responses to other students - constrain her actions and possibilities for expressing and exploring her interest.

Other students also indicated their perception of the importance of the teacher’s role, in her having control over how they would experience their learning about a topic, but in more positive ways than Michaela. Such control appeared to be a scaffold for the students’ learning and their development of interest. For example, Cathy commented that Ms Wheeldon ‘makes the topic good’ (November 2001 interview). Philippa indicated that if it was not for Ms Wheeldon’s careful planning, they would have nothing to do (November 2001 interview). Cathy, however, also pointed out that Ms Wheeldon’s enjoyment of science and technology was dependent on the students as well, highlighting the reciprocal nature of the process (November 2001 interview) and the sensitivity of the teacher in guiding the students’ participation:

KP-K: What do you think Ms Wheeldon thinks about science?

Cathy: I think she probably enjoyed it ‘cause, seeing everybody, like, interested in it and like actually into it and … yeah!

KP-K: Mmm. When you say ‘interested’, what do you mean? What

Cathy: Like
KP-K: do you mean by ‘interested’?

Cathy: Um, they’re really like, wanting to know what’s going on, and they’re happy, smiles on their faces and stuff, and so, like, she knows she’s doing a good job by making the topic good and stuff.

Cathy was able to see classroom learning from the teacher’s point-of-view and she appreciated the sense of satisfaction that Ms Wheeldon must have felt when she observed her students enjoying activities that she had planned for them. Her comments indicate Cathy’s understanding of enjoyment of teaching for the teacher and of learning for the students as a collaborative and negotiated social construction. The importance of emotional intersubjectivity between the students and the teacher also becomes central to the process of experiencing interest; interest in learning in the case of the students, and interest in teaching in the case of Ms Wheeldon.

The potential impact of the teacher on the students’ enjoyment of a particular domain was evident during the September 2002 follow-up interviews, when the focus students were in grade 6. There was an apparent lack of connection and intersubjectivity between the students and the specialist teacher in visual arts, Ms Miller, who was a secondary teacher who came weekly to the Junior School specifically to teach this subject. When the focus students were asked to rank their subjects in order of preference in term 1 of grade 5, art was ranked by all students, except Michaela, as their favourite or equal favourite subject (Michaela ranked it as 7th in 8 subjects). In term 3 of grade 6, art was ranked by all focus students, except Michaela and Jacqui, as their least favoured subject (Jacqui ranked it as 7th in 8 subjects, Michaela as 5th). When asked why their rankings had changed so dramatically, the students talked about their perceptions that Ms Miller did not want to be teaching them and that she shouted at them all of the time. Ms Miller’s approach to interacting with the students in art lessons and her classroom management style were impacting upon the possibilities for students’ development and experiences of interest in the visual arts. In talking about the context of art in grade 6, Stephanie remarked, ‘I think the teacher really does make a difference’ (September 2002 interview). Cathy, however, made an important distinction between the domain and the teacher, which it also seemed that Michaela was capable of making: ‘I like art, it’s just that I don’t exactly like the art that Ms Miller teaches us in this school’ (Cathy, September 2002 interview). While the
context for her school learning had decreased Cathy’s enjoyment of and interest in art in one sense, her interest in the domain was maintained because of the personal meaning of the subject beyond that school context. This sense of personal meaning contributed to self-canalising Cathy’s interest in art, despite other canalising forces that may have led to decreased interest in that subject.

7.3.6 ‘Personal theories’ of interest

During interviews over the course of the project and through written reflections, students’ personal theories of interest began to emerge through the way in which they spoke about their experiences. Some of the aspects of students’ tacit theories of interest have been previously discussed in detail within this chapter, such as the relationship between experiencing interest and engaging in hands-on tasks (section 7.3.3.1), interest when working individually or with peers (section 7.3.4) and students’ perceptions of the teacher’s interest (section 7.3.5). This present section of the chapter highlights some of the similarities and differences between the focus students’ claims about interest that have not already been reported. Aspects such as fun and enjoyment, time, novelty, variety, challenge, choice and control are discussed and examples are drawn from the interview data.

When talking about their interest in classroom tasks, it became evident that all of the students associated interest with having fun and enjoying their involvement in activities. In clarifying what she meant by ‘interesting’, Michaela stated that, ‘It’s fun and it’s how you learn things’ (November 2001 interview). Stephanie stated that the guest speaker visit during the electricity unit was ‘fun and interesting’ (interview, 16/3/01) and when asked to elaborate on what she found ‘fun’ about the visit, Stephanie replied ‘It was an interesting talk’. For Stephanie, the concepts of ‘fun’ and ‘interesting’ appeared interchangeable. Cathy explicitly recognised that what is considered fun might differ amongst her classmates, acknowledging that having a choice of tasks enables selection of an activity that is ‘fun in your point of view. Like, not other people’s; it might be boring for you but fun for them’ (November 2001 interview). In the process of interviewing students, as well as through incidental conversations in the classroom, it became evident that positive affect and interest were strongly related for them. Eleni, for example, talked about feeling happy, excited and a sense of wonder when she felt
interested in something, while Jacqui and Cathy also associated feelings of happiness and being interested in learning in the classroom (November 2001 interviews). Like Eleni, Stephanie linked excitement with interest but, along with Cathy, also highlighted the association between being interested and really wanting to do something, something considered as ‘good to learn about’ and ‘fascinating’ (November 2001 interviews).

Time also was related to interest by a number of the focus students. For example, Cathy indicated that when she was interested in a task, she wanted to spend time on it (reflection, 15/6/01). For Eleni, however, the relationship between experiencing interest and time was slightly different. When asked in an early interview (16/3/01), ‘What makes something interesting?’, Eleni replied, ‘Um, like, if you get to spend a lot of work on it’. Her response differs from Cathy’s observation, in that Eleni appears to be linking the potential for the development of interest with the availability and passage of time, whereas for Cathy, an existing interest creates the desire to spend time engaging in related activities.

Certain emphases in personal theories of interest also emerged that distinguished the focus students from one another. ‘Cute things’, especially animals and more specifically the miniature solar car shown to them in term 1, were mentioned by Stephanie, Eleni and Cathy as being associated with interest. Philippa spoke particularly about the importance of novelty to her enjoyment of learning and experience of interest. She related being interested with using new materials, such as clay during visual arts lessons, as well as with seeing new things, such as a Komodo dragon during the excursion to Taronga Zoo (November 2001 interview). Philippa also spoke about novelty in relation to experiments, when ‘you get to try new things. And you, like, you don’t know if it’s going to work or not. So it’s good to find out’ (November 2001 interview). Interest was created for Philippa through experiments and hands-on investigations, when there was a genuine desire to engage in something novel and when the outcome was unknown and potentially could reveal something unexpected – or in the case of a dissection, something ‘gross’! (September 2002 interview).

The unanticipated or the bizarre were acknowledged as creating interest for three other students: Stephanie, Eleni and Cathy. Stephanie talked about dramatic
events like explosions in chemistry experiments as being interesting, while Eleni indicated that unusual things, such as monotremes, were interesting to her (November 2001 interviews). Cathy gave the example of seeing her peers conducting experiments, which she herself would like to undertake.

Cathy: They were testing, like, a battery, where what happens when, if you keep a battery in salt water or something. And it looked really cool. And then I saw what happened afterwards and it was really strange!

KP-K: And so you’d like to have a go at doing that?

Cathy: Yeah.

The bizarre nature of her peers’ findings created interest for Cathy, such that she indicated that she herself wanted to complete a similar experiment.

Like Philippa, Michaela spoke about novelty, however she related this to her experience of interest in a topic that she already knew about but for which she realised that she could find out more (November 2001 interview). At the end of grade 5, following the main phase of the project, Michaela spoke about her enjoyment of SPECTRA projects. SPECTRA projects form a program offered by the Australian Science Teachers’ Association, where tasks related to a particular area of science – for example, entomology, chemistry, engineering – are outlined on a project card. Tasks are assigned a certain number of points, depending on the complexity of the task, and the students need to complete tasks to the value of 20 points in order to be awarded a SPECTRA badge in that area. Heathville College students completed one SPECTRA project each year from grades 4 to 6 during allocated science and technology lessons. The students chose their own topic then worked independently with teacher support to complete tasks both individually and with peers who were completing the same projects. The teacher provided encouragement to students to plan their time and organise the necessary materials for the tasks personally selected for completion. Michaela commented that, given the opportunity, her preference would have been to complete SPECTRA projects in science and technology for the whole year (November 2001 interview).
KP-K: What is it about SPECTRA you like so much?

Michaela: Um, you get a different, you've got all these different things. They're all hard, they're not like weird things, and you get to choose which ones you do.

KP-K: Mm.

Michaela: Like, the first and second, and you don't have sort of a specific date that you have to get them done.

KP-K: Mm. And you enjoy having that decision-making responsibility yourself?

Michaela: (nods)

KP-K: OK.

Evident in Michaela’s response on this and other occasions is an association between her enjoyment of the SPECTRA projects and the variety of tasks, challenge through difficult and meaningful activities which she considers as authentic to the domain of science, and choice and control of the tasks to complete and the order and timing for completion. Some of the other students also spoke about SPECTRA, highlighting similar attributes as making the projects particularly interesting and enjoyable. For example, Cathy stated that with SPECTRA ‘You get your choice of what you want to do and you get to choose the activities that you’re going to do. And I like that because you’re doing exactly what you want to do’ (September 2002 interview).

Choice and interest were associated for other focus students, including Eleni, although as Michaela pointed out, choice in itself is not sufficient to create interest; it depends on what the choices are as to whether choice makes learning interesting (September 2002 interview). Challenge was linked to interest particularly for Stephanie. In both of her interviews following the project’s main phase, Stephanie clarified the importance of challenge but at the right level of difficulty, so that she would not feel ‘panicky’ and would be able to experience success (November 2001 interview; September 2002 interview). Similarly, Philippa indicated that she really liked challenging tasks, but specified that she liked it when they ‘can be done, but they’re hard’ (September 2002 interview). Eleni also linked interest and success when talking
about her interest in music in relation to her talent for singing and a strong result in her piano exam (November 2001 interview).

The personal theories of interest articulated by the focus students during conversations in my research project share common aspects with previous studies of interest that will be discussed in Chapter 8. While interest had various dimensions according to each of the students, their notions of interest were shaped not only by their classroom learning experiences but also by their experiences beyond the classroom. The following section of the chapter focuses on how students’ classroom learning related to their experiences outside of the school context.

7.4 RELATIONSHIP OF PRESENT CLASSROOM LEARNING TO EXPERIENCES BEYOND THE CLASSROOM: HOW IS THIS MEANINGFUL AND VALUABLE TO ME AS I ENVISAGE MY FUTURE AS AN INTERESTED LEARNER?

The students also participated in activities related to their science and technology learning, but outside of regular classroom-based lessons through excursions beyond their school and guest speaker visits to their school. Such activities broadened their opportunities to engage with experts and materials that related to the real life practice of doing science and technology. These activities created new possibilities for experiencing interest in learning about the focus topics. Outside of school, the students also engaged in discussion and, sometimes, activities related to their classroom-based science and technology learning within their family contexts. Such learning experiences beyond the classroom are the focus of this section of the chapter, which concludes with discussion of students’ anticipated interest in science and technology lessons in grades 6 and 7, in the years following the main phase of my research project.
7.4.1 Excursions and guest speakers

In each term in the main phase of the study, the students interacted face-to-face with experts and participated in contexts that extended beyond the classroom-based learning community. In the first term when learning about electricity and energy resource conservation, the students had a visit from a guest speaker, Alison, from the Sustainable Energy Development Authority (SEDA). In the second term when learning about egg-laying animals, the students went on an excursion to Taronga Zoo. The excursion included time as a class group in the Zoo Education Centre interacting with educators with an opportunity to ask specific questions, as well as time in a small group, accompanied by an adult, to wander around the zoo to see animals of their choice in their enclosures. In this section of the chapter, I draw on focus students’ responses during informal interviews on the bus back to school following the zoo excursion (31/5/01) and during semi-structured interviews following the project’s main phase, along with written reflections, interest trajectory graphs and my field notes to consider variation in the perceived meanings and value of these activities.

On the day following the visit from Alison from SEDA in term 1, I asked the students to talk with me about what they recalled from her presentation (Figure 6.1, Chapter 6) and the activities that they completed (interviews with focus students, 16/3/01). The objects that Alison showed to the students – a miniature solar-powered car, solar panels (Figure 6.2, Chapter 6), a piece of coal, model wind turbines – featured in their responses, with all of the students indicating that they liked hearing about them and seeing how these worked. Cathy indicated her amazement at the way that her shadow could stop the model car from working and said that she had learned something new about solar powered batteries and panels. The students completed an energy audit of their classroom, to calculate electricity usage. Michaela particularly liked conducting the audit, which was another example of an authentic activity with real life implications. The results of the audit activity surprised Eleni, Philippa and Michaela, who clearly saw energy resource conservation as an important issue. They each independently reflected that they should make an effort to turn off the lights in the classroom when they didn’t need them and Michaela indicated that she would like to make an announcement in a school assembly to make others more aware of reducing their electricity usage. Philippa and Stephanie also recalled specific information about solar panels being made from silicon and remarked that they previously had not known
that silicon came from sand. Cathy, Stephanie, Eleni and Michaela were particularly active in asking and answering questions during the guest speaker visit (researcher field notes, 15/3/01). While Stephanie commented that the visit was ‘fun and interesting’ (16/3/01) because of the solar powered objects and the activities that they got to do, and Michaela found Alison’s presentation ‘interesting’ (16/3/01), Jacqui was the only focus student who spoke negatively in relation to the guest speaker visit. She said that she ‘didn’t like it that much, just a tiny bit’ (Jacqui, 16/3/01). Jacqui found the presentation in the school hall when Alison spoke to them ‘a bit boring’ but liked the outside activities when the solar car and panels were demonstrated. There is noticeable inconsistency, however, between Jacqui’s negative comments in her interview (16/3/01) and her high retrospective interest trajectory ratings recorded on the same day as the interview (Figure 7.1 – tasks 18, 19 and 20). A possible explanation is Jacqui’s confusion about her learning, a factor that arose in other interviews and was reflected in the lack of clarity or relatedness of her responses. Another explanation could be that Jacqui was having a particularly tumultuous time in her friendship with Michaela, but she still chose to work with her to complete the energy audit (researcher field notes, 15/3/01), which may have contributed to her responses during the interview and to her being distracted during the lesson when she completed her interest trajectory ratings.

The retrospective interest ratings for Alison’s guest speaker visit (Figure 7.1 – tasks 18, 19 and 20) are positive overall, with particular variation for the task of calculating electricity usage in the classroom. Interestingly, however, in follow-up interviews after the main phase of data collection none of the focus students spoke about Alison’s visit, or the associated activities, when asked a broader question about what they recalled or especially enjoyed about their science and technology learning in grade 5. This differed markedly from the term 2 excursion to the zoo, which most of the focus students spoke about in follow-up interviews. It may reflect their greater interest in the term 2 topic when compared with the term 1 topic (November 2001 interviews) and as revealed in the slightly higher class mean ratings of interest for term 2 (section 6.3.2, Chapter 6). It also possibly reflects the greater impact on the students of leaving the school to learn in a different physical and sociocultural context.

In asking students to reflect more broadly on what they enjoy about excursions, prior to going to Taronga Zoo in term 2 (written reflections, 29/5/01), it was evident from
their responses that the students valued the opportunity to learn outside of the school setting but related to a topic they are learning about with their class. ‘On excursions, I enjoy going outdoors and visiting new places, hearing new and true things said by experts’ reflected Cathy (29/5/01), while Stephanie emphasised the dual purpose of excursions ‘to learn and have fun’ (reflection, 29/5/01). The focus students’ trajectory ratings also indicated that they were interested in their learning on the excursion, both during the time that they spent in the Zoo Education Centre and when walking around the zoo, stopping to look at animals in their enclosures (Figure 7.2, tasks 17 and 18). The exceptions to the otherwise very interested and beyond very interested ratings were Stephanie, who indicated that she was not that interested in the Zoo Education Centre presentation, and Michaela, who was extremely interested during the time spent at the education centre but less interested in the time actually spent in the zoo. Both of these students recently had visited Taronga Zoo together on a weekend prior to this excursion, which perhaps was reflected in their experiences of interest on the excursion day (informal interview, 31/5/01). Stephanie commented that it was fun on the excursion, but that she’d had more fun at the zoo with Michaela in their own time because they ‘got to stay around to do stuff longer’, plus the seal show was better and they got to go on the sky-rail ride over the zoo (informal interview, 31/5/01).

Evident in the data gathered from students relating to the term 2 excursion to Taronga Zoo was the value in actually seeing the live animals that they were studying. For Stephanie, seeing the live animals contributed to it being ‘the best excursion ever!’ (reflection, 29/5/01). Michaela’s favourite part of the excursion was seeing the frogs, particularly the white-lipped green tree frog, and getting to touch it (informal interview, 31/5/01; Figure 7.5). Philippa enjoyed bringing a camera to take photos of the animals (informal interview, 31/5/01). Cathy and Eleni most enjoyed seeing their chosen animals, a taipan snake and an echidna, but Cathy also highlighted her enjoyment in finding out about animals that she hadn’t seen before, such as a Komodo dragon (informal interview, 31/5/01). For most focus students, it was the case that they saw the egg-laying animal that they had chosen to research. Philippa, however, was studying the ostrich and was ‘a bit disappointed’ to find that her animal was not included in Taronga Zoo’s collection (reflection, 1/6/01). For Jacqui, there was some confusion about whether she was studying the Egyptian cobra, which she had seen at the zoo, or another type of cobra (informal interview, 31/5/01).
Figure 7.5. The Zoo educator holds a white-lipped green tree frog as he talks with the students in detail about frog spawn and gives them an opportunity to touch the frog.

The focus of the zoo excursion on finding out answers to their own questions about egg-laying animals and enclosures also created meaning for the students. Cathy reflected (written reflection 1/6/01) that

I think that the excursion to the zoo helped a lot in my research because it gave me heaps of information on the questions I had to answer, so I managed to get three of my questions done. I think that I wouldn't have been able to find this on the internet or books.

Philippa also found going to the zoo helpful ‘in terms of research because we got to speak with the expert about the animal we are studying even if the animal wasn’t in the zoo’ (written reflection 1/6/01). Stephanie reflected, however, that the excursion was ‘fairly useful…because I found out where a platypus lays its eggs. I didn’t really learn anything that would be hard to find in a book’ (written reflection 1/6/01). She did get to
draw a rough sketch of the platypus’s enclosure that she visited, in preparation for designing and making her own platypus enclosure back at school (informal interview, 31/5/01), but she was somewhat disappointed that the elusive platypus was not visible in its tank during our visit (researcher field notes, 31/5/01).

For Stephanie, the social purpose of excursions was a feature that she emphasised in her reflections. Prior to the zoo excursion, she indicated that her enjoyment of excursions related to being able to go out with all of her friends and look at things (written reflection 29/5/01). Following the zoo trip, Stephanie noted that one of the reasons for going to the zoo was to develop skills of ‘cooperation’ with her peers (written reflection 1/6/01), as related to their need to work together in planning their route and then implementing their plan on the day. Cathy was not as positive as Stephanie about the experience of being in her group on the excursion as she found it frustrating when they couldn’t agree on where to go next (informal interview, 31/5/01). While Philippa enjoyed having the responsibility of cooperatively planning the group’s route in advance, the limited time at Taronga Zoo meant that they had to be highly selective in the animals they would get to see (informal interview, 31/5/01). She brought along a small clock to the zoo because she thought it would help her group keep moving along their planned route, in case they became ‘too interested in what they were doing’ and lost track of time (informal interview, 31/5/01). Eleni, however, highlighted that she found some group members were uncooperative, particularly Michaela and Jacqui, who wanted to go everywhere that they wanted and were ignoring the route that the group had planned in advance (informal interview, 31/5/01). I noted in my field notes (31/5/01) that, ‘From the very start, Jacqui and Michaela rushed a few steps ahead of us. I’m not sure whether this was an attempt to dominate the group and to have more of a say in where we stopped.’ Michaela acknowledged the tension in her group, the fact that they needed to wait for other members of their group and the lack of time for them to see as many animals as when she had visited more recently in her own time with Stephanie (informal interview, 31/5/01). We had from 12pm until 2pm in the zoo, following our time at the education centre, which probably was less time than an average family visit for children aged 9 to 11. Jacqui also later reflected that there was not enough time for them to look at many animals that were not egg-laying animals, which meant that she did not see some of her favourite animals such as meerkats (informal interview, 31/5/01). Both Jacqui and Michaela were pleased, however, to see the seal show even though it did not relate to their learning about egg-laying animals, which was the intended purpose of this school visit. For many of the students in the
group, the seal show had been a highlight of previous visits to Taronga Zoo with their families.

7.4.2 Families and outside-of-school experiences

In the process of being interviewed about their classroom-based learning, some of the focus students talked about their families and their involvement in activities outside of school that related to science and technology. In addition, for each term, students completed a *Family Conversation* survey (family survey) with their parents about their interest in the focus topic. These data revealed some insight into how the students were making connections between their learning at school and their learning outside of school, and how interest might be developing across different contexts. These data also provided evidence for the ways in which parents contributed to canalising their children’s interest through creating particular ZFM/ZPA systems through their social and material support.

Two focus students in particular, Eleni and Stephanie, appeared to be actively supported by their families in engaging in science and technology-related activities outside of school. These were the same two students for whom a global liking of science as a domain was expressed, as previously discussed in section 7.3.3.3. My observations of Eleni’s well-developed interest in science and technology were supported by her conversation relating to materials available to her at home. Eleni had electronics kits, given to her by her parents, that she played with at home and she saw herself as being ‘very interested’ in physics (November 2001 and September 2002 interviews). Eleni talked about her dad’s enjoyment of this area as well and shared with me that at home, her dad refers to himself ‘Mr Electronic’ (researcher field notes, 17/3/01). At times, Eleni’s parents’ encouragement of her learning appeared to border on *them* doing the task for her. For example, when making her electrical product, I noted in reflection in my field notes (17/3/01) that,

Ms Wheeldon and I were both quite shocked and rather disappointed when Eleni had an alarm, complete with circuit panel and sensor that
her dad had shown her how to hook up at home before she came to class today. We had envisaged that this would be a task that could provide a challenge for Eleni, but she had it all hooked up in about 5 minutes.

Eleni’s dad’s expert knowledge seemed to be helping to extend Eleni’s own understandings, and their interaction in relation to electronics appeared to be supportive of the co-creation of their shared interest. In their family survey (term 1, 2001), Eleni’s Dad identified himself as being ‘very interested’ in the topic of electricity because ‘It is the basic building block of all things’ while he also perceived Eleni as being ‘very interested’ because ‘Eleni is always interested and asking questions about electricity’. At times, however, this active support from her parents seemed to be detracting from Eleni’s own discoveries within the learning context. In grade 4 at Heathville College, Eleni had been given an opportunity to complete a personal interest project with an adult mentor. Initially she had selected Australian native animals as her focus topic, but told me that she had changed to lasers because ‘my dad was like, “Lasers are really interesting”, and I’m like, well, OK, anything goes’ (November 2001 interview). Eleni commented that she had really enjoyed studying lasers because she liked creating a laser light show and she was glad that she had changed topics. Her dad’s intervention served to create new possibilities for Eleni’s interest development in science more broadly. In conversation with Ms Wheeldon, (researcher field notes, 17/3/01) however, her concern as the teacher coordinating the mentor program was that Eleni’s dad ‘had also found it difficult to draw a line between helping Eleni with her mentor project… and doing it for her – despite attempts to discuss this made by both the mentor and Ms Wheeldon’. Eleni’s dad appeared to be successfully creating ZFM/ZPA systems within the family context that were fostering Eleni’s interest development in science and technology, but at the same time, his involvement in their shared activities appeared at times to limit the potential challenges in her learning by possibly providing too much scaffolding and by diverting her from other potential interests.

Like Eleni, Stephanie’s parents provided her with material and social support to pursue her interest in science outside of school, in ways that promoted possibilities for interest development. Stephanie’s parents enrolled her in a holiday course in chemistry. Later, Stephanie revealed to me, ‘I really love chemistry, it’s like a passion for me’ (November 2001 interview). It was evident that Stephanie’s interest in chemistry
had been developed through her parents making it possible for her to engage in chemistry-related activities outside of school, in a setting in which she could meet peers and adult experts who shared her interest. In term 1 of grade 5, Stephanie chose to make a lighting system as her electrical product, however she told me that she intended to make one of the other products at home (researcher field notes, 23/3/01). Stephanie’s mum had purchased additional electrical components so that she could make a torch at home. In term 2 when making her enclosure, Stephanie’s parents helped her to find a suitable box from the local fruit market. As a family, they talked about eggs ‘at length’ (family survey, term 2) and shared in experimentation to arrive at the perfect boiled egg. Both of her parents identified themselves and Stephanie as considering the topic of eggs and egg-laying animals as ‘very interesting’ (family survey, term 2). Stephanie was one of seven students in the class who wrote down the address for the recycling centre where Ms Wheeldon and I had purchased materials for making their enclosures, with the intention of visiting the centre in her own time (researcher field notes, 8/6/01). Eleni and Michaela were the other two focus students who recorded the address in their homework diaries.

Cathy also engaged in activities at home that were related to the topics that she was learning about at school, however unlike Eleni and Stephanie, Cathy’s pursuits seemed less dependent on active support from her parents. This latter perception may have arisen from Cathy not speaking about her parents being involved as much as these two other students in related activities outside of school. A greater independence in Cathy’s activities at home also could have been the result of her parents’ time and attention being spread across four children, rather than one or two. Two examples of her activities at home were her setting up the alarm that she had made in class in term 1 in her bedroom (November 2001 interview) and conducting an egg experiment after seeing it on a video shown in class (researcher field notes, 27/5/01). Cathy’s family survey for term 2 indicated that there had been minimal discussion about the eggs topic at home, however family conversation about the electricity topic had been greater (family survey term 1). Her parents indicated themselves as finding the electricity topic more interesting than the eggs topic, but observed Cathy as being more interested than them in eggs and egg-laying animals. They considered that she found both topics of interest because she spent time understanding ideas relating to electricity (term 1) and she sounded interested when she spoke about eggs and egg-laying animals (term 2). Outside of class time, Cathy also went to the school library at lunchtime with her friends.
who were also researching snakes as their egg-laying animals, to locate information that they subsequently brought to class (researcher field notes, 8/6/01).

Although Cathy’s parents apparently were not highly involved in the activities she undertook at home relating to her learning at school, Cathy evidently had high regard for her parents and their family discussions (September 2002 interview). Cathy indicated that, if given the choice to complete a project with a mentor, she would choose a focus related to the media or law because of her parents’ interests in these areas when they were watching the evening news as a family (September 2002 interview). She considered that there was future utility in understanding more about such areas, to help her when she was older and prepare her to participate more fully in her family and in communities beyond school. ‘If that’s the way you need to go when you’re older then I really want to learn about that stuff’ (Cathy, September 2002 interview). It appears as though Cathy’s parents’ interest in media and the law had had a canalising effect on her own interests, which Cathy had internalised. Cathy’s interest seems to be connected to her perception of the meaningfulness and relevance of learning about such topics.

As previously discussed in this chapter, links between her life outside of school and her school learning were important in creating interest for Michaela. Her interest was perceived as peaking when she engaged in activities that had purpose and meaning in her life beyond the classroom. For example, in term 1 Michaela had chosen to create a torch as her electrical product because she intended to use it on a camping trip with her dad. Another example of the importance of connections between school learning and her out-of-school experience is when Michaela talked excitedly about learning about bridges in term 4 of grade 5, following the main phase of this research project (November 2001 interview). After indicating that this was the science and technology topic that she had found most interesting in grade 5, Michaela discussed a specific book about bridges which she had used in her research at home and mentioned that she had climbed the Sydney Harbour Bridge to celebrate her birthday. While Michaela made links between out-of-school contexts and her school-based learning, it is less clear about the role that her parents played in promoting her interest in science and technology topics. She told me that her dad suggested some modifications to her torch design during term 1 ‘to make it more challenging’ (researcher field notes, 17/3/01). I noted in my field notes that from the way Michaela
spoke about her dad’s involvement, ‘this seemed to be supporting her learning rather than doing it for her.’ Her parents indicated their own interest as being greater than Michaela’s in the topic of electricity, noting that the main source of her interest appeared to be ‘in the hands on work of making something and seeing it work’ (family survey term 1). While Michaela had talked about what she was learning at school to her parents, they stated that they had not done anything as a family in relation to the electricity unit. She did not return a family conversation survey for term 2.

Philippa and Jacqui spoke less than the other focus students about the ways in which their family contexts and activities outside of school related to their learning at school. Philippa went shopping with her dad to purchase the components she needed to create an alarm as her electrical product (interview, 16/3/01). In her interview, she indicated that she had chosen to make an alarm because she thought it would be useful at home and if she made one, then her dad wouldn’t have to buy one. Philippa wanted this to be a surprise for her dad so she told him that they were making electrical products but did not specify what she had chosen to create. She recounted her trip to the electronics shop, exclaiming that it was such a big shop with so many ‘electric things’ and that she was not sure what she needed (interview, 16/3/01). After speaking with the manager, she chose the buzzer ‘for professionals’ and realised that she had the rest of the equipment that she required at home. This was the only reference to her family context in interviews or in informal in-class conversations recorded in my field notes.

Philippa’s family conversation surveys for both terms 1 and 2, however, revealed that she and her family had engaged in a number of activities and discussions at home that related to her science and technology learning at school. Her parents shared a high level of interest in the electricity topic with Philippa, observing that Philippa had ‘learnt a lot’ about the topic and that she was bringing her knowledge into her life (family survey term 1). Her parents reported having numerous conversations about renewable and non-renewable energy resources and that they had made an electrical circuit at home together. Philippa’s term 1 survey also indicated that her family had been ‘telling each other about what we know’ about electricity and ‘asking each other quiz questions’. These latter activities differed from her term 2 family activities, which were more closely related to the classroom tasks: gathering enclosure materials and making egg characters for a separate school fund-raising activity related to the egg...
topic (family survey term 2). While her family had engaged in conversation at home in relation to egg characteristics and hands-on tasks at school, her mum reported being more interested than either Philippa or her dad in the eggs topic. Philippa commented in a later interview that her mum really loved science when she was a student at school – ‘physics and chemistry and stuff’ – and that she now buys books about space to read at home, because she is fascinated by ‘all the interesting stuff’ that we don’t yet know about the Universe (September 2002 interview). In the same interview, Philippa indicated that if she was given the opportunity to complete a project with a mentor, she would choose space as her focus area because there remains so much for scientists to find out. She also had previously studied space in grade 4 and indicated that there was still a lot she wanted to know (November 2001 interview). It appears as though both her mum’s interest and her previous classroom-based learning about space at school were contributing to canalising Philippa’s interest in this area.

Jacqui mentioned her family context and activities outside of school only a few times in the course of the project and there was some indication that her family life at home with her dad and stepmum was sometimes tense (interview, 16/3/01). In term 1, she indicated that she was having difficulty creating her torch during the time allowed in class and that if she was unsuccessful, she intended taking it home, where her dad ‘might try and do it’ for her or her mum might ‘help a little’ (interview, 16/3/01). To her satisfaction, following the interview she did meet with success during class time. In term 2, Jacqui spontaneously talked with me before the start of that day’s science and technology lesson about trying an egg experiment at home after seeing it on a video shown in class (researcher field notes, 27/5/01). In the middle of talking with me about maths, she interjected, exclaiming ‘Oh, I tried that egg in vinegar experiment! But it got so smelly that my parents said I had to throw it out so I didn’t get to finish it.’ The only other time that Jacqui spoke about her home context in relation to her learning at school was when she mentioned in her grade 6 follow-up interview that she still had her torch that she had made in grade 5 in her garage at home (September 2002 interview). Jacqui returned her family survey for term 2, which indicated her own interest in eggs and egg-laying animals to be greater than her mum’s. While Jacqui had spoken about some of the class activities at home, they had not done anything related to the topic as a family (family survey term 2). Jacqui did not return the term 1 family survey.
It is evident from the data gathered that family contexts and out-of-school activities contributed in different ways to the students' experiences of interest in their classroom-based learning. For some students, most notably Eleni, the family context appeared to be highly important in their experience of interest and in canalising interest development. Some family contexts, such as Stephanie's, appeared to be more actively supportive than others in creating possibilities for interest development through making materials and experiences available to the children so that further exploration and engagement with ideas related to a topic could continue outside of school. For both Stephanie and Eleni, it appears to have been the case that when as children they displayed an initial interest in science and technology related areas, their parents responded in ways to support that interest in developing further, thus creating new ZFM/ZPA systems.

In each focus student's case, however, there was at least some family discussion of their learning at school in their home context. Most parents indicated relatively high levels of personal interest in the topics of investigation in their daughter’s class. Given that the age of these students was between 8 and 10 at the time of the study, it seems obvious that parents and also siblings would be significant in providing opportunities as well as constraints, both socially and in terms of material resources, which might foster the development of interest in a particular topic or domain.

7.4.3 Anticipating grade 6 and secondary school science and technology learning contexts

In interviews conducted with the focus students following the main phase of the project, I asked them to consider topics that they would like to learn about the following year in grade 6 (November 2001 interview). Subsequently, in the year following the main phase of the study when the students were in grade 6, I asked them to tell me what they thought science would be like during their first year of secondary school in the next year (September 2002 interview). Additionally, a couple of the students spontaneously raised career choice preferences during these two follow-up interviews. This section of the chapter focuses on how students were viewing their future learning related to science and technology.
The question that I asked in relation to students’ grade 6 topic choices did not limit them to topics that would specifically relate to science and technology as a learning area. I asked them to consider their response if one of the grade 6 teachers sought their advice on what topics they would like to learn about next year. It was interesting, therefore, to find that a number of the students indicated their interest in learning more about topics that were based in science and technology as a domain (Table 7.3). As the students discussed their choices, it was evident that they had an existing interest in and some knowledge about the topic selected, based on their out-of-school experiences, including in their family contexts, or based on previous classroom learning. These topics were ones about which they wanted to develop their knowledge or skills. A number of students indicated their interest in learning about nature or, more specifically, animals and this is consistent with most of the focus students retrospectively rating their interest in the grade 5 egg-laying animals learning unit more highly than the electricity learning unit (November 2001 interviews).

Secondary school science was anticipated positively by most of the focus students, who considered that it would be ‘pretty fun’ (Eleni, September 2002 interview), particularly because they assumed there would be more experiments (Michaela, September 2002 interview). Students who viewed secondary science positively indicated that having laboratories and special science equipment for conducting experiments would contribute to making science enjoyable in grade 7. Philippa emphasised that the laboratories would help them to do real science in secondary school, while Jacqui was anticipating doing ‘lots of science there, I know, ‘cause I’ve seen the science place’ (September 2002 interviews). Stephanie thought that secondary school science would be ‘Kind of fun but kind of hard’, with the fun related to doing completely new things in science, and the difficulty associated with her perception of everything changing from what she had done previously in primary school (September 2002 interview).
### Table 7.3

*Students' preferences for particular topics to learn about in grade 6*

<table>
<thead>
<tr>
<th>Focus student</th>
<th>Topic of interest for future learning</th>
</tr>
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<tbody>
<tr>
<td>Cathy</td>
<td>politics</td>
</tr>
<tr>
<td>Eleni</td>
<td>exotic animals *</td>
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<td></td>
<td>native Australian animals *</td>
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<tr>
<td>Jacqui</td>
<td>animals *</td>
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<tr>
<td>Michaela</td>
<td>orthodontists *</td>
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<td></td>
<td>animal communication *</td>
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<td></td>
<td>chemistry *</td>
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<tr>
<td>Stephanie</td>
<td>composition in music</td>
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<td></td>
<td>art techniques – sketching, painting,</td>
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<td></td>
<td>sculpting</td>
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<tr>
<td>Philippa</td>
<td>space *</td>
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<td></td>
<td>nature *</td>
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<td></td>
<td>ancient Egypt</td>
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</tbody>
</table>

*Note. Topics that are science and technology-related are marked with an asterisk (*).*
Cathy was noticeably more anxious about secondary science (September 2002 interview).

KP-K: With year 7 coming up, what do you think science is going to be like in the senior school?

Cathy: Um, I don’t know but I’m kind of scared of it, because I figure the senior school as, like, a big step ahead and it really matters on your grades up there. But here (in the junior school) it’s just kinda like warming you up for everything above. So I don’t get that scared. But in science, I think it might be a lot harder and you won’t exactly get choice.

Cathy had consistently rated science and technology as one of her favourite subjects during grades 5 and 6 and also had her enjoyment of and interest in the subject recognised by her teachers. In grade 6, she was one of a small group of students, including Eleni and Philippa, selected by the grade 6 teachers to participate in the Science Challenge, run by an external organisation. With two older siblings, it is possible that Cathy had spoken with them about science in secondary school and that this had contributed to her views on what science might be like in future years. From her comments, it also seems as though her anxiety related to the context of secondary school more broadly, rather than just to her learning in science classes.

Looking even further into the future, some of the focus students envisaged themselves pursuing science and technology related careers. More specifically, Stephanie indicated that she wanted to study a chemistry-related course at university (November 2001 interview), although later also raised the possibility of becoming an actor (September 2002 interview). Both of Michaela’s nominated future careers – as an engineer, like her dad, or orthodontist – were science and technology-based (November 2001 interview). Her interest in being an orthodontist, however, seemed to be related more to her potential income than to the actual work of a dental specialist! (November 2001 interview).
7.5 CHAPTER CONCLUSION

Chapter 7 has focused on six individual students’ participation within a classroom community and their experiences of interest in learning science and technology. Patterns of similarity and difference amongst the focus students have been reported in relation to their interest as observed in the context of their participation in classroom-based activities, in family contexts and as articulated by the students themselves. The multidirectional nature of interest development has been identified through consideration of students’ interest trajectories, which reveal fluctuations in students’ experiences of interest, more specifically from task to task within lessons, and more broadly within learning units. The ways in which interest is experienced as related to particular tasks, especially in terms of hands-on activities and collaborative tasks, have been discussed. Interest in particular topics and in the domain of science more broadly, along with students’ perceptions of the role of the teacher and peers in promoting interest development, have also been a focus. Factors identified with interest in students’ tacit personal theories of interest include fun and enjoyment, time, novelty, variety, challenge, choice and control.

The nature of the students’ interaction has been considered both within the classroom and beyond the school context, to contribute to consideration of processes of canalisation and self-canalisation in the contexts of communities of practice. The analytical usefulness of the sociocultural notion of ZFM/ZPA systems has been demonstrated through consideration of the constraints and affordances of particular learning contexts on students’ participation and interest development. Inferences have been made in relation to transformative internalisation of the values and meanings of particular communities of practice, based on externalisations of students’ interest in learning. The sociocultural notion of intersubjectivity also has been drawn upon, to enable consideration of processes of negotiation of shared purpose and meaning, as a context for the development of interest. Although not a focus of any of the research questions guiding the study, identity has arisen as relevant to the development of interest when considered from a sociocultural perspective.

The results reported in both Chapters 6 and 7 of the thesis are discussed in the following chapter.
CHAPTER 8

DISCUSSION OF FINDINGS

The findings of my research have emphasised the complexity of interest development in the context of children learning together in a classroom setting over time. Through considering the classroom as a community of learners, I have presented an analysis of the physical, pedagogical and social aspects which afford and constrain students' interest development. Sociocultural notions, such as canalisation and self-canalisation, an expanded concept of zones of development, internalisation and externalisation, intersubjectivity and connectedness, and identity have been drawn on to frame and interpret classroom activity and students' participation as interest develops. Consideration also has been given to students' participation in other communities of practice, in particular their families, to contextualise the development of their interest.

In this chapter, I discuss my research findings and the contribution of sociocultural theory to understanding interest and elaborating processes of interest development. I also highlight the ways in which my research findings have both supported and provided potential explanations for some of the characteristics of interest established in previous research, in which studies were based on alternative theories of interest and conducted using different methodological approaches. Limitations of the present study and directions for future research are presented in the final section of the chapter.

8.1 CANALISATION OF INTEREST DEVELOPMENT

One of the primary aims of the study was to investigate the role that the students' teacher and peers played in promoting and constraining the development of
interest in particular activities and when learning particular topics. To some extent, however, the data also revealed canalising factors within the focus students’ family contexts. Processes of self-canalisation also were evident in the data, particularly in relation to how students afforded and limited their own participation in specific classroom activities, and as they negotiated their identities as learners in the classroom community. While not as strongly supported by the data, inferences also were made about processes of internalisation and externalisation in reporting the findings of the study.

8.1.1 Key features of the learning units that contributed to canalising interest development

The findings of the study provided evidence for canalisation in relation to the learning activities of the classroom (Chapter 6). One of the features of the learning units that contributed to canalising students’ interest was the opportunity for student choice based on interest, which allowed for existing interests to be further developed. Inclusion of tasks that required students to work in small groups or with a partner also provided opportunities for new interests to emerge, as students interacted with their peers to establish and develop lines of thinking, exploration and activity. The teacher’s design of the learning units also valued and promoted certain ways of learning and knowing more highly than others. For example, inclusion of hands-on activities such as scientific investigations and design and make tasks in each of the units reflected the valuing of such learning processes by the teacher, and also were regarded as interesting by the students as evident in their interest trajectory ratings (sections 6.3 and 7.3). Other features of the classroom-based units which contributed positively to channelling students’ interest in learning included novel experiences, activities which connected students with communities and settings beyond the classroom (for example, the excursion to Taronga Zoo), opportunities to engage with real and meaningful issues (for example energy resource conservation and animal conservation) and the chance to work both collaboratively and individually (for example, section 7.3.4). The purposeful nature of tasks also appeared to contribute positively to fostering student interest, in that participation in on-going activities where one task led into or connected to later tasks was emphasised.
Seven initial instructional design principles were detailed in Chapter 4 (section 4.1), which guided the design of the two learning units in the main phase of the project. These instructional design principles were based on research literature relating to classrooms as learning communities (Bereiter & Scardamalia, 1993; Brown, 1997; Collins, 1998; Roth & Lee, 2006), as well as to motivation and interest research conducted in classroom contexts (Ainley, 2001; Bergin, 1999; Guthrie & Alao, 1997; Meyer & Turner, 2002; Mitchell, 1993; Paris & Turner, 1994). The findings of my study were supportive of the inclusion of these initial design principles in guiding classroom pedagogy, such that a classroom learning community promoting the development of interest was created. In section 6.2.3, evidence was presented in relation to the features of the learning units that contributed to developing a learning community supportive of interest development. The retrospective trajectory graphs charting students’ self-perceived interest (section 6.3) also revealed that students generally experienced interest in learning during each of the units. The implication for classroom practice is that use of these instructional design principles to plan future sequences of tasks should effectively contribute to the creation of a classroom-based community of learners that promotes interest in learning.

Following the project, three additional principles have been added to the seven initially proposed. The additional principles have emerged from the findings of the study. Each of these instructional design principles contributes to promoting the development of interest in learning. The additional design principles proposed are:

1. Lessons are planned by the teacher to include time for the students to play with materials and ideas.

2. The learning units are devised to excite the imagination, to create a sense of what could be and of possibilities in terms of the students developing their identities as learners.

3. The physical layout of the classroom is conducive to supporting collaborative and individual learning activities, with ease of student access to resources to encourage inquiry (for example, a computer with Internet access, books relating to topics being studied, classroom displays that promote questioning and investigation, materials to enable experimentation).
The first additional principle relates to my observations as a participant in the classroom, when I noticed the ways in which the students extended the exploration of ideas and materials along pathways that interested them when they were given time for free play following a more teacher-directed investigation. A particular example of this occurring was in the third lesson of the electricity unit, when a small group of students working together developed their own line of investigation to explore electrical conductivity (section 6.4.1). Possibilities for the development of interest were co-created as the students initiated and shared their own line of investigation. This principle relates to establishing a more open ZFM/ZPA system for students which promotes exploratory activity, whether collaborative or individual in nature, and which creates an opportunity for student-led interest to emerge, develop and motivate further learning. It follows from the emphasis that Dewey (1913) placed on the importance of play in relation to direct interest, when an object engrosses a child in terms of the value that is directly present. Play is seriously absorbing and pleasurable for children, reflective of social interest and brought about by stimulating situations (Dewey, 1913). Time needs to be provided by the teacher for such student activity to take place.

The second additional principle combines two aspects of interest that emerged in my research; firstly, the role of fantasy in creating interest (Bergin, 1999) and secondly, the importance of being able to envisage the potential pathways that being interested in a particular topic or domain might create in terms of identity as a learner. While the communities of learners literature emphasises the study of issues that are authentic to a subject domain (for example, Brown, 1997), my study also showed the way in which fantasy can enhance student interest through Ms Wheeldon’s use of the fictional Heathville Manor as the context for students investigating electricity and designing and making electrical products. In relation to the second aspect mentioned above, connections with communities of practice beyond the classroom enabled students to understand how the development of interest in a particular topic or domain could lead to their on-going participation in such communities. For example, the students’ interaction with the guest speaker, Alison, and with Russ the electrician in the term 1 learning unit provided them with insight into the different careers of two people with an interest in electricity, whose interest had been developed and pursued to become the focus of their work. Stephanie and Michaela were two students who identified science and technology-related careers as potentially interesting (section 7.4.3) and who clearly had begun to see science and technology as personally meaningful and relevant in the future lives that they envisaged. Additionally, both
Stephanie and Eleni made comments in interviews that indicated that an interest in science and technology informed their identities as learners (section 7.3.3.3). Creating opportunities for students to be able to envisage potential pathways for the development of their interest in a particular topic or subject domain thus is an important aspect of the design of learning units by the teacher.

The third additional principle acknowledges the importance of the physical aspects of the classroom environment in supporting a community of learners and promoting possibilities for the development of interest. The creation of a physical environment that was conducive to both collaborative and individual learning through the layout of desks in the classroom and the availability of spaces for class discussion and small group hands-on tasks was a factor that emerged as important in my research (sections 6.2.3.1 and 6.2.3.2). The interactive noticeboard that was developed in each of the learning units (for example, Figure 6.9) also provided a stimulus for students’ ongoing consideration of their questions about the focus topics. Ready access to materials to support investigations, both hands-on tasks and research tasks, also supported students’ abilities to further explore aspects of the topics in which they were interested. The importance of creating a physical learning environment that includes such features to support a classroom learning community where existing and emerging interests can develop is a further implication of this research.

Not all aspects of the learning units, however, were supportive of students’ development of interest. Lower ratings of perceived student interest were reported overall for class discussions, characterised by more limited possibilities for participation through a more restrictive ZFM/ZPA structure. It appears that while students may not have been as interested in their learning during class discussions, such discussion may have served other purposes within the classroom community, such as the negotiation of student identity (section 8.1.6) and establishing a greater sense of connectedness amongst the students and their teacher (section 8.2).
8.1.2 The roles of the teacher and students’ peers in canalising interest development

The findings of the study also demonstrated the roles that the teacher and students’ peers played as they interacted, that had a canalising effect on the development of interest. It was evident in my research that the classroom teacher, Ms Wheeldon, played an important role in the classroom learning community through guiding students’ involvement and structuring the possible ways in which students could participate. Ms Wheeldon contributed to canalising students’ interest development through being responsive and sensitive to students through her mutual involvement in their learning activities. Specific examples of when this was particularly evident were when Ms Wheeldon created time for class discussions to collaboratively solve problems that had arisen in students’ design and make activities (section 6.2.4.1) and research (section 6.2.4.2). She responded to the students’ body language, conversations and requests for assistance by restructuring a lesson to maintain student engagement and to support continued and deepening interest in the task of designing and making an electrical product so that the level of challenge suited students’ ZPDs. Ms Wheeldon also included tasks that enabled students to choose and develop a range of pathways for completion (for example, fair testing egg strength, section 7.3.2.1) which recognised and encouraged multiple possibilities for participation. She also included tasks which allowed for development of knowledge based on existing interests, such as when the students selected their own egg-laying animal to research and created questions that would guide the research (section 6.4.2). Some of the focus students also identified the ways in which the teacher could control how they would experience their learning about a topic (section 7.3.5). A further aspect of Ms Wheeldon’s guiding role related to her acknowledgment and provision of ‘space’ for resistance as a legitimate form of participation in the classroom community (Renshaw, 2003), particularly in relation to Michaela (section 7.3.5).

The importance of the teacher’s role in providing a model of an interested learner also has emerged in my study (sections 6.2.3.9 and 7.3.5). Non-verbal cues, such as body language and use of gesture, as well as articulations of her interest, were communicated to her students and provided them with a basis for their impressions of her interest in learning (section 7.3.5). Roth (1998) claims that, ‘I believe that all students can get excited about learning when they see their teachers excited about
learning … my enthusiasm for learning may be the most important “secret” of my teaching’ (p. 302). The focus students’ perceptions of Ms Wheeldon’s interest in science and technology topics and her involvement in the classroom learning community were evidence of a sense of connection between the teacher and students that contributed to emotional intersubjectivity. The students’ observations of their teacher’s interest appeared to scaffold the possibilities for their own development of interest and their enjoyment of the learning process. Long and Hoy (2006) drew similar conclusions following their investigation of teacher interest in a high school context, with demonstrations of teacher interest positively associated with student motivation and learning. They further distinguished between cognitive, affective and conative dimensions of teacher interest (Long & Hoy, 2006), which could be used to frame the students’ perceptions of Ms Wheeldon’s high levels of subject matter knowledge, her valuing of and responsiveness to their own learning needs, her enthusiastic gestures and comments in the classroom, and her effort, persistence and sense of humour.

Other research also has included a focus on the role of the teacher in supporting or scaffolding interest development (for example, Lipstein & Renninger, 2006). My study is able to provide illustrations from classroom practice that complement Blumenfeld et al’s (1992) observations of teaching and the nature of science tasks. In identifying practices that enhanced students’ interest and the perceived value of the content of the task, Blumenfeld et al (1992) characterised such practices in terms of ‘bringing the lesson to the students’ or ‘bringing the students to the lesson’. In my findings, there are examples of practices that fall into each of these designations, as reported in the narrative accounts of lesson episodes. For example, the fair tests of egg strength (section 7.3.2.1) provided an opportunity for the students to learn, enhancing their interest and value (‘bringing the lesson to the students’). The class discussion about Russ’s email responses to students’ questions (section 7.3.1.1), on the other hand, prompted the students to think about the material incorporated in his reply. Conversation amongst students and their teacher supported the children’s reflection and helped them to make connections amongst concepts and previous experiences (‘bringing the students to the lesson’). Sections 6.2.4 and 7.3.5 in the previous findings chapters focused specifically on the role of the teacher in enhancing and modeling interest in learning. In their theorising about interest development, Todt and Schreiber (1998) asserted that specific active interests emerge when social emotional aspects, such as teacher fairness and respect, and methodological-didactic aspects, such as well-structured presentation and variation in teaching, are evident.
The findings of my study support Todt and Schreiber’s (1998) assertions, particularly evident in the students’ comments about Ms Wheeldon’s interest in learning and teaching, as well as in the analysis and interpretation of narratives of key episodes from the classroom. While Paris and Turner’s (1994) theory of situated motivation focuses on motivation more broadly, the characteristics of academic tasks identified – choice, challenge, control and collaboration – are supported, specifically related to interest, in my classroom-based research. By considering the ways in which the presence of such characteristics in learning activities constrain and promote the development of interest, framed through the notion of canalisation within ZFM/ZPA systems, my research has related choice, challenge, control and collaboration more specifically to interest as a motivational construct.

The students’ peers also had an important canalising role in both supporting and limiting the ways in which interest might develop in the classroom community. The social nature of interest in learning as it is created and canalised in small group interaction was highlighted in section 6.4.1, through focusing on the way in which three students developed a particular line of inquiry into electrical conductivity as they negotiated and developed a shared focus of interest. The students’ initial participation in this small group exploratory task was characterised by argumentation in an attempt to clarify the task, which blocked and limited the possible pathways for interest to develop amongst the group’s members. Once the teacher-set task had been completed, however, a suggestion from one of the students to further test electrical conductivity re-established a common focus for their collaborative investigation. This suggestion opened up the possibilities for participation and a sense of connectedness amongst the students, and promoted the potential for interest to be co-created and pursued. These students continued their investigation along this line of interest, sharing and developing their own individual interest in the activity as they worked together in a socially and physically affording context. This key episode selected from the findings demonstrates how interaction with peers can both limit and promote opportunities for interest development, channeling interest along particular pathways as group members negotiate their participation in completing a specific task.

The findings of the study also revealed that the students varied in their preferences for working collaboratively or individually, and that this was related to their experiences of enjoyment and interest (section 7.3.4). Some students reported
experiencing greater enjoyment of and interest in learning when they worked with peers whom they had chosen themselves. Other students indicated that they experienced interest and enjoyment working individually or with peers, but that it was the nature of the task which determined their preference. Sharing ideas with others and achieving more within the time allocated for task completion were aspects of working in a group which could support interest development. Disagreement amongst group members that hindered progress or dominance within a small group by one student were factors identified which could hamper the development of interest. The study's findings showed, however, that if the task characteristics were strongly supportive of developing students' interest, this could overcome some of the limitations of working with an argumentative group member. Students' planning of their own zoo excursion route was an exciting, novel task that allowed for choice and promoted decision-making that would determine their own experiences during the field trip (section 7.3.4). Although the other focus students experienced frustration in working with Michaela, who attempted to block the decision-making process, their interest in the task remained strong.

8.1.3 Students' family contexts and interest development

The ways in which children’s parents and other family members contribute to canalisation of interest also were considered in the findings of the present research. How parents valued classroom-based learning, both in terms of the content and the processes of learning, had a canalising effect on the focus students’ experiences of interest (section 7.4.2). The connections that children made between their learning outside of school and their school learning were strengthened when their parents created particular ZFM/ZPA systems by providing social and material support. The parents of the focus students indicated fairly high levels of personal interest in the focus science and technology topics that the students were studying during the research project. It also was evident that in some students’ cases, particularly Eleni’s, there was equipment available at home that could support their learning at school. The students also were creating meaningful contexts for their classroom-based learning through connecting tasks with their home environments, particularly evident when they made electrical products. The family context thus also was contributing to self-canalisation processes.
Previous research into families and children’s interest development has mainly focused on the early interests of young children (J. M. Alexander, et al., 2008; Johnson, et al., 2004; Leibham, et al., 2005; Lightfoot, 1988; Renninger & Leckrone, 1991). The findings from my study indicate that the family context continues to play an important role in channelling children’s interest in later childhood. This is an aspect of the study which could be further investigated in future research (section 8.6).

8.1.4 Canalisation more specifically within ZFM/ZPA systems

The findings of my research have demonstrated the ways in which ZFM/ZPA systems can be created in the classroom so that they offer students limited choices for participation (for example, the class discussion, section 7.3.1.1), structured choice (fair testing egg strength, section 7.3.2.1) or more open and flexible possibilities for participation (for example, the zoo field trip, section 7.4.1). The affordances for and constraints on participation in specific tasks provided both opportunities for and limitations on interest development along particular pathways. It was generally the case, however, that the students reported stronger interest when ZFM/ZPA systems were more open and thus offered them greater choice and control of their learning. In such open tasks, students were given choice in regard to content, but within the broader context of the learning unit so that the choice was meaningful; an example is the activity where students collaboratively devised the focus questions that would guide their research into an egg-laying animal of their choice (section 6.4.2). Tasks in which there were more open ZFM/ZPA systems also were characterised by multiple pathways for task completion, so that there was the possibility of creating or pursuing and developing interest, whether students were working collaboratively with peers, or individually.

8.1.5 Self-canalisation and interest development

The notion of self-canalisation was drawn upon in the findings to analyse the role of the individual student in both promoting and limiting her own opportunities for interest development. By considering self-canalising factors, the agency of the individual was highlighted. Specific examples of self-canalising factors included Stephanie’s views of herself as being into science and technology (sections 7.3.3.3 and
7.4.2) and Philippa’s perception of novelty as related to interest (section 7.3.6); in each case, the student’s beliefs about themselves as learners positively oriented them to experiencing tasks in ways that could support the development of interest.

The distinction between canalisation and self-canalisation processes was particularly evident in the case of Cathy talking about her interest in visual arts (section 7.3.5). The canalising force of the teacher was negatively impacting Cathy’s interest in art in her school context, however Cathy’s interest in art was sufficiently developed for her to be able to distinguish that she still liked the subject. The personal meaning and value of art for Cathy had a self-canalising effect on her interest, such that the present context in which she was learning art at school did not affect her overall interest in the domain.

Self-canalisation appears to be a process that contributes to explaining the interrelationship between identity and interest. During interviews in the main phase of the study, for example, Michaela consistently ranked science and technology as one of her least favourite subjects and expressed a lack of interest in the focus topics. At this time, Michaela saw herself as not being interested in science and technology and this negative self-perception was contributing to the way that she participated in class activities in this subject. She was observed as off-task or resistant on several occasions during the project (for example, section 7.3.4). An explanation for such participation is that her lack of identity with the subject was having a self-canalising effect, in that it was limiting possibilities for her involvement and the potential for interest to develop. It was as though she was thinking, ‘This is science and technology and that’s not me’. Michaela’s interest trajectories (Figures 7.1 and 7.2), however, indicate that her interest was not consistently low, and she did experience variations in her interest while learning about each of the science and technology topics. Tasks which were personally meaningful and relevant, such as making a torch that she could use on a camping trip with her dad (section 7.4.2), were reflected in peaks in her interest ratings. It appears that such tasks had the potential to provide a ‘hook’ for Michaela in developing her interest in science and technology, and in challenging her self-perception of not being interested in the subject more broadly. As long as she perceived herself as being interested in some of the science and technology tasks, she could envisage the possibility of her becoming someone more interested in science and technology as a domain.
8.1.6 Identity and interest development

While not a specific focus of the guiding research questions for the project (section 4.4), the findings of my study have highlighted some of the ways in which students have expressed their interest in learning in on-going classroom activities that have suggested a relationship between interest and identity. In contrast to Michaela, both Stephanie and Eleni made statements that indicated that their interest in science and technology was a defining component of their identity as a learner. Eleni’s own perception of her learner identity as strongly based in science and technology was reinforced by her teacher and her peers recognising her as a relative expert in the topic of electricity (section 7.3.1.1), her selection to participate in the Science Challenge in grade 6 (section 7.4.3) and her mum’s view of science as ‘her thing’ (researcher field notes, 22/8/02). Within the interest literature, Hannover (1998) asserts that ‘people develop interest in order to define who they are and to communicate their identity to others’ (p. 108). Although Hannover (1998) does not define identity from a sociocultural perspective, instead essentially equating identity with self-concept, her argument that ‘interests are developed according to the degree to which they help us define ourselves and to communicate our identity to others’ (p. 114) is consistent with some of the statements made by Stephanie and Eleni (section 7.3.3.3) in my study.

Focusing on identity also places emphasis on the person within a sociocultural theory of interest, whereby ‘identity is the vehicle that carries our experiences from context to context’ (Wenger, 1998, p. 268). Interest is increasingly attributed to the individual through their externalised actions and language, as was the case for the focus students at different stages in my project (Chapter 7). Through their participation, the individual students had opportunities to increasingly identify with the content and context of the interest. In the initial stages of participation, there was the potential for an emerging value and identification with the object of interest. Through ongoing participation, valuing and identification with the object of interest became stronger and marked the development of interest, as Renninger (2009) similarly describes.

From a situative perspective, Nolen (2007) also has associated identity and interest, claiming that in her classroom-based research, ‘The motivational properties of autonomy, creative control and interest can be seen as in relation to that community and the children’s identities in it’ (p. 262). I further extend this comment by suggesting
that in considering interest within communities of practice, value and identity also need to be understood in relation to canalisation and self-canalisation processes. For Eleni, her valuing of science and technology related activities was being channelled in supportive ways both through her participation in her classroom community and in her family context. Both communities of practice were contributing to her identity as a relative expert in science and technology topics. As Eleni internalised the values and the identity that were being created and reinforced for her through her participation in these communities of practice, there was a self-canalising effect. Eleni saw herself as being capable and knowledgable about science and technology, which oriented her towards confidently selecting and eagerly participating in related activities, which contributed to her interest developing further in this subject.

From a sociocultural perspective, the concept of negotiation of identity is important. The contribution and validation of others (McCaslin, 2009) in constructing an individual as interested, as well as an individual’s own efforts to create an identity as someone interested in science and technology or a particular topic or task within the domain, needs to be considered. While the students in the present study generally reported experiencing less interest when participating in class discussions (section 8.1.1), it appears as though such discussion could be a key element in contributing to the negotiation of identity. Class discussions provide opportunities for students to express their developing interests, so that their teacher and peers gain insight into how and what they are thinking about, or what they are doing, in relation to a shared focus topic, issue or problem. There is negotiation of a student’s developing identity as an interested learner in this process, in that whether, and then what, the student chooses to externalise contributes to how they are perceived by the other members of the classroom community. At the same time, the feedback given to the student by other community members, which may value, disregard or attempt to redirect the student’s expressions of interest, contributes to how the student’s identity as an interested learner develops.
8.1.7 Internalisation and externalisation processes

The process of internalisation and externalisation appears vital to explaining how interest shifts from having social origins to becoming increasingly associated with the individual, and the identity of the individual. The data gathered in support of internalisation and externalisation processes is not as strong as for canalisation, partly because of the more limited data gathered through strategies devised to capture students’ reflection on the learning process (section 6.2.3.7). Students’ written reflections often were not as detailed or developed as initially anticipated. From observations of students’ on-going participation in classroom-based activities and from interviews with focus students, however, it is apparent that both content and processes of learning that are valued within a community become transformatively internalised by individuals. When later externalised through expressions and articulations that can be recognised as interest, or a lack of interest, individuals contribute to shaping the dynamic, evolving practices and values of that community.

A sociocultural perspective draws on a transformative, bidirectional conceptualisation of the process of internalisation and externalisation (Valsiner, 1997c) to explain how interest develops from initially being strongly connected to social contexts to being increasingly identified with the individual. An example from my study is when each student selected an egg-laying animal in which they were interested, on which to conduct a research investigation in the classroom, which then guided their focus on the zoo excursion and the model that they made as a part of the class zoo enclosure design and make activity (section 6.2.2). The bidirectionality of the internalisation and externalisation process enabled the individual to both contribute to and learn from the social activity in which development is situated, while the transformative character of the process emphasised the agency and autonomy of the individual. Internalisation of possible objects of interest, of ways of experiencing and expressing interest and of valuing activity, is therefore selective and constructive. Externalisation also is an active process, by which the individual expresses interest in interaction with others in particular social contexts.
8.2 CONNECTEDNESS AND INTERSUBJECTIVITY

Evident in my findings were three aspects of a sense of connectedness that contributed to students' experiences of interest and opportunities for interest development. Two of these related to interpersonal relationships within the classroom: firstly, a student's relationship with her teacher and secondly, a student's relationship with her peers. In each case, a sense of connectedness between people creates possibilities for the development of intersubjectivity, or a sense of shared purpose and meaning, as discussed in Chapter 3.

The focus students generally had a sense of connection with Ms Wheeldon. This connectedness was reflected in their positive perceptions of Ms Wheeldon's interest in science and technology (section 7.3.5), which was affectively communicated to them through her enthusiasm during lessons, her body language and her facial expressions. There was evidence of Ms Wheeldon's expressive responses to students' learning scaffolding their own interest during classroom activities, especially in the cases of Stephanie and Jacqui. Students had positive perceptions of Ms Wheeldon's control over their classroom learning activities, with the exception of Michaela, whose perceptions of Ms Wheeldon changed during the course of the year. A sense of connection between Ms Wheeldon and Michaela seemed to take longer to develop than was able to be discerned in the main phase of the study. There was evidence that Michaela's interest in science and technology became stronger in terms 3 and 4, when her relationship with Ms Wheeldon became stronger and she felt a greater sense of connection, in terms of personal meaning and relevance, to the focus topics.

The importance of a sense of connection with the teacher as a factor supporting interest development was apparent in my study. When there was a lack of connection with a teacher, the focus students' interest in the domain of visual arts was negatively affected (section 7.3.5). The students' rankings of visual arts as one of their least favourite subjects were related to a change in teacher to one whom they perceived as not wanting to teach them because she shouted all of the time. As Stephanie commented, 'the teacher really does make a difference' (section 7.3.5).
A student’s relationship with her peers was another aspect of a sense of connectedness which related to the potential for interest in learning to develop. Some of the focus students, such as Stephanie, expressed a preference for working in small groups with friends, with whom she had already established relationships and with whom she felt connected (section 7.3.4). Eleni also identified small group work as providing opportunities for new interests to develop because of information a peer might have that was different from what she had found by herself. For other students, such as Jacqui, working with friends such as Michaela could limit possibilities for interest to develop, because of Michaela’s dominant status and frequent off-task behaviour when they worked together.

The third aspect of connectedness evident in my study relates to the connection a student has with the classroom activities, in terms of personal relevance and meaning. For Michaela, this sense of personal relevance and meaning was usually evident in relation to her experiences beyond the classroom, as previously discussed in section 8.1.5. Personal relevance and meaning arising from students making connections across communities of practice in which they participated also was evident for other focus students (section 7.4) and related to their interest in learning in the classroom. There also was evidence, however, of relevance and meaning being created by students across activities within the classroom community, which was supported by the teacher emphasising connectedness between the tasks within the learning units. For example, the students selected an egg-laying animal on which to conduct research, then devised the questions that would guide their research, and designed and made a model of a zoo enclosure for the animal that they had selected, incorporating the findings from their research and information gathered during their excursion to Taronga Zoo. The starting point in this learning sequence was the personal selection of an animal, based on each student’s interest. The subsequent activities built from an existing interest as the starting point and provided opportunities for students to increase their knowledge about the animal, which also created possibilities for developing their existing interest. This was observed in the case of Cathy, for example, who indicated that she would have chosen to engage in the task of designing and making her enclosure more often than the class timetable allowed, such was her excitement for this activity (7.3.3.1).
8.3 PATTERNS OF INTEREST DEVELOPMENT

Interest trajectories revealed patterns of interest development through consideration of class mean trajectories (Chapter 6), at the same time as enabling insight into individual students’ perceptions of their interest (Chapter 7), to reflect similarities and differences in their experience of interest within the same sequence of classroom activities. Peaks and troughs in experiences of interest were evident at both class and individual student levels, and such patterns support the multidirectional nature of interest development (Hidi & Renninger, 2006). On an individual level (section 7.3), some students expressed their experience of interest as having more extreme variations (for example, Michaela) while others experienced their interest as more consistent within their learning of a particular topic (for example, Eleni).

In considering focus students’ retrospective interest trajectories and statements made in interviews, the data from my study support the claim that students may experience interest in specific tasks, interest in particular topics and interest in subject domains more broadly (section 7.3.3). This analysis supports previous research conducted by Hoffmann (2002), who identified that an object of interest can relate to the content of learning but also to the types of activities involved and the context associated with the learning. My study illustrates the importance of the context of the task and topic in relation to the experience of interest for individual students. I have drawn on the notion of self-canalisation to explain how students with an interest in a subject domain may be positively oriented towards all tasks and topics that are associated with that domain, whereas students whose learner identities are not defined by the context of a particular domain may be more interested at the level of specific tasks or topics.

8.4 FINDINGS FROM MY RESEARCH AND PREVIOUS STUDIES OF INTEREST

Although my study was conducted within a theoretical framework and using a qualitative approach that differed from most previous studies of interest, many findings in relation to the characteristics of interest as a motivational construct were similar. For example, interviews with students and classroom observations captured the affective component of interest (Hidi, et al., 2004), and emphasised the importance of
meaningful participation (Mitchell, 1993), value and personal meaning in the development of interest (Ainley, 2001; Hidi & Renninger, 2006; Renninger, 2000; Schiefele, 1991, 1998). The focus students' emerging, tacit theories of interest (section 7.3.6) shared aspects such as enjoyment, involvement and increased concentration in common with studies of text-based learning contexts (P. A. Alexander & Jetton, 1996; Hidi & Anderson, 1992; Krapp, et al., 1992; Schiefele, 1991; Schiefele & Krapp, 1996; Tobias, 1994; Wade, et al., 1993) and novelty, challenge and attention demand with Chen et al's (2001) study of situational interest and its sources. Bergin (1999) further emphasises the importance of humour in creating situational interest, which was evident in my own research particularly in the lesson when egg strength was demonstrated (Figure 6.7) and students reported feeling very interested (Table 6.4, task 5). When students in my study spoke about their interest, it also was related to first hand experiences, such as fair testing, design and make tasks and excursions, as well as to prior experiences and opportunities to marvel. Hoffmann (2000) identified similar dimensions in his intervention designed to interest boys and girls in learning physics. Furthermore, Rathunde's (1998) definition of interest as the coordination of affect (enjoyment and positive feelings) and cognition (relevance and meaning) is also reflected in my study's findings, both in relation to observations of students' participation and through self-report measures.

8.4.1 The Four Phase Model of Interest Development and a sociocultural theory of interest: Potential for elaboration, points of similarity and difference

A sociocultural perspective emphasises different processes of interest development to the Four Phase Model of Interest Development (Hidi & Renninger, 2006), such as canalisation and self-canalisation, internalisation and externalisation, and a definition of identity that relates to participation in particular communities of practice. Drawing on sociocultural notions enables elaboration of some of the aspects of the Four Phase Model, while also presenting alternative explanations for other aspects. Here, I draw on my findings to illustrate how such elaboration is possible.

The notions of canalisation and self-canalisation can contribute to explaining how shifts from external to internal support are necessary for interest development and that interest development is unlikely to occur in isolation (Hidi & Renninger, 2006). This
is particularly evident in my study in relation to the trajectory graph data (Figures 6.12 and 6.13; Figures 7.1 and 7.2). Certain types of tasks were more likely to result in peaks in interest, such as hands-on tasks (fair tests and design and make activities) and field trips. It could be argued that most students were in the first two phases of interest development as described by Hidi and Renninger (2006), because of the way in which the characteristics of the tasks in the classroom could be related to situational interest. For Eleni, however, her interest across tasks fluctuated very little when learning about the two science and technology topics (Figures 7.1 and 7.2). When other data also is taken into account, it could be argued that Eleni’s interest in the domain was more highly developed than that of other students in the class. Greater consistency in Eleni’s self-reports of her experiences of interest could be interpreted as there being fewer contextual canalising processes and greater self-canalisation, the latter positively orienting her to all science and technology tasks and topics. Both canalisation and self-canalisation processes appear important to understanding the development of interest through the four phases identified by Hidi and Renninger (2006), although it seems likely that the impact of self-canalisation increases in the latter two phases.

In the process of conducting my research, two further questions have arisen in relation to canalisation and self-canalisation that could contribute to explaining shifts from one phase to another in Hidi and Renninger’s (2006) model. Firstly, there is the question of whether there are points in the processes of canalisation of interest development at which self factors are stronger than social factors, assuming that interest is social in origin. Secondly, if this is the case, then could this be where new pathways for interest development are created or envisaged? From my research project, Michaela’s involvement in designing and making her electrical product could be used to illustrate this possibility (Pressick-Kilborn & Walker, 2002). In the broader context, Michaela frequently claimed to be uninterested in science and technology in the main phase of my study. This was despite her peers experiencing interest, as evident in their self-reports and from my classroom observations, and her teacher designing class tasks that were aimed at scaffolding interest development. When the task of designing and making an electrical product was introduced to the class, however, Michaela was visibly excited and subsequently became positively and actively engaged as she worked with her friends to make a torch. She had selected a torch so that she could use it on an upcoming Dads and Daughters’ camp, plus it was also a hands-on activity of the type that she enjoyed. It could be argued that initially,
self factors were stronger than social factors for Michaela in her being uninterested in science and technology lessons, but that making a torch for the camp had a social meaning beyond the classroom that contributed to triggering Michaela’s interest in the lesson activity. From here, the real social context in which she could use her torch in the future contributed to canalising her interest. The task took on a personal meaning such that self factors began to strengthen over the social again and created a new pathway for Michaela’s development of interest. Michaela both valued and cared about this task, and its successful completion.

The notion of transformative internalisation and externalisation also can contribute to elaborating the relationship between situational and individual interest, the constructs on which the phases of the model are based. Internalisation and externalisation appears to occur within each of the four phases and this highlights the personal dimension of situational interest, in a similar way to which Fink (1995) has previously emphasised the situatedness of individual interest. From a sociocultural perspective, the individual identifies with and internalises interest at some level during the situational phases of interest development. Identification and internalisation, and subsequently externalised expressions of interest, become stronger in the latter two phases of individual interest development. In creating this argument, I am suggesting that situational interest has a stronger personal component than previously recognised (Hidi & Renninger, 2006). An example from my study which illustrates this claim is the students’ interest in the task of generating the questions that would guide their egg-laying animal research (section 6.4.2.1). An initial analysis of the activity could be made in relation to situational interest. The features of the task, such as the snowballing technique for grouping the students and narrowing the range of questions, were supportive of the creation of situational interest for the students. The personal meaning of the task, however, in relation to the importance of the final question selection in guiding their own research about an egg-laying animal of their choice, also is an important feature of this activity. I argue that when we consider a task not in isolation but as contributing to on-going activity in communities of practice, the personal component of situational interest is more significant.

Through their participation in both classroom and family communities of practice, the individual increasingly identifies with the content and context of the interest. I suggest that in earlier phases of interest development, there is emerging
value and identification with the object of interest. In these early phases, this object of interest is something which is valued and promoted as being a suitable focus of interest within the community of practice. The individual observes other members of the community who are interested in the same object and joins in community activities with other interested individuals. By participating in the ongoing activities of the community of practice, the individual begins to internalise the values of the community and also contributes to ongoing changes in the activities and values of that same community. In the latter phases of interest development, the individual increasingly identifies with the object of interest and describes her interests in relation to that object, in terms of her identity. Statements made in my study by Stephanie such as ‘I really love chemistry, it’s like a passion for me’ (section 7.4.2) are indicative of well-developed interests that have become internalised and contribute to Stephanie’s identity as a learner.

8.5 METHODODOLOGICAL CONTRIBUTIONS OF THIS RESEARCH

Consistent with sociocultural theory, my research project has placed emphasis on the importance of studying interest in real life contexts over time, as learners engage in authentic activities. Data were gathered from the students directly through interviews and self-reporting strategies, as well as through participant observation in the classroom and conversations with the classroom teacher. In this way, methodological triangulation was achieved through gathering data at the same time point using multiple strategies. The diverse data that resulted subsequently contributed to the writing of the narrative accounts (Chapters 6 and 7). Individual self-reports of interest gathered through the retrospective trajectory task could be considered in conjunction with observations of students’ participation in classroom activities more broadly, and observations of and individual interviews with the focus students more specifically. Considering all sources of data provided information that enabled explanations of why students may have reported fluctuations in their experience of interest in relation to specific activities within a lesson (sections 6.3 and 7.3). Patterns emerging in focus students’ interest trajectories considered in conjunction with analysis of their interview data also contributed to developing their tacit personal theories of interest (section 7.3.6) which has implications for processes of self-canalisation.
To gain richer insight into how interest may change and develop over time, data also was gathered over multiple time points. This enabled backtracking during stages of analysis, so that data gathered at one time point could be contextualised with data gathered at other stages in the project. Conversations with the classroom teacher provided another perspective on students’ participation, as well as on the process of refining and modifying the learning units as they were being implemented, in response to students’ involvement. More broadly, focusing on the social interaction and participation of students within a classroom-based learning community and considering more specifically the participation of individual students reflected methodological foregrounding of the classroom community plane, the interpersonal plane and the intrapersonal plane (Rogoff, 1998) whilst considering the total activity. This is consistent with the notion of inclusive separation of the individual and the field of participation (Valsiner, 1998); while one of the planes may be in focus, the others remain in view. Interest, therefore, is regarded as not separate to learning but as integral to the process of learning.

The use of narratives of key episodes from the classroom to create a context for analysis and interpretation of student participation and interest development also has made a distinct contribution to the reporting of findings in interest research. Renninger and her colleagues (for example, Lipstein & Renninger, 2006; Renninger, et al., 2002) previously have developed profiles, or portraits, of students to illustrate aspects of their interest which contribute to them being characterised as having less-developed or well-developed individual interests, or as being in one of four phases of interest development. In a similar way, the narratives written and included in my research provide a context for incorporating key notions of sociocultural theory in analysing and interpreting students’ development of interest.

The qualitative methodological approach taken in my research also has contributed to emphasising some of the key aspects of interest that Dewey (1913) identified almost a century ago. The importance of the process, or means, in giving significance, value and meaning to the end was acknowledged by Dewey (1913). My design of a classroom study has focused on gathering qualitative sources of data over a longer period of time than many quantitative studies of interest. As a result, my research has emphasised the development and interconnectedness of activities that Dewey (1913) regarded as important in his notion of interest. My study has considered
interest in the context of real activities relevant to the child’s ongoing experiences, in which the students have seen other people's interest, and had opportunities themselves to participate in enduring activity (Dewey, 1913). Dewey (1913) argued that such participation is what enables children’s interest to grow, change and gain personal significance.

8.6 LIMITATIONS OF THE CURRENT STUDY AND DIRECTIONS FOR FUTURE RESEARCH

In this section, I discuss limitations of the study created by my presence as a solo researcher in the classroom, the length of time spent in the field and the nature of the participating class. Implications for future research that arise from my study are identified in relation to each of these limitations. Suggestions for future research thus focus on how the sociocultural theory of interest proposed in this thesis could be refined and further developed through conducting research in other contexts, with participants from varying backgrounds. Extending the focus beyond interest to incorporate other motivational constructs is identified as another pathway for future research, in considering the potential for sociocultural theory to contribute to understanding motivation more broadly. Finally, I suggest that clearer articulation of the distinction between theories of motivational change and of motivational development could contribute to clarifying the nature of interest development.

For this type of qualitative, classroom-based research, teams are needed for the most effective conduct. Participating in the classroom-based research context as a solo researcher created limitations on the data that could be gathered. There was some involvement from a research assistant, who volunteered to assist with videoing classroom interaction during term 1, and some conversations with the classroom teacher which positioned her more as a co-researcher than as a participant in the study. There also were regular discussions with my doctoral supervisor and other researchers which contributed to my analysis and interpretation of the field data gathered. For the most part, however, I was collecting data and analysing it as a single researcher. As a result, I could not always observe or capture the interactions and details of the participation of the six focus students in every activity. This created limitations on the data that it was possible for me to collect. The creation of research
teams to conduct classroom-based motivation research (for example, McPhail, et al., 2000; Turner, et al., 1998) appears better suited to this style of field project, to more fully capture the complexity of interaction amongst students and their teacher as they participate in a range of activities, as well as to offer a range of perspectives during the process of analysing and interpreting data. Use of particular strategies for gaining insight into grade 5 students' perspectives also emerged as being more effective than others in gathering relevant data. In particular, the charting of trajectory graphs of perceived interest was effective, while written reflection was usually not in sufficient depth to contribute meaningful data. Wenger (1998), however, emphasises the role of reflection in educational imagination, in being able to envisage oneself as a future learner. Reflection also is one of the key activities in a community of learners (Brown & Campione, 1996). Scheduling time for reflection may thus be regarded as important in future research where the relationship between interest and identity is investigated further.

Although my study was conducted over a longer time period than many of those reviewed in Chapter 2, the main phase of the project was limited to six months in a classroom with the same teacher and the same class members. There appear to be benefits in following a group of students over a longer time period, to gain greater insight into canalising factors in their interest development, as they learn with different teachers in different classroom contexts. Nolen (2007) has demonstrated in her research on young children's motivation to write that longitudinal studies can provide powerful evidence of the importance of understanding motivational development in relation to specific contexts. Research studies of interest need to continue to gather data in relation to community, interpersonal and intrapersonal planes of activity in order to gain a complete picture of interest development. Such studies should continue to explore relationships amongst various aspects of sociocultural theory, such as identity and value, and internalisation and externalisation processes, as they relate to the development of interest.

The participants in the present study were girls, who were mainly from middle class families, attending an independent, single-sex, fee-paying school. While I maintain that a study of interest needs to involve students who are interested in learning, to further develop the sociocultural theory of interest that has been proposed and advanced in this thesis, different groups of learners studying other subject domains
The role of family members and, more broadly, other communities of practice in children’s interest development is an aspect of my project that could be developed in future research. The perspectives of parents were limited to the Family Conversation surveys in the present study, yet it was evident from interviews with the focus students that their families were an important context for interest development. Considering children’s interest and family context at various ages – prior to starting school, in the early and later years of primary schooling, in secondary school and even in the years post-school – could contribute to increased understanding of the ways in which families contribute to canalisation and self-canalisation processes. The studies of Johnson, Leibham and J.M. Alexander and colleagues (for example, J. M. Alexander, et al., 2008) into home and family contexts and interest development of young children, provide a basis for research that could develop in this direction and extend the focus on the roles that families play in motivation development beyond the early childhood years (Vauras, Salonen, Lehtinen, & Lepola, 2001). Furthermore, a sociocultural conceptualisation of interest could provide further insight into families and interest development. For example, Lightfoot’s (1988) analysis of a child and mother provides an example of how a sociocultural perspective can potentially contribute to understanding the negotiation processes and intersubjectivity between a parent and child who are involved in a task of mutual interest.

Another potential area for future research is to extend the focus on interest to incorporate other motivational constructs, to focus more broadly on motivation development. Most recently, a study by Harackiewicz et al (2008) has provided an
example of how research is moving in this direction, in that more than one motivation construct – in this case, goals and interest – is investigated within the one project. Another example is provided by Hidi and colleagues (Hidi, Ainley, Berndorff, & Del Favero, 2006; Hidi, Berndorff, & Ainley, 2002), who have conducted research examining interest and self-efficacy through an intervention study focused on children’s expository writing. Furthermore, Sansone and colleagues (Sansone & Harackiewicz, 1996; Sansone & Smith, 2000; Sansone, et al., 1999) have studied relationships between interest and self-regulation, while Ainley and Patrick (2006) have examine self-regulated learning, goals and interest within the same study, and Renninger, Bachrach and Posey (2008) have considered relationships between interest, goals and self-concept of ability. None of these studies was conducted from a sociocultural perspective. It is suggested, however, that an alternative theoretical framework could further contribute to conceptualising relationships amongst motivation constructs, through emphasising dynamic, bidirectional transactions between individuals and particular social contexts, and drawing on key sociocultural notions (Chapter 3). As sociocultural theories conceptualise the relationships between the individuals and context differently to some other approaches to studying motivation in context (Pressick-Kilborn, et al., 2005; Volet & Jarvela, 2001) by blurring the boundaries between the individual and the social or situational, such a perspective has the potential to making a unique contribution to understanding motivation development, as Hickey (1997), Hickey and McCaslin (2001), Walker (In press) and Walker et al (In press) have argued theoretically. In the light of such recent theorising, the challenge is to continue to design field-based research studies that explore the relationships amongst motivational variables framed from a sociocultural perspective.

Finally, MacCallum (2007) has raised the question of whether theories of motivational development are actually theories of development or whether they are theories of change. In this thesis, I have used the term interest development to contextualise my research in the interest literature more widely, where reference is to development rather than to change. I have found Rogoff’s (2003) conceptualisation of development as multidirectional and involving a range of potential, desirable endpoints both useful and productive in positioning my research as a sociocultural theory of interest development, rather than change. Further theorising of motivational change as distinct from motivational development is another area for future research, which should contribute to elaborating processes of interest development over time. A sociocultural conceptualisation of development has the potential to contribute to such
theorising, as MacCallum (2007) has started to explore by drawing on Valsiner’s theorisation of development.
CHAPTER 9

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

In this thesis, I have established a framework for conceptualising and studying interest from a sociocultural perspective. Elements of a sociocultural theory that were most strongly supported in the findings of my study are processes of canalisation and self-canalisation, and the negotiation of ZFM/ZPA systems, within classroom learning communities and, to a lesser extent, within families. Elements seen as important to sociocultural models of interest development, but for which evidence was not as strong in this particular research project, are internalisation and externalisation processes, negotiation of intersubjectivity and connectedness, and the relationship between identity and the development of interest. My study has illustrated the roles that the teacher plays, the affordances and limitations of the physical setting, and the importance of the contexts of the peer group, the task and topic in relation to the experience of interest for individual students. I have drawn on the notion of self-canalisation to explain how students with an interest in a subject domain may be positively oriented towards all tasks and topics that are associated with that domain, whereas students whose learner identities are not defined by the context of a particular domain may be more interested at the level of specific tasks or topics.

My research also has made a contribution to methodological approaches to studying interest and its development. Consistent with sociocultural theory, my research project placed emphasis on the importance of studying interest in real life contexts over time, as learners engaged in authentic activities. This study has illustrated the way in which self-report measures, such as the charting of trajectories, can be used in combination with classroom observation and interview data to capture a rich and complex picture of interest development, through consideration of individuals’ participation in on-going activities and the ways that they are experiencing interest.
9.1 IMPLICATIONS FOR PRACTICE

The main implication for classroom practice arising from my research is the important role that a teacher plays, both in programming for learning experiences that are personally meaningful and relevant to students, and as a model of an interested learner who is connected with students. Classroom-based programs contribute to the creation of a classroom community that is supportive of the development of interest in learning. The decisions that a teacher makes about the content focus, the sequence and types of tasks, the grouping structures, the physical and human resources, the excursion sites and the allocation of time all create opportunities and limitations for interest to develop. The use of the instructional design principles outlined in section 4.1 and extended in section 8.1.1 are recommended as a guide to programming learning units that promote the development of interest. It also is important to note that obstacles or problems that arise in children’s learning can promote the development of their interest (Dewey, 1913), rather than inhibit it. When the teacher builds on such obstacles by addressing them in a constructive way, the students’ learning can move forward (for example, section 6.2.4.1) and their interest in the on-going activity can be deepened.

The teacher’s role as a model of an interested learner also has emerged as important in students’ learning, yet is an area for which there are few empirical investigations (Long & Hoy, 2006). The students in my study generally perceived their teacher as interested in and responsive to their own learning as well as the topics and tasks in which they were engaged. The teacher’s interest contributed to a sense of connection with her students, which enhanced the potential for shared meaning and focus to develop in the classroom. ‘When students see their teacher’s wonder, they recognise that wonder is what they too are experiencing. When they see their teacher’s excitement about learning, they recognise their own excitement’ (Metcalfe & Game, 2006, p. 103). As Metcalfe and Game (2006) emphasise, a teacher’s continued passion for learning, shared openly with the students, enables connections to be made. Students need to see their teacher’s interest and action within learning contexts, in order for them to develop interest themselves (Dewey, 1913).
Another implication for practice lies in the design of learning programs that make explicit connections for students across the communities of practice in which they participate, to promote interest development. How teachers engage families in classroom-based learning should be considered, so that opportunities are provided for students to relate their school-based experiences to their participation in other communities of practice. Again, emphasising such relationships across communities is designed to promote the development of interest through enhancing personal relevance and meaning for individual students.

A further implication for practice that arises from my findings also relates to teacher education. It is recommended that both initial teacher education programs and on-going professional development courses include strategies to raise awareness of the ways in which a teacher’s pedagogical decision-making contributes to creating affordances for and constraints on children’s development of interest. Such strategies could be incorporated in subjects and courses focusing on the design of educational programs or teaching to enhance student motivation.

9.2 A FINAL STORY

I started this thesis with a personal story, and so I will end it with one as well. When my daughter Zara was about 18 months old, she began to notice birds. As I knew the specific names of birds in our area, I named them when she pointed, rather than just confirming that it was a bird. She started to say the names of birds that she saw, to echo their calls and then she began to choose a bird identification book from our shelves, flicking through it and delighting in finding birds that she recognised. Friends and family members started giving her bird-related gifts, such as children’s picture books about birds and t-shirts with birds on them. Her grandma gave her a poster of Australian birds, and Zara initiated a game with me, where either she or I had to find all of the parrots or all of the wrens or particular birds that visited our backyard. Her aunt gave her some toy birds which made that bird’s call when they were squeezed and Zara frequently asked to visit a local shop that had more of these toy birds on display. She’d then play with the display birds for relatively long periods of time. As a family, we became members of the local natural history museum and the zoo, and regularly visited the city’s botanic gardens, so that Zara could see and find out
more about a wider range of birds. More recently, once she turned three, she was invited by an adult friend to join her on a bird-spotting tour for children in a nearby forest and we also joined other local community members in planting trees in a park to create a habitat for small birds.

To me, this story provides yet another example of the ways in which drawing on sociocultural notions can elaborate an understanding of interest development. Zara’s initial interest in birds was expressed and responded to by the adults around her in such a way as to promote and canalise her development of interest along pathways considered to be socioculturally appropriate. An interest in birds has been valued by those around her and ZFM/ZPA systems have been created by others in response to her expressions of her interest, so that she has had opportunities to develop knowledge, understanding and personal meaning, even at a young age. Family members and friends have started to contribute to her construction of identity in relation to her interest in birds and are connecting her with other people who share her interest and are expert in ornithology. From here, time will tell how her interest in birds develops into her preschool years and beyond ... or how new interests emerge and her early interest in birds may wane.


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APPENDIXES
Dear <name of Principal>,

I am writing to formally request permission to conduct a research study at <name of school> towards my Doctor of Philosophy degree entitled 'Towards a sociocultural theory of interest: Students’ interest in learning science and technology as a community of learners'. This research is being conducted within the Faculty of Education at the University of Sydney.

The purpose of this letter is to:

- outline the purpose, aim and significance of this study,
- highlight the commitment to participation by <name of school>, particularly <teacher's name> and her 2000/2001 year 5 classes in the Junior School, and
- indicate some anticipated benefits to the School from participation in the study.

**The purpose, aim and significance of this study**

When an aim of contemporary school education is to provide experiences to develop students as lifelong learners, it is imperative for educational research to provide insight into how this aim can be achieved. Numerous studies of children's motivation suggest that as children grow older, there is a tendency for deterioration in their values, interests and attitudes towards school generally and specific subject areas, including Science. Primary schools, as formal early learning institutions, have a central role in supporting the creation of learning environments that develop and support students’ interest in learning. However, in order to work towards creating such learning environments, more needs to be known about the process of interest development.

The purpose of this inquiry is to develop a theory of the process of interest development from a sociocultural perspective; that is, from a perspective that considers the social, cultural and historical embeddedness of human activity as central to understanding development. The specific aim is to establish the ways in which the social and physical settings in which children learn Science and Technology create possibilities and constraints upon their development of
interest in learning. Implications for teaching and learning approaches in classroom-based contexts will be drawn from the study.

**What commitment from <name of School> will participation in this study involve?**

In 2000, I will only be working directly with staff and will not need permission from parents for students' involvement. Copies of permission forms will be shown to the Principal for approval prior to distribution.

**Term 3, 2000**

- Observation in some of <teacher's name> Science and Technology lessons to gain an indication of her current approach to teaching Science and Technology.
- Informal discussion with <teacher's name> to discuss her approach to programming in Science and Technology.

**Term 4, 2000**

- Collaborative development of a pedagogical approach consistent with theories and previous classroom-based studies of the classroom as a Community of Learners. In developing this pedagogical approach, I will be seeking to involve interested staff in the Junior and Senior Schools by holding an initial workshop to consider theoretical and practical issues relating to developing a curriculum that supports and develops students' interest in learning. A tentative pedagogical framework should emerge from this workshop. I will then seek to organise a subsequent workshop in which teachers can share their experiences using this pedagogical framework to enable refinement of the framework. Subsequently, this pedagogical framework will be further developed by <teacher's name> through her involvement in the study in 2001, as this framework would be the guiding influence upon her programming of Science and Technology learning units in terms 1 and 2.

- Generation of strategies for developing and fostering students' reflective journal writing skills. I will be seeking teachers who are willing to share, generate and trial strategies over the term.

In 2001, I will be working directly with students and will need permission from parents for students' involvement. Copies of permission forms will be shown to the Principal for approval prior to distribution.

**Terms 1 and 2, 2001**

Main data collection phase, as a classroom ethnography. Ethnographic approaches seek to understand and deeply explore phenomena in authentic settings with classroom ethnographies centrally concerned with exploring the perspectives and activities of teachers and students and understanding the social processes in natural classroom interaction. Specifically, the techniques for collecting data in this study will be:
• Participant observation in <teacher's name>'s year 5 Science and Technology classes. I will be taking field notes during <teacher's name>'s lessons and discussing her planning and reflection with her. Participation in the classroom will be to the extent that I may engage in some informal teaching as an assistant to <teacher's name> (eg. working with a small group in the classroom) however my principal role is not as a teacher. Observations will also be made in the playground and on excursions. The latter indicates a further requirement of <teacher's name>'s Science and Technology program during the first 2 terms of 2001, as a concern of this research study is children's learning in different physical settings. These excursions do not need to be costly to students eg. Visiting a local park may be a relevant excursion venue, depending on the Science focus topic.

• Video-taping and/or audio-taping of students' interaction in Science and Technology lessons and related activities. Care will be taken to ensure that this is as unobtrusive as possible. Recordings will be made for two main purposes:
  (a) to enable more detailed analysis of class activity and dialogue.
  (b) to facilitate students' recall of specific learning activities in interviews, so that the students' and teacher's interpretation of their involvement in activities can be verified.

Any recordings made will only be viewed or listened to by the researcher, her University-based supervisor and/or the participants in the taped episode. The recordings will be safely stored during the research process and destroyed five years following the study.

• Informal and formal interviews with year 5 students and <teacher's name>, relating to learning and teaching in Science and Technology.

• Reflective journals kept by the year 5 students and <teacher's name>, in relation to learning in Science and Technology. The researcher will also keep a reflective journal.

• Attendance at any Junior School staff meetings where Science and Technology is discussed, for the purpose of understanding approaches and attitudes of staff towards Science and Technology.

What are some of the anticipated benefits to <name of School>?

• Professional development of staff at no financial cost to the School.

• Contribution of the research project to the focus upon developing constructivist-based pedagogies across the School.

• Fostering P-12 professional relationships through term 4 2000 collaborative workshops.

• Development of the researcher's current informal role as 'critical friend' to the year 7 program.

• Opportunities for collaborative research papers between the researcher and staff members.

This research study has been approved by the School of Educational Psychology, Literacies and Learning in the Faculty of Education at the University of Sydney. The study has also been approved by the Human Ethics Committee at the University of Sydney. If at any time during the conduct of the study you have concerns or complaints, you can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 93514811.

At the conclusion of the study, following analysis of the data collected, summary reports of the findings and implications will be prepared for the students and staff and for parents whose daughters were involved. In any publications or presentations from the research project during
or following the conduct of the study, anonymity of <name of School>, specific staff members and students is assured.

I have spoken informally with <teacher's name>, who has expressed her willingness to participate in this research study and has given her verbal agreement to participate. I anticipate that the research project will involve a study of what <teacher's name> and the students would be doing as a normal part of Science and Technology, but with increased reflection upon this activity. Clearly, the proposed extent of her involvement needs her consideration and I have also given her a copy of the details of the commitment required. <teacher's name> is under no obligation to consent to participation in this study.

These information sheets are for you to keep. I look forward to the opportunity to discuss this research study with you in the near future.

Yours sincerely,

Kimberley Pressick-Kilborn
Doctor of Philosophy candidate, Faculty of Education, University of Sydney
Lecturer, Faculty of Education, University of Technology, Sydney

Phone: (02) 9514 5330  Fax: (02) 9514 5265

e-mail: kimberley.pressick@uts.edu.au

Any person with concerns or complaints about the conduct of a research study can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 9351 4811.
PARTICIPANT CONSENT FORM - School Principal

Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners

I, ………………………………………………………………………………………….. (name)
of…………………………………………………………………………………..
(address)

have read and understood the information for participants on the above named research study and have discussed any questions with the researcher.

………………………………………………………………… (signature)

I am aware of the procedures involved in the study. I freely choose to give permission for this study to be conducted at my School and understand that we can withdraw at any time.

I understand that the research study is confidential and that pseudonyms will be used to conceal the identity of the school, class, teacher and individual students.

I hereby agree to give my permission for the School to participate in this research study.

Signature: …………………………………………………………………………..

Name: ……………………………………………………………………………

Date: …………………………………………………………………………..
Signature of witness: .............................................................

Name of witness: ...............................................................

Please return to: Ms Kimberley Pressick-Kilborn

SEPLL, Faculty of Education, University of Sydney NSW 2006
Dear <teacher's name>,

Following our recent discussions, I am writing to formally invite you to participate in a research study entitled 'Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners'. I am conducting this study as a part of my Doctor of Philosophy degree, being carried out within the Faculty of Education, University of Sydney.

The purpose of this letter is to:

- outline the purpose, aim and significance of this study,
- highlight the commitment to participation by <name of School>, particularly by you and your 2000/2001 year 5 classes in the Junior School, and
- indicate some anticipated benefits to the School, and to you specifically, from participation in the study.

When an aim of contemporary school education is to provide experiences to develop students as lifelong learners, it is imperative for educational research to provide insight into how this aim can be achieved. Numerous studies of children's motivation suggest that as children grow older, there is a tendency for deterioration in their values, interests and attitudes towards school generally and specific subject areas, including Science. Primary schools, as formal early learning institutions, have a central role in supporting the creation of learning environments that develop and support students' interest in learning. However, in order to work towards creating such learning environments, more needs to be known about the process of interest development.

The purpose of this inquiry is to develop a theory of the process of interest development from a sociocultural perspective; that is, from a perspective that considers the social, cultural and historical embeddedness of human activity as central to understanding development. The specific aim is to establish the ways in which the social and physical settings in which children learn Science and Technology create possibilities and constraints upon their development of interest in learning. Implications for teaching and learning approaches in classroom-based contexts will be drawn from the study.
In 2000, I will only be working directly with staff and will not need permission from parents for students' involvement. Copies of permission forms will be shown to the Principal for approval prior to distribution.

- Observation in some of your Science and Technology lessons to gain an indication of your current approach to teaching Science and Technology.
- Informal discussion with you to discuss your approach to programming in Science and Technology.
- Collaborative development of a pedagogical approach consistent with theories and previous classroom-based studies of the classroom as a Community of Learners. In developing this pedagogical approach, I will be seeking to involve interested staff in the Junior and Senior Schools by holding an initial workshop to consider theoretical and practical issues relating to developing a curriculum that supports and develops students' interest in learning. A tentative pedagogical framework will emerge from this workshop. I will then seek to organise a subsequent workshop in which teachers can share their experiences using this pedagogical framework to enable refinement of the framework. Subsequently, this pedagogical framework will be further developed by you through your involvement in the study in 2001, as this framework will be the guiding influence upon your programming of Science and Technology learning units in terms 1 and 2.
- Generation of strategies for developing and fostering students' reflective journal writing skills. I will be seeking teachers who are willing to share, generate and trial strategies over the term.

In 2001, I will be working directly with students and will need permission from parents for students' involvement. Copies of permission forms will be shown to the Principal for approval prior to distribution.

Main data collection phase, as a classroom ethnography. Ethnographic approaches seek to understand and deeply explore phenomena in authentic settings, with classroom ethnographies centrally concerned with exploring the perspectives and activities of teachers and students and understanding the social processes in natural classroom interaction. Specifically, the techniques for collecting data in this study will be:

- Participant observation in your year 5 Science and Technology classes. I will be taking field notes during your lessons and discussing your planning and reflection with you. Participation in the classroom will be to the extent that I may engage in some informal teaching as an assistant to you (eg. working with a small group in the classroom) however my principal role is not as a teacher. Observations will also be made in the playground and on excursions. The latter indicates a further requirement of your Science and Technology program during the first 2 terms of 2001, as a concern of this research study is children's learning in different physical settings. These excursions do not need to be costly to students eg. Visiting a local park may be a relevant excursion venue, depending on the Science focus topic.
- Video-taping and/or audio-taping of students' interaction in Science and Technology lessons and related activities. Care will be taken to ensure that this is as unobtrusive as possible. Recordings will be made for two main purposes:
(a) to enable more detailed analysis of class activity and dialogue.
(b) to facilitate students' recall of specific learning activities in interviews, so that the students' and teacher's interpretation of their involvement in activities could be verified.

Any recordings made will only be viewed or listened to by the researcher, her University-based supervisor and/or the participants in the taped episode. The recordings will be safely stored during the research process and destroyed five years following the study.

- Informal and formal interviews with year 5 students and you, relating to learning and teaching in Science and Technology.
- Reflective journals kept by the year 5 students and you, in relation to learning in Science and Technology. The researcher will also keep a reflective journal.
- Attendance at any Junior School staff meetings where Science and Technology is discussed, for the purpose of understanding approaches and attitudes of staff towards Science and Technology.
- Professional development of staff at no financial cost to the School.
- Contribution of the research project to the focus upon developing constructivist-based pedagogies across the School.
- Fostering P-12 professional relationships through term 4 2000 collaborative workshops.
- Development of the researcher's current informal role as 'critical friend' to the year 7 program.
- Opportunities for collaborative research papers between the researcher and staff members.

Participation in this project will contribute to your own professional development, enabling you to articulate and refine your classroom practice. It will also provide evidence to future employers of your commitment to the education process and your willingness to contribute to advancing the education community's understandings of learning and teaching. There will also be opportunities for you to co-author papers relating to aspects of the research study.

This research study has been approved by the School of Educational Psychology, Literacies and Learning in the Faculty of Education at the University of Sydney. The study has also been approved by the Human Ethics Committee at the University of Sydney. If at any time during the conduct of the study you have concerns or complaints, you can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 93514811.

At the conclusion of the study, following analysis of the data collected, summary reports of the findings and implications will be prepared for the students and staff and for parents whose daughters were involved. In any publications or presentations from the research project during or following the conduct of the study, anonymity of <name of School>, specific staff members and students is assured.

I have indicated to <name of Principal> that I have spoken informally with you and that you have expressed willingness to participate in this research study, giving your verbal agreement to participate. Clearly, the proposed extent of your involvement needs your consideration and you are under no obligation to consent. I anticipate that the research project will involve a study of what you and your students would be doing as a normal part of Science and Technology, but with increased reflection upon this activity.
These information sheets are for you to keep. I look forward to the opportunity to discuss this research study with you in the near future.

Yours sincerely,

Kimberley Pressick-Kilborn

Phone: (02) 9514 5330          Fax: (02) 9514 5265

e-mail:kimberley.pressick@uts.edu.au
PARTICIPANT CONSENT FORM - Teacher

Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners

I, …………………………………………………………………………………… (name)

of…………………………………………………………………………………

(address)

have read and understood the information for participants on the above named research study and have discussed any questions with the researcher.

………………………………………………………………… (signature)

I am aware of the procedures involved in the study. I freely choose to participate in this study and understand that I can withdraw at any time.

I understand that the research study is confidential and that pseudonyms will be used to conceal the identity of the school, class, teacher and individual students.

I hereby agree to participate in this research study.

Signature: ………………………………………………………………………...

Name: ……………………………………………………………………………

Date: ……………………………………………………………………………
Signature of witness: .................................................................

Name of witness: .................................................................

Please return to:  
Ms Kimberley Pressick-Kilborn
SEPLL, Faculty of Education
University of Sydney NSW 2006
APPENDIX C
Dear 5W students,

You are invited to take part in a research project that I will be conducting with your class during terms 1 and 2 this year. I am hoping to find out more about how you feel about learning in Science and Technology and why you feel this way. I am especially interested in finding out more about people’s interest in learning and how they become interested or disinterested. I am hoping that by finding out more about how people become interested in learning, I will be able to tell teachers about good ways of organising their classrooms and lessons so that children have the chance to become interested. I would really like your help because you know best about what it’s like to be a student in a classroom.

If you would like to participate, some of your lesson activities will be watched by me and these may also be recorded using an audio-tape and/or video tape. I may also watch you in the playground and during excursions. I will also ask you to share your writing in your learning journal with me and to talk with me in interviews about your learning. These interviews will be no longer than twenty minutes each and you will meet with me no more than three times each term.

The project that I am doing will be a part of your regular weekly Science and Technology lessons. It is expected that you will improve your approaches to and strategies for learning during the project.

You, your class or your teacher will not be able to be identified in any publication, such as a book or article, that I write about the project. The tape recordings of your lesson activities will not be shown to or heard by anyone outside of the project.

Being in this study is completely voluntary and at any time you can choose to pull out. If you have any questions or would like to talk about any part of this project, you can talk with me when I visit your classroom. If you decide not to participate in the study, you will still be a part of class Science and Technology lessons but I will not make any recordings about your learning or collect anything that you write.
This information sheet is yours to keep. If you would like to participate in this study, please talk about it with your mum or dad then sign the attached consent form.

Yours sincerely,

Kimberley Pressick-Kilborn

Any person with concerns or complaints about the conduct of a research study can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 9351 4811.
PARTICIPANT CONSENT FORM - Students

Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners

I, ................................................................. (name)

of .................................................................

(address)

have read and understood the information for participants on the above named research study and have discussed any questions with the researcher.

................................................................. (signature)

I am aware of the procedures involved in the study. I freely choose to participate in this study and understand that I can withdraw at any time.

I understand that the research study is confidential and that pseudonyms (made-up names) will be used to conceal the identity of the school, class, teacher and individual students.

I agree to participate in this research study.

Signature: .................................................................

Name: .................................................................

Date: .................................................................
Signature of witness: ...........................................................................................................

Name of witness: .............................................................................................................

Please return to: Ms Kimberley Pressick-Kilborn
c/o <name of school> Junior School office

in a sealed envelope by Friday 2nd February, 2001
Dear Parents of 5W students,

**Title of research project:** ‘Towards a sociocultural theory of interest: Students’ interest in learning science and technology as a community of learners’

You are invited to permit your child to participate in a study of children’s development of interest in learning. Through conducting this research project, I hope to learn more about how interest in learning develops in a class in which children are learning Science and Technology together. By explaining interest development, I am further hoping to be able to identify ways that classrooms can be organised and lessons structured so that teachers can support and encourage children’s interest in learning. This research is being conducted within the Faculty of Education at the University of Sydney as a part of my Doctor of Philosophy degree.

If you decide to permit your child to participate, I will be observing her participation in activities during Science and Technology lessons in terms 1 and 2, 2001. These may be recorded using an audio-tape and/or video tape. I may also observe students’ interaction in the playground and during excursions. I will ask your daughter to share her writing in a learning journal that will be used to promote reflection upon the learning process. Interviews will also be conducted with students about their learning. These interviews will be no longer than twenty minutes each and your child will meet with me no more than three times each term.

The project that I am doing will be a part of your child’s regular weekly Science and Technology lessons. It is expected that your child will improve in his/her approaches to and strategies for learning during the project.

Your child, the class or class teacher will not be able to be identified in any publication, such as a book or article, that I write about the project. Pseudonyms will be used for the school, class
and individuals. The tape recordings of lesson activities will not be shown to or heard by anyone outside of the project. The tapes will be stored securely and destroyed five years after the conclusion of the project.

Your child’s participation in this study is completely voluntary and at any time you can choose to withdraw your child. If you have any questions or would like to talk about any part of this project, you can contact me on either of the phone numbers at the bottom of this page. Alternatively, you can make an appointment to see me through sending a message to the class teacher.

If you decide not to permit your child to participate in the study, she will still be a part of class Science and Technology lessons. However, I will not make any recordings of or about her learning, interview her or collect anything that she writes.

These information sheets are yours to keep. If you agree to your child’s participation in this study, please talk about it with her, then sign and return the attached consent form.

Yours sincerely,

Kimberley Pressick-Kilborn

Any person with concerns or complaints about the conduct of a research study can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 9351 4811.
PARTICIPANT CONSENT FORM - Parents

Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners

I, .......................................................... (name)

of..........................................................

(address)

have read and understood the information for participants on the above named research study and have discussed any questions with the researcher.

......................................................... (signature)

I am aware of the procedures involved in the study. I freely choose to give permission for my child to participate in this study and understand that he/she can withdraw at any time.

I understand that the research study is confidential and that pseudonyms (made-up names) will be used to conceal the identity of the school, class, teacher and individual students.

I hereby agree to give permission for my child to participate in this research study.

Signature: ..........................................................

Name: ..........................................................

Date: ..........................................................
Signature of witness: …………………………………………………………………………..

Name of witness: …………………………………………………………………………..

Please return to: Ms Kimberley Pressick-Kilborn

c/o <name of school> Junior School office

in a sealed envelope by Friday 2nd February, 2001
APPENDIX E
APPENDIX F
Think back about our lessons in science so far in term 1. Look at the numbers on the bottom of the graph page. Mark on the graph how interested you felt when you were completing the activities listed below.

**Lesson 1**
1. Hearing about Heathville Manor
2. Writing down what you know about electricity and drawing a torch
3. Talking to friends about what you already know about electricity
4. Posing questions about electricity and teacher writing these down

**Lesson 2**
5. Doing the experiment about static electricity with balloons
6. Experimenting with globes, batteries and wires to make an electrical circuit
7. Investigating changes in energy in a CD player and toaster

**Homework**
8. Drawing a plan of switches and powerpoints in your home

**In class time prior to lesson 3**
9. Going to the Senior School to see the solar car

**Lesson 3**
10. Doing two tasks – circuit task and challenge task (lemons)
11. Talking with the whole class about experiments with circuits in the hall

**In class time prior to lesson 4**
12. Reading books about energy and electricity with Ms Wheeldon

**Lesson 4**
13. Finding out what people now know about electricity in a class discussion.
14. Drawing a torch again and pasting this in your book
15. Writing to Russ, the electrician, using email

**Lesson 5**
16. Talking about Russ’ answers to girls’ questions
17. Starting to design a product (torch, alarm etc) for Heathville Manor

**Special lesson – Visit from Alison from SEDA**
18. Hearing Alison talk about electricity and the Greenhouse effect
19. Calculating electricity use in the classroom
20. Seeing and hearing about solar energy and the solar panels in the playground
Think back about our lessons in science so far in **term 2**. Look at the numbers on the bottom of the graph page. Mark on the graph how interested you felt when you were completing the activities listed below.

**Lesson 1**
1. Listening to Ms Wheeldon read *Wilfrid Gordon McDonald Partridge* picture book and discussing it
2. Writing down what you knew about eggs already and drawing an egg cross-section
3. Talking to friends about what you already knew about eggs and choosing a fact to write on a yellow egg
4. Posing questions about eggs and Ms Wheeldon and Ms Pressick writing these down on pink eggs for the noticeboard

**Lesson 2**
5. Testing the strength of eggs with a demonstration of Josephine standing on the shelf
6. Designing and doing your own fair tests to test the strength of a raw egg, hard boiled egg and blown egg
7. Writing up your results and drawing a picture to show your findings from your test

**Lesson 3**
8. Watching a video about eggs
9. Doing your own egg dissection
10. Drawing what’s inside an egg and labeling it

**In class time prior to lesson 4**
11. Reading books about eggs and egg-laying animals in silent reading time

**Prior to lesson 4**
12. Choosing an egg-laying animal to research and become an expert about

**Lesson 4**
13. Choosing 3 class questions to research about egg-laying animals
14. Choosing 2 personal interest questions to research about your animal
15. Getting your own data booklet to record information
16. Planning your group’s route and itinerary for the zoo excursion

**Zoo Excursion**
17. Going to the Education Centre at the zoo
18. Spending time looking at different animals and enclosures with your group
Science Day

19. Going to the computer room and working in the classroom for animal research
20. Seeing the shows, *Lab on Wheels* and *Skydome*
21. Paper aeroplane flying competition

Lesson 6

22. Designing your zoo enclosure for an egg-laying animal
23. Thinking about materials and looking at objects from *Reverse Garbage*

24. Writing reflections on the Left Hand Page and in your journal
APPENDIX G
5W Family conversations about Science and Technology, Term 1

Please talk with your mum, dad or both of your parents and write down their ideas about the following questions. If you need more space, write on the back of this age.

1. Before you start, who are you talking with? Mum   Dad   both my parents

2. At home, have we had any conversations, that I have started, about electricity, saving energy or related topics? Please give specific details.

3. What have I said at home about what we are doing in science and technology at school?

4. From your perspective, have we done anything as a family in relation to my year 5 electricity unit? (for example, looking at the electricity bill, borrowing a book from the library, doing an Internet search etc)

5. How interesting do you think electricity is as a science topic?

---------------------------------------------------------------------------------------------------------------------------------------

Not at all interesting                                                   Very interesting

(Put a tick along the line - use blue for Mum, red for Dad)

Why?

6. From your observations of me at home, how interested do you think I have been in learning about electricity this term?

---------------------------------------------------------------------------------------------------------------------------------------

Not at all interested                                                   Very interested

Why?

7. If you have any other comments about my learning about electricity this term, please tell me. (Write these on the back of the page.)

331
5W Family conversations about Science and Technology, Term 2

Please talk with your mum, dad or both of your parents and write down their ideas about the following questions. If you need more space, write on the back of this page.

1. Before you start, who are you talking with? Mum  Dad  both my parents

2. At home, have we had any conversations, that I have started, about eggs, egg-laying animals or related topics? Please give specific details.

3. What have I said at home about what we are doing in science and technology at school?

4. From your perspective, have we done anything as a family in relation to my year 5 eggs unit? (for example, looking at the eggs at home, borrowing a book from the library, doing an Internet search, visiting the zoo, gathered materials for my enclosure etc)

5. How interesting do you think eggs and egg-laying animals are as a science topic?

_________________________________________________________________________________________________________________________________________

Not at all interesting  Very interesting

(Put a tick along the line - use blue for Mum, red for Dad)

Why?

6. From your observations of me at home, how interested do you think I have been in learning about eggs and egg-laying animals this term?

_________________________________________________________________________________________________________________________________________

Not at all interested  Very interested

Why?

7. If you have any other comments about my learning about eggs this term, please tell me. (Write these on the back of the page.)
APPENDIX I
<table>
<thead>
<tr>
<th>Date of interview with focus students</th>
<th>Guiding questions</th>
</tr>
</thead>
</table>
| 20 February 2001                     | 1. Using the subject cards, rank these subjects that you learn at school and explain the ranking.  
   2. What has been your favourite year at school? How does year 5 compare so far?  
   3. Focusing on science and technology, what do you think about the electricity topic so far?  
   4. When you do science and technology, do you usually prefer working by yourself or in a group? Why?  
   5. Who do you like to work with in class? Why?  
   6. In the playground, who do you like playing with? Why? What do you play? |
| 9 April 2001                          | 1. At the beginning of term, I asked you to rank subjects. Has your experience of learning about electricity this term changed this? Why/why not?  
   2. What should we make sure we include in this unit when it’s taught next year? What should we leave out?  
   3. What did your friends who you worked with think about science and technology this term?  
   4. What do you think Ms Wheeldon thought about this topic?  
   5. In the playground, did you talk about or do anything related to electricity topic?  
   6. If you could learn about any topic in science and technology next term, what would you choose? |
| 18 May 2001                           | Use trajectories and photos to stimulate discussion about the unit so far.  
   1. What are your feelings about this term’s science unit so far? Why?  
   2. What do you think it means to be interested in what you are learning? |
3. What are you finding interesting about the eggs unit so far? What makes you feel that way?
4. Do you think that Ms Wheeldon is interested?
APPENDIX J
Questions that guided follow-up semi-structured interviews with focus students

<table>
<thead>
<tr>
<th>Date of interview</th>
<th>Guiding questions</th>
</tr>
</thead>
</table>
| November 2001     | 1. Rank science topics for this year. Why?  
|                   | 2. What have you enjoyed most/least about science this year?  
|                   | 3. What topics would you be interested in learning more about in year 6? Why?  
|                   | 4. How has this year been similar to/different from learning science in other years? Group work?  
|                   | 5. How do you see Ms Wheeldon? Me?  
|                   | 6. Have you borrowed any library books that relate to science topics?  
|                   | 7. Do you think your friends are interested in science?  
|                   | 8. How do you feel about reflection and the strategies that we’ve used (whole class, left-hand page, interviews with peers)? |
| September 2002    | 1. Tell me about science this year, including your choice of science project topic.  
|                   | 2. What do you remember about science in year 5?  
|                   | Is there anything you miss about science last year? What is better about science in year 6?  
|                   | 3. What do you remember about excursions and guest speakers from year 5?  
|                   | 4. Which topic has been your favourite that you’ve learnt about in science, over the whole of primary school? Why?  
|                   | 5. Order your school subjects from most to least preferred, using the subject cards. Give a brief explanation for why you have ordered them in that way.  
|                   | 6. What do you think would have been your mum’s/dad’s favourite subject at school? Why?  |
What is their job now?

7. If you had the chance to work with a mentor to complete a personal interest project, what would you choose to do it on? (Why? Have you been interested in that topic for a long time? How did you become interested in that/what makes that topic interesting to you?)

8. Some girls have told me that if you have choice or get to help make decisions about what you do and whom you work with, it is more interesting. Would you agree or disagree with that? Tell me more.

9. Some girls have told me that the teacher makes a difference to how much you enjoy or are interested in a subject. Would you agree or disagree with that? Tell me more.

10. Year 7 is coming up. What do you think science will be like in secondary school?

11. What is your date of birth?

12. Present each student with the interest profile that I have generated so far for them in my research, to obtain their feedback.

13. Give students a list of statements about interest generated from my research (Appendix L), again to obtain their feedback.
APPENDIX K
Monday 12 August, 2002

Dear Ms G and Mr J,

During terms 1 and 2 last year, you may recall that I conducted a research project as part of my PhD study, entitled ‘Towards a sociocultural theory of interest: Students’ interest in learning science and technology as a community of learners’. <Student’s name> probably told you that she was interviewed by me about her experiences of learning science and technology during this time. In order to place these experiences in the context of her learning in year 6, I seek your permission to conduct one further follow-up interview with your daughter. I will be asking her about her perceptions of interest in science topics and seeking her feedback about the ways in which I am writing about interest in my thesis. The interview will be no longer than half an hour and will be organised at a time convenient to <Teacher’s name> and the 6A class program during term 3. <Principal’s name>, the Principal of <name of school>, has given her approval for these interviews to be conducted.

Your child, the class or class teacher will not be able to be identified in any publication, such as a book or article, that I write about the project. Pseudonyms will be used for the school, class and individuals. The tape recordings of these interviews will not be shown to or heard by anyone outside of the project. The tapes will be stored securely and destroyed five years after the conclusion of the project.

This information sheet is yours to keep. If you agree to <Student’s name> participation in this follow-up interview, please talk about it with her, then sign and return the attached consent
form. If you have any questions, please contact me by telephone (9514 5330) or arrange to meet with me by sending a note to <School secretary>.

Yours sincerely,

Kimberley Pressick-Kilborn

Any person with concerns or complaints about the conduct of a research study can contact the Secretary of the Human Ethics Committee, University of Sydney, on (02) 9351 4811.
PARTICIPANT CONSENT FORM - PARENTS - Follow-up interview, 2002

Towards a sociocultural theory of interest: Students' interest in learning science and technology as a community of learners

I, ........................................................................................................ (name)

of.........................................................................................................

(address)

have read and understood the information for participants on the above named research study and have discussed any questions with the researcher.

........................................................................................................ (signature)

I am aware of the procedures involved in this follow-up stage in the study. I freely choose to give permission for my child to participate in this study and understand that she can withdraw at any time.

I understand that the research study is confidential and that pseudonyms (made-up names) will be used to conceal the identity of the school, class, teacher and individual students.

I hereby agree to give permission for my child to participate in this research study.

Signature: ..............................................................................................

Name: ......................................................................................................

Date: ..........................................................................................................
Signature of witness: ………………………………………………………………………

Name of witness: …………………………………………………………………………..

Please return to: Ms Kimberley Pressick-Kilborn

c/o <name of school> Junior School office

in a sealed envelope by Friday 16 August, 2002
When you work in science and technology lessons at school, how true are these statements for you?

T = true  t = sort of true  f = sort of false  F = false

Circle the letter that is most true for you.

1. To be interested in a task, topic or subject, I need to feel as though it matches who I am.

   T   t   f   F

2. If an activity is hands-on, it is more interesting.

   T   t   f   F

3. Even if I’m not interested in a topic or the subject, a task can be interesting.

   T   t   f   F

4. I feel interested in things that my teacher is enthusiastic about.

   T   t   f   F

5. New ideas and activities at school are interesting to me.

   T   t   f   F

6. I am not interested when I am have choices in my learning.

   T   t   f   F

7. If I’m working with people who are interested in learning, I feel interested too.

   T   t   f   F

8. If something is challenging but not too difficult, I feel interested.

   T   t   f   F

9. Even if I’m not interested in a topic at the beginning of term, the things that we do and the way that we learn can make me feel interested as I learn more.

   T   t   f   F
10. There are some tasks, topics and subjects that I could never find interesting. 

T  t  f  F

11. Working in a group makes me feel more interested than working individually. 

T  t  f  F

12. Even if I’m not interested in the subject, a topic can be interesting. 

T  t  f  F

13. I feel interested in learning at school when there is variety.  

T  t  f  F

14. At school, it is important for me to learn about topics that I am interested in. 

T  t  f  F

15. It is more interesting to do tasks that don’t have just one right answer or way of doing them. 

T  t  f  F

16. If I’m interested in something I’ve learnt at school, I try to follow it up at home in my spare time. 

T  t  f  F
APPENDIX M
<table>
<thead>
<tr>
<th>Focus student</th>
<th>Researcher Field journal reference</th>
<th>Video presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michaela</td>
<td>Term 1 p. 55– live wire</td>
<td>Tape 1 9/2/01 Gets a postcard to write on – initiates reflection</td>
</tr>
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<td></td>
<td>p. 58 – global dislike of science expressed</td>
<td>Tape 2 9/2/01 Posing questions in class collation of questions</td>
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<td></td>
<td>p. 60 started a postcard</td>
<td>Tape 2 16/2/01 Annoying a small group: working productively on circuit task with a partner</td>
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<td></td>
<td>p. 65 most engaged when doing circuit station (most open-ended) when working with Adriana</td>
<td>Tape 3 23/2/01 Small group station task – negotiating argumentatively and animatedly with Eleni during prediction time (Josephine also in the group.)</td>
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<td></td>
<td>p. 69 resistant (also refers to trajectory sheet); asking, ‘When do we get to move on?’</td>
<td>Tape 4 9/3/01 In whole class lesson introduction to DMA task – excitement evident in body language when making own torch announced; also, reaction to LW and trying to enable Jacqui to change to torch</td>
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<td></td>
<td>‘I remember Michaela from when she was in 2H and I used to do philosophy with them…on sporadic occasions. She was quite a resistant student then, too, with an air of disengagement about her, almost as though she didn’t care. She was, from memory, quite opinionated and if the topic of conversation interested her, she would become involved. I think that she is quite bright, but also stubborn and likes to do her own thing. I’m not sure whether she is playing this up even more to be noticed by me. I would like to include her in the study because she appears to be a bit ‘different’ from the other girls and is prepared to express an opinion that challenges the authority of the teacher. She is spirited and a little subversive.’</td>
<td>Tape 6 23/3/01 (Also on 6A, from different angle) – shares torch in class discussion, claps hands excitedly when torch group is selected by LW to share first</td>
</tr>
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<td></td>
<td>p. 82 confrontation with Eleni during a circuit task</td>
<td>Tape 6A 30/3/01 Is excited about a rainbow lorikeet outside the classroom, popping eyes, moving closer to the door, calling Lori over, which all happens just as LW is settling the class down for the lesson after recess (LW ignores); poses a question in class list being created for what we still don’t know, actively participates, enthusiastic (hand fluttering to be noticed, keen to answer/ask)</td>
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<tr>
<td></td>
<td>p. 90 urgent to contribute to class discussion – ‘hand up, panting, eyes popping’ and frequent contributor (discussed again on p. 92 – raised on her knees with hand up) journal entry about science (in addition to LHP entries)</td>
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<td></td>
<td>p. 91 doesn’t appear interested in engaging in sending class e-mail to Russ, the on-line electrician</td>
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<td></td>
<td>p. 92 seated with Jacqui in class discussion circle and engaging sometimes in private conversation</td>
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<tr>
<td>p. 93 receipt of a postcard from her</td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------</td>
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<tr>
<td>p. 96 contributing to class discussion in relation to e-mail received from Russ, the online electrician, with conversation with me continuing after the class discussion, at her initiation, posing questions related to off-peak energy – concern with practicalities and costs apparent</td>
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<tr>
<td>p. 97 previously seated slightly isolated from the rest of the class, at the rear of the class on the floor (her own choice), excitement about Design, Make and Appraise and electrical product task is apparent, as design brief is announced – bobbing on knees in anticipation. Michaela attached real purpose to making a torch, as it could be taken on the upcoming school Dads’ and daughters’ camp</td>
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<tr>
<td>Tape 6A 6/4/01 5 minutes to plan how they will spend lesson, Michaela is sullen, disagreeing with Jacqui and Anita</td>
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<tr>
<td>Tape 7 6/4/01 Sulking in background while Philippa, Eleni and Su-Mei are filmed; Stephanie is near her, continues working with some interaction with Michaela, then moves away to publish her article on the computer; Later, Michaela is filmed watching Philippa’s group rehearse, and has moved over to near her desk</td>
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</tbody>
</table>
### Sample pages from table comparing focus students – summarised data from November 2001 interviews

<table>
<thead>
<tr>
<th>Term 4 final interviews, November 2001</th>
<th>Stephanie</th>
<th>Michaela</th>
<th>Eleni</th>
<th>Jacqui</th>
<th>Philippa</th>
<th>Cathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment, interest and liking for subjects and topics</td>
<td>*interest/enjoyment linked with success. If something is too difficult, it results in the subject being less enjoyable/liked. * fun when learning linked with having free choice within a task structure and choice of who you work with, what you talk about on excursions on the bus * relates science with self ‘I’ve always really sort of liked science’ (p. 3; again p. 8) but sees other</td>
<td>* liking and enjoyment of science depends on interest in the topic * career choices (engineer or orthodontist) based in science * enjoys practical, hands-on tasks * likes to be in the position of expert when working with peers (to demonstrate her superior skills, knowledge, understanding?) * her perceptions of a teacher has an important</td>
<td>*interest/enjoyment linked with perceptions of success and external indicators of achievement * sense of personal history with the piano linked with liking * excellent factual/experiential recall - gives specific details about topics studied in different parts of the interview (p. 2, 4, 6, 7, 11) * likes and is interested in novel and unusual things</td>
<td>* unsure about distinction between subjects, which topics fit into which subjects * enjoys finding answers to questions, learning and finding ideas</td>
<td>* enjoys learning when parts come together as a whole (eg music cantata) * subject preference and fun linked * novelty and variety as important characteristics of tasks/subjects she enjoys</td>
<td>* enjoys 'experiments', which seem to be any active, hands-on task, including designing and making and investigations * likes/finds fun opportunities for choice and being actively involved, where she is creating things</td>
</tr>
</tbody>
</table>
subjects as just not interesting to her.

* likes to have variety in her learning, hands-on and tactile experiences 'I like getting dirty' (p. 6).

* has always been interested in science, tv character 'Sabrina' who likes chemistry, equipment/drama related to science liked by Steph.

* spontaneous expressions of enthusiasm about topics eg 'I loved the eggs!' (p. 6) 'I really love chemistry, it's like a passion for me' (p. 10).

impact on her enjoyment of a subject

* bridges data booklet she liked because of choice of interest-based questions – knew she wanted to know more, independent work at home

* links between home life and topics/tasks at school generate interest – specific bridges book, bridge climb for her birthday, reference to her father's job, her budgie – relate to self

* topics to learn about next year – orthodontists and feedback from a teacher does not make her like a subject, necessarily (p. 3).

* contradiction in bridges research-one of her favourite science tasks but left until the last moment

* appears to globally like science as a subject – not topic dependent. Both mentor possibilities relate to science.

* Parents influence interest eg. Mum suggesting bailey bridge question in assignment and Dad suggesting and actively supporting mentor topic choice

* self/home link with electricity topic

* likes choice, creative & hands-

* likes drama of experiments

* fun working with others and fun influences her hypothetical choice of Spectra topic in yr 6

* more fun to learn by doing than by different from peers

* seeks challenge and difficulty

* sees uncertainty about outcomes, in experiments, tasks and units, as a motivating factor – genuinely not knowing is motivating because she wants to find out (inauthenticity detracts from pleasure of finding something/finding something out)

* acknowledges r'ship between prior knowledge and having questions about a topic

* expresses sense join in family conversations in an informed way – non-science, link with home and Dad

* takes school-related products/ideas/tasks home (egg experiment from the video and alarm set up in room)

* cannot name something she did not enjoy in science, but liking seems to relate to the 'experiments' tasks, rather than to topic subject-matter.

* interest associated with task/objects (in case of solar display) and with self (in case of zoo excursion)
| * links between out-of-school and school – ‘Terrific scientific’, seeing a platypus |
| * likes school but also change of context (7) |
| * her friend loves science partly because of the researcher – teacher impact on interest/enjoyment |
| * wants to study chem.-related course at Uni |

| animal communication – each fit into science |
| on tasks |
| * likes excursions – novelty, take photos |

| writing (p. 11) |

| of wonder/surprise about bridge |
| * has alarm at home but did not identify self with topic |
Sample pages from table summarising data from researcher field notes – Attributes of the classroom community of learners

<table>
<thead>
<tr>
<th>Not evident</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>p. 55 ‘Angela and her partner moved away from Eleni and Josephine during this time, claiming that Eleni and Josephine were copying their ideas. They came and sat quite close to where I was sitting writing notes, and I heard them deciding upon questions to record and discussing whether or not they knew the answers – it appeared a little as though they were quite absorbed in the number of questions they could come up with, rather than the quality of the questions and whether it would be challenging to find answers. There were a couple of questions that they recorded to which they definitely knew answers and discussed these.’</td>
<td>Competition</td>
</tr>
<tr>
<td>p. 57 students’ questions show teacher still perceived by students as a ‘gate keeper’, allowing and restricting their activities within the negotiated task of planning a Zoo route and what they will be able to purchase on the day</td>
<td>Teacher control/authority</td>
</tr>
<tr>
<td>p. 58 diversity in opinions being expressed, however, these were resulting in conflict and frustration, as well as more limited productivity in getting the task done, in the case of the zoo planning group containing focus students</td>
<td>Competition</td>
</tr>
<tr>
<td>p. 69 Zoo educator with 5F described by Ms O as overly threatening to the excited girls –eg commented that girls would be sent outside if noise continued and that their teachers would be most unhappy. Ms O felt it was on-task, responsive noise, rather than off-task. A different approach by the teacher to that being taken at school was experienced by these 5F students.</td>
<td>Teacher control/authority</td>
</tr>
<tr>
<td>p. 79 very strong teacher scaffolding during the enclosure design introductory lessons, in terms of constraints on design activities and time as individuals and in group discussion – however within this framework there is scope for student choice, interaction with peers and materials, and decision-making (following making lessons are definitely student directed).</td>
<td>Teacher control</td>
</tr>
<tr>
<td>p. 83 Ms H, the remedial support teacher, is doing and making decisions, rather than guiding and supporting Jacqui’s enclosure making</td>
<td>Teacher control</td>
</tr>
<tr>
<td>p. 84 teacher praise plays a role – praises students generally for listening well during explanation/discussion of portfolio task, then again praise for individual students who are settling well and on task, also to Adriana for using a text box beside her egg diagram to explain the function of each part of the egg – status of teacher within the</td>
<td>Teacher authority</td>
</tr>
</tbody>
</table>
classroom reinforced

p. 84 teacher acknowledgment as an aside joke to the researcher when she realises that she is asking a 'guess what's in the teacher's head' question in prompting the girls to come up with the term 'conservation' for the portfolio task cloze sentence.

Evident

p. 33 girls have time for individual work, pair discussion then building to contributing to a class noticeboard of 'what we know now' and questions about what we would like to know

p. 33 choice in presentation of prior knowledge thinking/drawings in books

p. 34 girls share ideas and drawings with a partner, then return to classroom and record a fact of their choice on an egg-shaped piece of cardboard to then be displayed in the classroom. Girls name their facts on the front side.

p. 36 sense of purpose being supported by girls knowing about the activities planned in the unit from the beginning of the term

p. 42 students planning their own fair tests to determine egg strength, working in small groups to design and carry out the tests (working in table groups)

p. 42 Philippa overhears the group next to her's planning their fair test and comments, 'That's not fair though', stimulating further discussion in that group.

<table>
<thead>
<tr>
<th>Teacher authority</th>
<th>Discussion/collective understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice</td>
<td>Choice</td>
</tr>
<tr>
<td>Discussion/collective understanding</td>
<td>Discussion/collective understanding</td>
</tr>
<tr>
<td>Student purpose</td>
<td>Student choice/ownership/purpose</td>
</tr>
<tr>
<td>Discussion/collective understanding</td>
<td>Discussion/collective understanding</td>
</tr>
</tbody>
</table>
APPENDIX N