Secondary Students' Narratives of Emotion Work While Engaging in Extended/Open Science Inquiry Projects

Zennifer Libo-on Oberio

Submitted in accordance with the requirements for the degree of
Doctor of Philosophy

The University of Leeds
School of Education

November, 2016

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To my family, whose love and support give me the courage to venture into the unknown and to take risks; and to my friends, the family that I chose, who are on the other end of the line without fail.

To my Lord and Saviour Jesus Christ, without whose surpassing grace this work would not have been possible: "For from Him and through Him and to Him are all things. To Him be the glory forever." (Romans 11:36)

Acknowledgements

I would like to express my gratitude to my primary supervisor, Professor Jim Ryder, whose expertise, guidance, patience and understanding added considerably to my challenging and rewarding PhD experience. I greatly appreciate his ability to get me to scrutinise my thinking and to point me towards productive paths. His incisive comments on my writing has benefitted this thesis greatly.

I also would like to give my sincerest thanks to my other supervisor, Dr Indira Banner. Her generosity with her expertise and her time could not have been more apparent than in the many opportunities that she gave me to bounce off her my inchoate ideas. Her empathy and her ability to engage in fun academic discussions had greatly reduced the angst that comes with doing a PhD.

I have explored many personal frontiers in this PhD, starting with learning about emotion work, and I appreciate my two supervisors' company and support in these explorations.

I would like to thank my research participants, who entrusted me with their personal stories. Thank you also to the pilot study participants, whose involvement and feedback contributed to the refinement of my research design.

My conversations with several people helped refine my thinking and my writing. My gratitude to Dr Jaume Ametller for listening patiently as I poured out a litany of literature review woes and for making a wise suggestion on how to approach it, which lit up a proverbial light bulb in my mind and got me writing again. A very special thanks to Ana Ilse Benavides-Lanhstein, my PhD buddy, who had sat through many a mini-presentations of my developing ideas. I appreciate her effort to understand my mindmaps and the thoughtful questions she posed. My research had benefitted from her intellectual curiosity and outsider perspective. I must also acknowledge Dr Elisabetta Adami for critiquing my ideas about semiotic analysis and for directing me towards discourse analysis.

My appreciation goes to the members of the Centre for Studies in Science and Mathematics. Their contribution during the seminar I gave about the analysis of narratives helped my thinking about my data analysis. A special thanks to Stefan Lesnianski for the generous technical support since my MPhil days.

My heartfelt gratitude to my two transcriptionists, whose timely offer of assistance enabled me to focus on data analysis. My appreciation also goes to my two research assistants who competently implemented the recruitment and data gathering activities during the first phase of the research.

Finally, I am greatly indebted to the School of Education, University of Leeds, for the scholarship to do this PhD. Thank you so much for the opportunity and the financial support.

Zen Oberio

November 2016

Abstract

There is growing evidence showing the significance of student emotions in influencing student engagement and achievement. However, naturalistic studies that provide insights into contextual factors that engender students' emotion experiences and how students manage these experiences to promote the achievement of their academic goals have been sparse. This study investigated secondary students' emotion work (i.e., attempts to change the degree or quality of emotion experiences) within a distinctive learning environment. The forty-four participants (15-17 years old) were high-achieving students in a selective, science specialist school in the Philippines, who were undertaking two-year open school science inquiry projects with links to real-world research. Students' emotion work narratives (68 written narratives and 57 narrative interviews) were collected over a ten-month period (which included an eight-month field work). Data analysis focused on situations that engendered emotion work and the strategies students used. School artefacts and students' narratives were examined for ideas about achievement that were transmitted to and apprehended by students (i.e., achievement discourses), and how these discourses were linked to students' emotion work.   Five thematic groups of situations and four families of emotion work strategies were identified. The emotiveness of the situations was heightened by discourses that associated achievement with students' social identities and extraordinary performances. Students' emotion work served the instrumental goals of sustaining engagement in school work, managing the impact of problematic relationships with peers and teachers, and maintaining students' social identities. Students demonstrated agency in how they harnessed for their emotion work the resources and opportunities afforded by their social networks and by the achievement discourses. This research underscores the role of emotion work in students' effective functioning in a demanding learning environment with high levels of uncertainty. Its findings suggest the need for more research that explores students' potential to shape their school experiences through emotion work.

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Chapter 1
Introduction

This chapter provides an overview of the study and a preview of the organisation of the rest of the thesis.

Until recently, student emotions seem to have been relegated as an epiphenomenon in education research. They have not been the focus of much inquiry except for students' test anxiety (Schutz & Pekrun, 2007); and there has been little research on student emotions in the context of their everyday life in school (Harden, 2012). Nevertheless, the educational significance of student emotions is almost axiomatic. Research has shown that student emotions are associated with students' motivation (Meredith, Fortner, & Mullins, 1997), attitudes (e.g., towards science, Zembylas, 2004), and achievement (Pekrun, Frenzel, Goetz, & Perry, 2007), and with learning environments (Moll, 2011, cited in Ritchie, Tobin, Sandhu, Sandhu, Henderson, & Roth, 2013; Zembylas, 2004).

In science education, in particular, students' emotion experiences during science learning have been found to impact their engagement with science (Lin, Hong, & Huang, 2012). Moreover, it has been observed that the "emotional perceptions of science learning" that these students develop while in school are likely to endure as they become adults (Lin et al., 2012, p. 38). Hence, within the international climate of urgent concern for increasing recruitment to science and fostering students' science career aspirations (DeWitt, Osborne, Archer, Dillon, Willis, & Wong, 2013; Osborne, Simon, & Collins, 2003), investigations into students' emotion experiences in different science learning contexts hold considerable value. One such context is school science inquiry.

Students' emotion experiences in school science inquiry. School science inquiry is an inherently emotive setting (Ritchie, et al., 2013; Zembylas, 2004). Anecdotal accounts in school science inquiry research literature have suggested that the emotiveness of this learning environment is more so in extended/open inquiry, where students have considerable

autonomy and independence in designing and conducting investigations for open-ended problems that they themselves conceptualised (e.g., O'Neill & Polman, 2004; Polman, 2000; Roth & Bowen, 1993-1994). The challenges of extended/open inquiry have been documented in the researcher's MPhil research (Oberio, 2013) and in previous studies of students' experience in school science inquiry; and these challenges could elicit strong emotions from students. For instance, while open inquiry evoked in students positive emotions, such as feelings of independence, pleasure, satisfaction, and interest in doing inquiry (Roth & Bowen, 1993-1994; Sadeh & Zion, 2011), it could also elicit negative emotions, such as anxiety arising from the unexpectedness of the tasks (Chin & Kayalvizhi, 2005) and feelings of intimidation due to students' unfamiliarity with the process (Gertzman & Kolodner, 1996; Hipkins et al., 2002; Polman, 2000). These are anecdotal evidence, however, because the focus of these studies was not students' emotion experiences.

Research on students' emotion experiences in school science inquiry*.* There is very little research that focuses on students' emotion experiences within the school science inquiry context. During the conceptualisation of this research, literature search within data bases, and within science education research and emotion research journals, yielded only one study. The research focused on how the teacher developed students' positive emotions towards science and science learning by co-constructing with them emotional rules in the classroom (Zembylas, 2004). More recent searches yielded a few more which generally focused on students' positive emotion experiences (e.g. Bellocchi & Ritchie, 2015; Jaber & Hammer, 2016; King, Ritchie, Sandhu, & Henderson, 2015). The search results underscore the need for more research in this area.

One recent study, which focused on positive feelings of pride and triumph evoked as students engaged with science inquiry, also reported students' experiences of negative emotions (Bellocchi & Ritchie, 2015). In their recommendations, the authors suggest the pursuit of "a different line of research [that] focus[es] on how students manage and resolve potential feelings such as anger, frustration, and irritation that may be aroused during

extended inquiry projects" (p. 665). Although the present study was conceptualised before the publication of the aforementioned research, it nevertheless addresses the recommended research agenda by investigating students' emotion experiences using the concept of emotion work, which provides insights into students' attempts to "change in degree or quality" their emotion experiences (Hochschild, 1979, p. 561) while engaging in school science inquiry. As far as can be ascertained, there is only one study with an explicit focus on emotion work in the school setting (i.e., Tainio & Laine, 2015). It investigated the emotion work within teacher-student interactions in mathematics classrooms; but the research findings did not explicitly depict students' emotion work.

The research agenda and setting. This study, therefore, contributes to the knowledge base in the areas of student emotions and school science inquiry research, by focusing on students' emotion work (instead of student emotions) as they engaged in extended/open school science inquiry projects. The setting of this study presents a rich context for studying students' emotion work. The study was conducted in a selective science specialist school where high-achieving students, aged 15 to 17, conceptualised and undertook two-year open science inquiry projects. This is a different context from those of two studies on students' emotion experiences during science learning: that of Zembylas (2004), who investigated the emotional practices of first and second graders in teacher-led science learning using the inquiry approach, and of Bellocchi and Ritchie (2015), who observed secondary students inside the classroom as they engaged in an extended problem-based learning of a unit of science lesson.

The characteristics of the school science inquiry undertaken by the students in this study make for a particularly emotive context. The students were considered novices, as they were conducting their science inquiry projects as first-time researchers. They engaged in school science inquiry that features extended student engagement, independent work, substantial student autonomy, open-endedness, real-world interactions, and an inherently critical learning environment which involves high-order intellectual activities. This learning environment involves a radical shift from traditional

school work. The undertaking of the science inquiry projects, therefore, exposed students to what was tantamount to "culture shock", plunging them into a learning environment that was very unfamiliar to them (Anderson, 2007).

The emotiveness of this particular school science inquiry setting was further intensified by two pre-existing traits in the participants: they were adolescents and high-achievers. Typical adolescents have heightened feelings of self-consciousness and self-absorption, and hypersensitivity to evaluation by others, which mean that they usually place a high value on self-presentation (Zeman, Cassano, Perry-Parrish, & Stegall, 2006; Zeman & Shipman, 1997). Classic high-achievers, on the other hand, are highly competitive and task-driven (DeLong & DeLong, 2011). They want to do things perfectly the first time, have overloaded agendas and a compulsive need to achieve, and have difficulty differentiating between the urgent and the important. They feel guilty when they cannot fulfil their agendas or their high standards, tend to overreact when they encounter unpleasant and disappointing surprises, and are terrified at the prospect of "losing their image of competence"[1] (Ideacast, 2011).

Recent studies on student emotions have generally been concerned about the association between emotion and academic achievement (e.g., Frenzel, Pekrun, & Goetz, 2007; Goetz, Preckel, Pekrun, & Hall, 2007; Lipnevich, MacCann, Bertling, Naemi, & Roberts, 2012). In contrast, this study, by investigating students' emotion work, highlights students' effortful and active stance in dealing with emotion-eliciting situations within the school science inquiry context. This perspective is especially significant because anecdotal accounts of students' inquiry experiences (e.g., in Chin & Chia, 2004; Polman, 2000) point to the possibility that students' willingness and competence to perform emotion work might be one factor that determines

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[1] This quote is taken from the transcript of a podcast of Sarah Green's interview of Thomas J. DeLong, a professor at the Harvard Business School who studied high-achieving individuals, for the Harvard Business Review entitled "The Hidden Demons of High Achievers". The above ideas about high-achieving individuals are based on DeLong & DeLong (2011) and this transcript.

their ability to deal successfully with the challenges of extended/open inquiry and whether they would have a positive or negative over-all inquiry experience. Furthermore, this perspective underscores the difference between the present study and studies on affect that deals with students' attitudes towards science, enjoyment of science, interest in science, motivation, beliefs, self-efficacy, self-confidence, and values (Alsop & Watts, 2003).

The study examined students' emotion work by employing ideas from both psychology and sociology. Using students' narratives, this study looked at the individual processes of students' emotion work in terms of situations that engendered emotion work and strategies that students used, but located them within the context of the undertaking of two-year open school science inquiry projects. It also considered influences from the students' social and cultural environment by identifying the links between students' emotion work and achievement discourses, as depicted in school artefacts and students' emotion work narratives. These research aims (explicated further in Chapter 4) are in line with recent recommendations for research on emotion that forges links across disciplines (Gross, 2013), incorporates a social focus to psychological research on emotion, and uses a multilevel analytical approach (Butler & Gross, 2009).

Significance of the study. The findings of this research can lead to a discussion of students' potential to shape their classroom and school experiences through their emotion work. For science education, the contextualised depiction of students' emotion work extends the sparse existing knowledge on students' emotion experiences while undertaking open school science inquiry. The findings of this study provide new insights into students' emotion experiences in school that may guide the design of learning environments and the provision of pedagogical support. Furthermore, by examining students' management of emotion within the context of their daily school life, this study contributes evidence that might be used to assess the ecological validity of emotion research findings from clinical and experimental settings.

Organisation of the thesis. The subsequent chapters of this thesis are organised as follows: conceptual background on emotion, emotion experiences, and emotion work (Chapter 2); literature review (Chapter 3); the research questions (chapter 4); research methodology and design (chapter 5); analytical procedures (Chapter 6) and research results pertaining to the situations (Chapter 7) and strategies (Chapter 8) of students' emotion work; analytical procedures (Chapter 9) and research results (Chapter 10) pertaining to the links between students' emotion work and achievement discourses; and finally, the discussion of the findings, implications, and limitations of the research (Chapter 11).

Chapter 2
Conceptual Background: Emotion, Emotion Experiences, and Emotion Work

This chapter explains the perspective that is adopted in this study for the following concepts: emotion, emotion experiences, and emotion work.

The perspectives of "emotion" and "emotion experiences" that are adopted in this study are explained in the first two sections. Then, in the following sections, the various aspects of emotion work are elaborated—what emotion work is; how it is related to emotion regulation, and to display and feeling rules; and the strategies of emotion work.

2.1 Emotion

Emotion, in this research, is viewed as both embodied and socially constructed. This view reflects a moderate position with respect to the biological-social debate on emotion. Emotion is currently viewed as a non-unitary concept; as such, there has been no consensus as to its definition and researchers adopt heuristic definitions (Izard, 2010). At the biological end of the continuum, the most basic organismic models view emotion as "caused by a dedicated mechanism (a definable brain circuit or affect program) that produces a coordinated package of experiences, incipient response tendencies, expressive behaviors (e.g., facial expressions), and autonomic and neuroendocrine responses" (Gross & Barrett, 2011, p. 10). This view has insufficient explanatory value considering the socio-cultural perspective adopted in this research.   At the other end, within the most hard line of social construction models, emotions are "social artifacts or culturally-prescribed performances that are constituted by sociocultural factors, and constrained by participant roles as well as by the social context" (Gross & Barrett, 2011, p. 11). This extreme position discounts emotions as internal mental states (Gross & Barrett, 2011).

A moderate position in the biological-social continuum, on the other hand, depicts emotion as "temporally embodied self-feelings which arise from emotional social acts persons direct to self or have directed toward them by others" (Denzin, 1983, p. 404). The term "embodied" refers to the interplay between mental awareness and bodily actions or responses (Sarbin, 2004). Hence, bodily expressions of emotions (e.g., frowning, smiling, a lump in the throat, a racing heart, or change in the tone of the voice) might either influence or be indicators of the inner experience of emotions (e.g., anxiety,

joy, sadness, anger, or fear). This view of emotion highlights the fact that though emotion experiences are internally constituted, they are nevertheless influenced by one's interaction with the self and others (see also Tamir, 2011, for similar ideas as they relate to emotion regulation).

One perspective of emotions that is useful in considering experiences of emotion in the school setting derives from an episodic-dynamic systems component view of emotion (Pekrun, 2006; Shuman & Scherer, 2014). In this view, emotions are episodes that are evoked by actual, remembered or imagined stimuli, such as, for example, the anxiety that students feel when taking a test or from the thought of the possibility of failing a test (Shuman & Scherer, 2014). Furthermore, emotions are thought of not as discrete emotions (e.g., anger, fear, sadness, happiness) but as "multi-component, coordinated processes of psychological subsystems including affective, cognitive, motivational, expressive, and peripheral physiological processes" (Pekrun, 2006, p. 316). So, for instance, when one thinks of anxiety from this perspective, anxiety can be composed of "uneasy and tense feelings (affective), worries (cognitive), impulses to escape from the situation (motivation), … peripheral activation (physiological)" (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011, p. 37) (e.g., elevated pulse rate (Shuman & Scherer, 2014)), and "anxious facial expression (expressive)" (Pekrun, 2006, p. 316). This perspective was especially useful in examining students' narrations of experiences of emotion, since students' narratives of emotion experiences were generally event-focused and their depiction of emotions included any of these components.

The terms "feelings" and "emotions" are used interchangeably in this study for the following two reasons; although it is recognised that the nuance between the two terms has been explicated (see Denzin, 2009, p. 3, for one example). Firstly, because the focus of this research is on the acts that students do to manage their emotions, and not on feelings or emotions as such. Secondly, the primary data source was self-accounts, where references to emotions and feelings were based on the participants' unique understanding of the terms. Requiring these young people to keep in mind the distinction between the terms based on heuristic definitions while they write or talk about their emotion experiences would have been an imposition that might have been counterproductive.

2.2 Emotion Experiences

In this study, the term 'emotion experiences' is used to refer to the phenomenological contents of students' experiences of emotion, as revealed in their emotion work narratives. According to Barrett, Mesquita, Ochsner, and Gross (2007), the phenomenological contents of emotion experiences are a person's "mental representation of ….past feelings (memories), hypothetical feelings (imaginings), or feelings that are occurring in the moment (on-line experiences)" (p. 377). Furthermore, they explained that "self-reports" (e.g., personal narratives) are "the most direct way" to access these phenomenological contents (p. 377). Barrett et al. (2007) described several components of this mental representation. The most basic component, the "core affect", is a state of pleasure or displeasure about objects or events (p. 377). Then, in addition to the core affect, emotion experiences are differentiated by their arousal, relational, and situational contents. Arousal content refers to "felt activation" of the mind or body, which is related to "actual physiologic activity" (p. 379). Relational content, on the other hand, is associated with values and norms about social relationships within a "particular cultural context" (p. 380). Situational content is the "situated meaning" that a person ascribes to an experience of a "psychological situation" with respect to it being "(a) novel or unexpected, (b) conducive or obstructive to some goal, and (c) compatible (or not) with norms and values (d) for which a person has (or does not have) some responsibility or agency" (p. 380).

The term 'emotion experiences' is considered appropriate for referring to students' emotion work-related accounts because, in many cases, students did not explicitly identify discrete emotions. Rather, their accounts were an amalgam of emotion labels, emotional displays, and arousal, relational, and situational contents, as explicated above.

2.3 Emotion Work

Emotion researchers determined that emotions may be activated and an ongoing emotion experience can change to another during "events [or] situations that present challenges or opportunities", in "social interactions and affiliations", and in "goal-related activities" (Izard, 2010, p. 366). Emotions can also be elicited in the course of the undertaking of "appraisal processes" (i.e., the subjective evaluation of events and situations that one encounters) (Brosch, 2013, p. 369) and other acts of cognition, such as

when one recalls memories or sees images (Izard, 2010). But not all the emotions that are generated in these situations trigger the performance of emotion work.

2.3.1 Emotion Work Defined

The concept of emotion work signifies an individual's agency over his or her own feelings. Hochschild (1979), who introduced the concept, defined it as "the act of trying to change in degree or quality an emotion or feeling" and categorically stated that emotion work is not merely an effort to "stifle or prevent feeling" (p. 561). She stressed that emotion work refers to the "effort…and not to the outcome, which may or may not be successful" (p. 561). In building up the concept of emotion work, she presented the idea that individuals have a "primary emotive experience" that is passively experienced and might be induced or stimulated by social factors. Simultaneously, they can also perform "secondary acts" on these emotions. Hence, the basic assumption that underlies emotion work is this: people think about what they feel, and they can take an active stance towards what they feel and do something about it.

Although it is conceded that it is difficult to separate automatic or routine emotion regulation from intentional and effortful management of emotion (Bolton & Boyd, 2003), it is, however, recognised that emotion work is better explained using a two-factor model that considers both the elicitation of emotion as one factor and the management of an existing emotion as a second factor (von Scheve, 2012). Therefore, any consideration of emotion work would entail the scrutiny of an emotion-eliciting situation and would look for evidence of awareness of self-feelings within a particular situation, a goal to modify the experience of emotion, and intentionality.

This research adopts a broad perspective of emotion work that includes research works that built on Hochschild's (1979) idea of emotion work. Hochschild's (1979) initial conceptualisation of emotion work on oneself reflects a dichotomy, which consists of "working feeling up" or the evocation of a "desired feeling which is initially absent", and "working feeling down" or the suppression of an "undesired feeling which is initially present" (p. 561). She also explained that emotion work is synonymous to emotion management or deep acting[2], but is broader in scope than mere emotion

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[2] Deep acting involves attempts to make the internal emotion experience congruent to the outward display of emotion, "to actually experience the emotions" that

control or suppression (Hochschild, 1979). Recent literature, however, suggests that the maintenance of a desired feeling, especially over an extended period (e.g., efforts to sustain passion for a long-term commitment), is also a form of emotion work (as implied in Jacobsson & Lindblom, 2013). In addition, emotion work may also involve the shaping of one's feeling, which can be an attempt to influence an existing emotion without the goal of eradicating it; for example, boosting an existing emotion or using it to segue to another emotion, such as the progression from joy to pride (Lively, 2008).

This idea of performing emotion work on oneself has been expanded to include other participants, showing that emotion work consists of interactions not only with oneself but also with others: "emotion work can be done by the self upon the self, by the self upon others, and by others upon oneself" (Hochschild, 1979, p. 562). The notion that emotion work is performed in both private and social spheres has been reinforced by other sociologists:

> [T]here have been three distinct types of work that have been characterised as 'emotion work': the management of self-feeling, the work of making others feel a certain way, and the effort involved in giving definition to one's work. (Mirchandani, 2003, p. 722)

> Daniels' definition suggests that emotion work involves not only monitoring one's reactions to situations but also caring for others and establishing links between people and events. (Mirchandani, 2003, p. 723, citing Daniels, 1987)

2.3.2 Terms Related to Emotion Work

There are several terms in the literature that are associated with emotion work. The closest one is emotional labour, which is usually depicted as emotion work in the public sphere and in paid work contexts (Hochschild, 2012). Another is emotion management, which is used interchangeably with the other terms (e.g., in Bolton & Boyd, 2003; Thiel, Connelly, & Griffith, 2012). However, the concept that has close association with emotion work and was helpful in conceptualising this study is emotion regulation, which provides insights into the individual aspect of emotion work.

Emotion regulation and emotion work can be taken as terms that refer to a similar phenomenon. To illustrate, the following definition of emotion regulation (Gross, 2007, cited in Brans, Koval, Verduyn, Lim & Kuppens, 2013, p. 1) virtually maps onto Hochschild's (1979) definition of emotion

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one displays. In contrast, surface acting "involves simulating emotions that are not actually felt." (Morris & Feldman, 1996, p. 990)

work: "Emotion regulation has been defined as the strategies that people use to decrease, maintain, or increase their emotions." The concepts are similar in the sense that they recognise the presence of a goal to transform (i.e., increase, decrease, or maintain) emotion (Brans et al., 2013; Gross, 2013). Furthermore, some studies on emotion work have identified strategies that have also been established as emotion regulation strategies (e.g., Jacobsson & Lindblom, 2013; Williams, 2013).

Emotion regulation and emotion work, however, differ in the perspectives and foci that are adopted when investigating the phenomenon (von Scheve, 2012). Emotion regulation is studied from a psychology perspective and focuses on "individual processes and mechanisms"; while emotion work adopts a situated, sociological point of view and focuses on the influence of social and cultural factors on the regulation of emotion, and might explore the interaction of psychological and social-cultural processes (von Scheve, 2012, p. 2). In addition, emotion regulation includes automatic and spontaneous acts (Gross, 1999), while emotion work, with its emphasis on the individual's active stance towards emotion, deals with conscious efforts to manage emotions (Bolton & Boyd, 2003).

2.3.3 Feeling/Display Rules and Other Motivations for Emotion Work

The performance of emotion work might be brought on by several factors. First, an awareness of a discrepancy between what one feels, what one should feel, and what one wants to feel, can lead to an attempt to eliminate this discrepancy by "working on feeling" (Hochschild, 1979, p. 560). 'What one wants to feel' might be influenced by his or her knowledge of feeling rules or display rules, which is a result of the socialisation process that an individual underwent (Hochschild, 1979; Morelen, Zeman, Perry-Parrish, & Anderson, 2012; Zeman et al., 2006). According to Hochschild (1979), feeling rules are social "guidelines that direct how we want to try to feel… for the assessment of fits and misfits between feeling and situation" (pp. 563, 566). For example, one feeling rule might be that an employee can be "legitimately angry at the boss" (Hochschild, 1979, p. 566). Similarly, "[d]isplay rules are culturally defined rules that guide a person's decision to alter emotional behaviour consistent with the demands of the social context" (Zeman et al., 2006, p. 157). Offering a smile and a thank you, for example, is the display rule for expressing a feeling of gratitude towards the giver of a present (Zeman et al., 2006).

An individual's adherence to these rules might be judged by others on the basis of the fitness of his or her emotional display to the situation. Hence, the desire to avoid stress, which may result from one's awareness of the discrepancy between what one feels and how one is expected to feel (Mirchandani, 2003), or to avoid sanction from self or others for "misfeeling" (Hochschild, 1979) can be motivations for the performance of emotion work. In such cases, emotion work is aimed at achieving a consistency between emotion, rule, and situation (Hochschild, 1979).

Second, emotion work might figure in activities that involve meaning-making or require the sustaining of meaning (Hochschild, 1979). For instance, students involved in what they perceived to be tedious activities might deploy strategies in order to appreciate the significance of their undertaking so that they can evoke enthusiasm for it.

Third, emotion work might be performed to maintain or "re-create" an emotionally-balanced environment (Kawale, 2008). For this reason, the desire to avoid what one perceives to be "negative" emotions (Scherke, 2012) or to alleviate negative emotions (Davis, Levine, Lench, & Quas, 2010) is a strong motivation for emotion work. However, there are suggestions from emotion regulation researchers that "feeling better is rarely the desired end-state" for managing emotions (Tamir, 2011, p. 4). Rather, a fourth motivation for emotion work might be the successful attainment of instrumental goals (Gross, 2014; Tamir, 2011).

2.3.4 Strategies of Emotion Work

Researchers have different ways of classifying strategies in managing emotions. In her seminal article on emotion work, Hochschild (1979) identified three kinds of techniques:

> One is <u>cognitive</u>: the attempt to change images, ideas; or thoughts in the service of changing the feelings associated with them. A second is <u>bodily</u>: the attempt to change somatic or other physical symptoms of emotion (e.g., trying to breathe slower, trying not to shake). Third, there is <u>expressive emotion work</u>: trying to change expressive gestures in the service of changing inner feeling (e.g., trying to smile, or to cry). This differs from simple display in that it is directed toward change in feeling. It differs from bodily emotion work in that the individual tries to alter or shape one or another of the classic public channels for the expression of feeling. These three techniques are distinct theoretically, but they often, of course, go together in practice. (p. 562)

Other emotion work researchers that built on Hochschild's concept of emotion work referenced emotion regulation literature in conceptualising

emotion work strategies (e.g., Fixsen & Ridge, 2012). Researchers on emotion regulation, on the other hand, cited literature on coping as a basis for conceptualising emotion regulation strategies (e.g. Parkinson & Totterdell, 1999).

In emotion regulation, strategies are classified as either diversion or engagement, expressed either as a cognitive act or a behaviour. Diversion strategies involve "redirecting cognition or action away from the current concern" while engagement consist of "sustained attention to, or work on, the problem or affect" (Parkinson & Totterdell, 1999, p. 284). Another perspective classifies emotion regulation strategies into antecedent-oriented strategies that aim to influence the emotion-eliciting situation, and response-oriented strategies that are deployed once emotional responding has been initiated in order to deal with the consequences of an emotion (von Scheve, 2012). The process model of emotion regulation identifies five emotion regulation processes that map onto these two groups of strategies: situation selection, situation modification, attentional deployment, and cognitive change (i.e., antecedent-oriented strategies), and response modulation (i.e., response-oriented strategy) (Gross, 1998).

Academic coping, on the other hand, considers strategies that students deploy in dealing with the "cumulative demands and problems presented by their everyday life" in school (Skinner, Pitzer, & Steele, 2013, p. 804). Coping involves the regulation of emotion in stressful situations (Buric, Soric, & Penezic, 2016; Compas, 2004); although, coping has been differentiated from emotion regulation by its focus on reducing negative affect and its longer time frame (Gross & Thompson, 2007). Skinner et al. (2013) have identified families of academic coping strategies, which were differentiated further as either adaptive (e.g., problem-solving, support-seeking) or maladaptive (e.g. escape, social isolation). Adaptive strategies promote academic engagement or re-engagement, while maladaptive strategies amplify negative emotions and lead to disengagement from academic tasks (Skinner et al., 2013).

In this study, ideas based on Hochschild's (1979) categories, and on emotion regulation and coping strategies, were used as conceptual guide in

identifying instances of students' emotion work in the narratives. A list of these strategies with corresponding descriptions is provided in Table 6.4.

2.4 Chapter Summary

This chapter explicates the perspectives that this study has adopted on emotion, emotion experiences, and emotion work. These emotion-related concepts foreground the psychosocial, sociological and contextual perspectives that characterise the empirical research literature that is reviewed in the next chapter.

Chapter 3
Literature Review

This chapter presents an overview of empirical studies related to students'
emotion work. It highlights the research contexts, methods, and outcomes
of these studies.

3.1 Overview of the Chapter

The literature review, which has four main parts, starts in Section 3.3 after a
description of the literature search protocol in Section 3.2. Due to the
paucity of research on students' emotion work, the following review was
drawn from a broad set of literature that covers various research settings
and approaches.

First, two theories that underpin two areas of research on students' emotion
experiences in the academic setting are presented, and allusions to emotion
work implied within the theories are noted. Key ideas from these theories,
on achievement emotions and coping, relate to how students' appraisals and
how contextual information from students' social and cultural environment
can influence their experiences of emotion in school. Selected studies
underpinned by these theories are then examined to identify some of these
social-cultural elements. These two theories are useful as lenses for
understanding students' emotion experiences in research literature from
various contexts. (Section 3.3)

Second, the only research article on emotion work in a school setting which
involved students is reviewed. To supplement this, selected studies on
emotion within academic settings that have some congruence to the agenda
and setting of the present study are also reviewed. It is argued that,
although empirical research in this area is sparse, evidence from these few
studies suggests that students manage their emotion experiences by
deploying various strategies, and that teachers and the school structure
influence the way students experience and manage emotion. (Section 3.4)

Third, a selection of articles featuring students engaged in science inquiry is
surveyed. The survey shows that, although the focus of these investigations
was neither emotion nor emotion work, anecdotal accounts in these
research articles provide insights into potentially emotion-eliciting situations,
within contexts that are similar to that of the present study, that might
engender students' emotion work. (Section 3.5)

Fourth, an overview of emotion work research in non-school, non-paid work settings is presented to draw out two features of existing research on emotion work: how emotion work is depicted, and how emotion work is investigated in these contexts. The emotion work literature suggests that problematic or unpleasant situations, rather than the positive ones, usually engender emotion work. Furthermore, emotion work researchers endeavour to locate emotion work not only inside but also outside of the individual, in order to highlight the social-cultural contexts that impact on people's emotion experiences. (Section 3.6)

At the end of the chapter, the last section presents a summary of the key ideas from the literature review.

3.2 The Literature Search

The research literature that is cited in this review was located via a broad but not exhaustive literature search. Relevant literature was located using the Web of Science, a university library resource which provides access to multiple data bases. Then, the reference lists of these source materials were also searched for other relevant literature. The following protocol was applied in three rounds of literature search: (1) during the conceptualisation of the study, (2) after the field work and during data analysis, and (3) before the writing of the thesis.

A search was conducted using the Web of Science to find articles with 'emotion work' in the title and topic. The search results were scanned to identify empirical studies investigating emotion work within school settings. These search criteria yielded one emotion work research article within a school context (see Section 3.4.1). Other articles in the aforementioned search results were then examined more closely. Since the present research is an exploration of students' emotion work within the school setting, research articles that were not relevant to the setting and agenda of the present study were excluded from consideration. For instance, a survey of the articles showed that emotion work in paid work settings or within the context of economic activities (also referred to as emotional labour) has a different nuance from that in non-paid work settings; so it was decided that research literature within the aforementioned settings and context would not be included. It was also decided that emotion work by teachers that is explicitly connected to an economic activity (e.g., as an employee of the school) would not be considered. The screening of the literature search results was then focused on emotion work research in non-school, non-paid

work settings. It turned out that the application of these criteria excluded research articles with quantitative and mixed methodologies. Thus, the remaining articles that were considered for this literature review reported about qualitative research. The aforementioned search criteria generated fifteen emotion work research articles in non-school, non-paid work contexts (see Section 3.6).

To address the paucity of emotion work research literature in school settings, the next approach to literature search located emotion research literature within school settings. The search results were screened to admit only those articles that provide information relevant to the agenda and context of the present study. The nine articles that were found are reviewed in Section 3.4.2.

Finally, in response to research evidence that students' emotion experiences are domain-specific (Goetz, Frenzel, Pekrun, & Hall, 2006), and the fact that the abovementioned search did not yield research literature on emotion work within the context of school science inquiry, further literature search was conducted to locate empirical research literature featuring students engaged in science inquiry that contained anecdotal evidence of potentially emotion-eliciting situations that might engender emotion work. A survey of the ten articles is reported in Section 3.5.

3.3 Two Theories That Underpin Students' Experiences of Emotion

The following two theories underpin a number of research on student emotions in the school setting. These theories assert that students' appraisal of situations that they encounter in school determines to a large extent their experiences of emotion.

3.3.1 The Control-Value Theory of Achievement Emotions

Pekrun's (2006) control-value theory of achievement emotions recognises that school is an achievement setting and explains that emotions can be evoked (a) during the performance of achievement (or learning) activities and (b) by the outcomes of these activities. Hence, there are activity emotions associated with "ongoing achievement related activities" (e.g., enjoyment, boredom), and outcome emotions (e.g., hope, disappointment) (p. 317). Outcome emotions can be further characterised into two kinds: (a) anticipatory and prospective emotions, which are dependent on students' expectations of outcomes (e.g., anxiety about a test result), and (b)

retrospective emotions (e.g., shame), which are experienced once feedback about outcomes is received. Furthermore, these emotions are characterised by valence. That is, whether students would experience positive or negative emotions associated with these activities and outcomes would depend on two things: (a) their appraisal of control, the extent of the influence that they have over the actions and outcomes related to these achievement activities, and (b) their judgement of the value of these actions and outcomes. For instance, when students think that an achievement activity is worth undertaking (positive value appraisal) and that they are capable of doing it (control appraisal), they would likely experience enjoyment (i.e., activity emotion) while doing it. Inversely, if they think they have failed in what they had set out to do (negative value appraisal), they would likely feel shame (i.e., retrospective outcome emotion) if they attribute the failure to themselves (control appraisal), or anger, if the failure is attributed to others.

Pekrun's theory identifies a set of discrete emotions known as academic or achievement emotions (Pekrun, 2006), and related research has focused on outcome emotions such as anxiety, pride, and shame, and activity emotions such as enjoyment and boredom (Pekrun & Linnenbrink-Garcia, 2014). Boredom, for example, could be due to the lack of challenge (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010), or to the "tediousness and meaninglessness of a task", and might be characterised by feelings of dissatisfaction and frustration (Acee et al., 2010, p. 17). It is considered a negative, debilitating emotion that adversely affects "attention and effort at achievement activities", and individuals who experience it have a desire to escape the situation that causes it (Pekrun et al., 2010, p. 533). This reference to 'desire to escape' by either behavioural or mental disengagement suggests the possibility of the performance of emotion work.

3.3.2 Theory of Stress and Coping

The second theory, which is on stress and coping and was developed by Lazarus and his colleagues (Folkman & Lazarus, 1985), has relevance to the study of students' emotion work because it describes the nature of situations that might evoke stress-related emotions and engender emotion-focused coping strategies, which arguably can be considered as emotion work. According to this theory, students would consider situations to be stressful if they perceive threats (i.e., the "potential for harm or loss") or challenges (i.e., the "potential for growth, mastery, or gain"), or actually experience perceived harm or loss, as they interact with the school environment (p. 152). In these situations, students would be assessing how

they are managing the impact of these threats, challenges, and harm-loss on their well-being. If they perceive adverse impact on their well-being and excessive demands on their resources, distressing emotions can be evoked. They might then deploy strategies to manage their emotions, or to change the distress-causing situations.

Folkman and Lazarus (1985) categorised emotions related to stress and coping, which were experienced by students undertaking university examinations, as threat emotions ("worried, fearful, and anxious"), challenge emotions ("confident, hopeful and eager"), harm emotions ("angry, sad, disappointed, guilty, and disgusted"), and benefit (mastery-gain) emotions ("exhilarated, pleased, happy, relieved") (p. 154). Their findings also showed how students' emotions and their ways of managing their emotions changed at different times during the examination period, an allusion to students' emotion work.

These abovementioned two theories suggest that situations that can potentially engender students' emotion work might be identified by looking at students' appraisal of control and value of achievement activities and outcomes, and by examining situations that involve problematic student/school-environment relationships.

3.3.3 Contextual Elements That Can Influence Students' Emotion Experiences

Although the aforementioned theories have a cognition focus because of their emphasis on appraisal processes, they also acknowledge that social and cultural contexts can influence students' emotion experiences in school.

Pekrun (2006), for instance, points out that information about "controllability and academic values" that the social and cultural environment transmits to students will have a substantial impact on the emotions they experience (p. 325). Examples of these elements are "autonomy support, goal structure, … achievement-related expectancies of significant others, … feedback and consequences of achievement", and "cultural values pertaining to the definition and relevance of achievement" (p. 325). Lazarus's theory, on the other hand, underscores that a person's emotional response to a "troubled person-environment relationship", and how he or she coped with it, is influenced by his or her appraisal of this troubled relationship (Folkman & Moskowitz, 2004, p. 746). In essence, these theories suggest that the cognitive appraisal that evokes an experience of emotion does not take place in a void; contextual information from the environment is involved in

this appraisal. The following two studies referencing Pekrun's theory and a third study on coping underpinned by Lazarus's theory illustrate this idea.

A quantitative study involving 200 grades 7 to 10 students in Latin language classes in the German school system provides confirmatory evidence that students' experiences of emotion are correlated with aspects of their social environment, such as peer influence, achievement pressures from family and in school, and teacher and pedagogical factors (e.g., teacher enthusiasm, mode of instruction) (Goetz, Pekrun, Hall, & Haag, 2006). Peer regard, a type of peer influence which reflects students' perception of the regard their peers hold for particular academic subjects or activities, was shown to have greater relevance to students' experiences of academic emotions in these Latin language classrooms than their motivation or academic performance.   On the other hand, the effects of students' perception of quality of instruction and of the teacher as punitive were related to students' experiences of anger, boredom, and enjoyment in mathematics classes, according to a quantitative study involving 1,623 students from 69 grades 5 to 10 classes in Germany (Frenzel et al., 2007).

A study of university students' coping strategies during the examination period, on the other hand, found that appraisals with regards to stakes or personal risk (such as not achieving the desired grade or appearing incompetent to others), the perceived difficulty of the examination, and how much in control the students were feeling, accounted for the variations in the emotions they experienced (Folkman & Lazarus, 1985). In addition to this, the study also found that students' social support system was a useful coping resource at different times during the examination period, with emotional support most sought after when dealing with the outcome of the examination. This result suggests that "[h]aving a social support system … may contribute to whether a person feels generally challenged or threatened" by stressful situations (p. 161).

These two theories and the empirical research underpinned by them explicate the antecedents of the various emotions that students might experience in school and the social and cultural elements that might influence these experiences. The next section features a review of literature on emotion work and emotion within the school setting.

3.4 Emotion Work in School Contexts

The first of the two subsections is a critical examination of a study of emotion work in school. In the second subsection, studies that investigated students' emotion experiences in school are surveyed for ideas relevant to students' emotion work.

3.4.1 Emotion Work in the School Setting

The study by Tainio and Laine (2015) is the only research article found that explicitly claims to investigate emotion work in a school setting. It examined emotion work that was embedded in teacher-student interactions in Finnish mathematics classrooms.

Background details. The study aimed to "identify [interactional] practices that might serve as sources of decreasing positive emotional engagement" (p. 70). Data sources were video-recordings of ten sixth-grade mathematics lessons that were taught by different teachers in comprehensive schools. Data were analysed using conversational analysis. The unit of analysis was Initiation-Response-Evaluation (IRE) sequences that featured an incorrect answer from students. Both linguistic and non-verbal elements of the interactions were considered in the analysis. The results of the micro-level analysis were (1) a typology of teacher evaluative responses to students' incorrect answer, (2) three instances of emotion work as drawn from teachers' and students' affective stances during the interactions, and (3) the outcomes with respect to sustaining students' participation in the interactions. An affective stance was defined as "a mood, attitude, feeling, and disposition, as well as degrees of emotional intensity vis-à-vis some focus of concern" (Ochs, 1996, cited in Tainio & Laine, 2015, p. 68).

View of emotion work. The aspect of emotion work that the study used as its underpinning was the relationship between "emotional rules" and displays of emotion—how one's "orientation" to these rules could lead to "emotional labor" (Hochschild, 2003, cited in Tainio & Laine, 2015, p. 68). The assumption was that interactional practices in the classroom could lead to the development of social norms, which included emotional rules.

In the article, there was no reference to Hochschild's (1979) definition of emotion work as attempts to "change in degree or quality an emotion or feeling" (p. 561) (see Section 2.3.1). Instead, there was a tacit assumption that emotion work was being undertaken within student-teacher interactions, as indicated by their exchange of affective stances. Corollary to this was the implicit assumption of intentionality; that is, teachers' and students' affective

stances were directed to influencing their emotion experiences within the ongoing interactions.

Comments on the methods. The abovementioned tacit assumptions can be considered limitations of the study due to the kind of data sources and the analytical approach the researchers used. In the absence of personal accounts from the participants, the researchers were dependent on verbal and non-verbal cues within episodes of pedagogical interaction in interpreting teachers' and students' emotional responses, and there was no way of establishing whether the participants were indeed attempting to influence their or the other person's emotion experience. Notwithstanding these limitations, this study illustrated how emotion work might be identified in teacher-student interactions using conversation analysis (the original contribution claimed by the researchers). Their claims about emotion work could have been strengthened, though, if they provided corroborating evidence from personal accounts of teachers and students.

Findings on emotion work. The study investigated one situation, which was predetermined and tacitly assumed to engender emotion work. In their findings, emotion work was depicted as a reciprocal endeavour by both teachers and students, which was governed by their intersubjective understanding of the underlying emotional rules. However, although the study was predicated upon the emotional rules inherent in classroom interactions, the researchers only mentioned their assumption with respect to the emotional rules that pertained to teachers, namely, "professional neutrality" and the display of emotions "to help pupils enjoy the learning process and to motivate them in their task" (Tainio & Laine, 2015, p.84). There was no mention of the emotional rules for students, or shared rules that were operating or developed during the interactions.

This research depicted emotion work as situated in teachers' interactional moves, which were interpreted as affective stances that initiated a sequence of student and teacher responses, which comprised an episode of emotion work. Emotion work was described in terms of the affective turns the teachers and students made during the interaction that featured students' incorrect answers. There were descriptions of the verbal and non-verbal responses by teachers and students, their emotional displays, and the instances where students' and teachers' emotional displays differed or matched. The pedagogical message that might have been communicated by the teacher stance and how it might have impacted on students' engagement in the interaction and the pedagogical task that was being

undertaken during this interaction were interpreted. In this sense, emotion work was seen as instrumental to achieving the pedagogical aims of classroom interactions. However, although the authors referred to the "division of emotional labour" between students and teachers (Tainio & Laine, 2015, p. 78), the emotion work was essentially credited to the teacher—because it was the teacher's response to the student's incorrect answer that was highlighted as having influenced the student's participation, tacitly implying the elicitation of an emotional response from the student that either sustained or disrupted his or her engagement. Three different episodes were reported as examples of emotion work. One of the three illustrative cases, for instance, pointed out that the teacher's use of humour led to an interaction where the student's incorrect answer was treated as "accidental" and as a "normal, appropriate part of classroom interaction"; hence, it seemed to "encourage pupil participation" (Tainio & Laine, 2015, pp. 75, 76).

Relevance to the present study's research questions. Tainio and Laine (2015) drew attention to pedagogical messages in teacher stances, which can be considered as information from the social environment that students might receive and use in their appraisal of emotion-eliciting situations (see Pekrun's (2006) theory in Section 3.3.1). The research also suggests one situation that can engender emotion work, namely, teacher-student interaction within a questioning activity. Furthermore, it provides a situated view of how teachers performed emotion work in interactions with students in the form of affective stances. The teachers' affective stances might be viewed as a resource for students' emotion work; although, the researchers did not explicitly mention this. One aspect that is missing in the research findings is the explicit identification of students' emotion work; which means that, as far as can be ascertained, the present study is the first to have an explicit focus on students' emotion work.

3.4.2 Emotion Studies in School Contexts That Contribute Ideas Relevant to Students' Emotion Work

The following emotion research literature (see Table 3.1 below) contains some aspects that are congruent to the agenda of the present study, although these studies did not investigate emotion work. The first four articles provide ideas about learning contexts wherein students' emotion experiences are evoked. The next two articles report on coping and emotion regulation strategies in academic settings, providing insights into the ways students deal with their emotion experiences. The last three articles

highlight the contextual elements that can influence students' emotion experiences and the way they deal with these experiences—the most prominent of which are the messages that teachers communicate to students.

Table 3.1 A summary of research literature on students' emotion experiences in school.

Reference	Focus of the Article, Setting and Participants	Methodology
Bellocchi & Ritchie, 2015	Students' feelings of pride and triumph when learning science Australia, 8th grade class (29 secondary students) in a science classroom	Microsociological methodology to investigate interactions; students' emotion diaries, video-recordings of class interactions, interviews with students within a 10-week period wherein 13 one-hour science lessons were observed; analysis of emotion diaries to identify lessons and lesson segments related to the production of students' emotional experiences, of video-recordings to identify students' emotional expressions, of interview data for students' perspective about their emotional experiences
Linnenbrink-Garcia, Rogat, & Koskey, 2011	Students' affect and social-behavioural engagement during group work (2 studies) United States, upper-elementary students from a school district (138 4th and 5th graders, 193 5th and 6th graders)	Study 1: Researcher-assigned three-person groups of students worked on a 30-minute mathematics group activity; students completed a questionnaire assessing affect and social-behavioural engagement (in terms of positive group interactions and social loafing) immediately after the activity Study 2: Teacher-assigned four-person groups completed three small group assignments in class over a five-week period for a mathematics unit; students completed questionnaires about affect and positive group interactions after each activity and about social loafing during the group activities at the end of the mathematics unit; videotapes of 6 groups performing the small group activities were qualitatively analysed
Zschocke, Wosnitza, & Burger, 2016	Students' emotions in group work Germany, convenience sample of 446 university students on pre-service teacher training	Self-generated groups (105 groups, 3 to 6 members) worked on an out-of-class group assignment; participants answered questionnaires about their emotional experiences and appraisals of group work at the start and end of the 6-week group assignment period

Reference	Focus of the Article, Setting and Participants	Methodology
Järvenoja & Järvelä, 2009	Students' emotion regulation in collaborative learning situations Finland, 63 first-year teacher education students (volunteers)	Study groups (3 to 5 members) undertaking 3 collaborative learning tasks; after each task, participants answered a researcher-designed questionnaire, rating their experience of 14 (predetermined) possible scenarios that were considered socio-emotionally challenging and their use of various (predetermined) forms of emotion regulation; data from two study groups were compared qualitatively
Buric et al., 2016	Development and validation of the academic emotion regulation questionnaire (a series of four empirical studies; only the first, which is an exploratory study on the content and coverage of emotion regulation strategies, is considered) Croatia, 20 university students in a graduate psychology programme	Students responded to an open-ended questionnaire prompting them to think about the emotions they usually experienced while studying, attending classes, taking exams and tests, and to list the strategies they used to regulate their emotions; analysis of student responses by rational sorting into conceptually distinct groups of emotion regulation strategies
Nett, Goetz, & Daniels, 2010	Explore the different strategies for coping with boredom in mathematics classes Germany, 976 students in 38 grades 5 to 10 classes	Students responded to a questionnaire, the degree of their agreement or disagreement with 20 items, covering four groups of coping strategies with five representative strategies per group; latent profile analysis to identify patterns of use of coping strategies was performed
Turner, Meyer, Midgley, & Patrick, 2003	Teacher discourse, and students' achievement-related behaviours and affect, in mathematics classrooms with high mastery/high performance achievement goal structure USA, two sixth grade classes and two teachers	Audio-recording of teacher discourse and observation for 10 days of mathematics instruction; survey (Likert scale) of students' perception of classroom achievement goal structure, achievement-related behaviours, and negative affect for failure in mathematics
Zembylas, 2004	Role of young children's emotional practices in science learning USA, one teacher, two sets of first- and second-grade students (multi-grade classroom)	3-year ethnographic case study; interview transcripts, field notes, videotapes of classroom observations (200 hours), documents, interview with teacher (45 hours); qualitative coding of classroom dialogue and interview transcripts; constant comparative approach to build and confirm emerging theory

Reference	Focus of the Article, Setting and Participants	Methodology
Harden, 2012	Explore the construction and negotiation of emotions as part of children's classroom experience Scotland, one primary 2 class (6-7 years old) with one teacher and 27 children	Four-month observation of children in school (average of 15 hours per week in classroom and during breaks); two interviews with groups of children; individual interviews at home with 12 children; thematic analysis of interview transcripts (supported by field notes, materials, observation notes)

Situations. The following studies examined two kinds of emotion-eliciting situations: challenging tasks in science learning, and working within a group context.

Bellocchi and Ritchie (2015) reported that emotions could be elicited when students encountered challenging science tasks related to assessment and answering science questions. One of the three findings they discussed dealt with the transformation of one student's emotion experience from negative to positive during a question and answer session involving the whole class and the teacher. The researchers related the student's negative emotions (i.e., embarrassment, disappointment, and irritation) to loss of social status vis-à-vis peer regard, and to negative teacher sanction when the student gave an incorrect answer. They also identified elements of the social interaction that elicited these emotions: the class laughed, the teacher and the student engaged in an "adversarial argumentative" interaction when the student positioned himself as correct and the teacher as wrong (p.651), and the subsequent interaction where other students gave the correct answers. The researchers' analysis did not deal with what the student did to transform his emotions; rather, the transformation was depicted as a consequence of events wherein the student realised his misconception (i.e., display of surprise), which led to a change in his conceptual understanding and to being able to give correct answers (i.e., displays of pride and triumph).

The next three studies investigated students' emotion experiences within the group work context and identified contextual elements that evoked negative emotion experiences. Linnenbrink-Garcia et al. (2011) focused on negative group interactions and social loafing. Their analysis of quantitative data found that negative group interactions (e.g., disrespect, actions that discouraged participation) could engender negative affective responses (e.g., upset, frustration). Furthermore, the analysis of qualitative data found a cyclical pattern between students' negative affect and negative group

interactions—that is, these two conditions could mutually sustain each other over time, but could be disrupted either by positive affect or positive group interactions. They recommended the conduct of further research to test their speculation that this disruption might be due to group members' competence to regulate their emergent emotional responses, alluding to emotion work. Social loafing, on the other hand, was initially hypothesised as an outcome, not an antecedent, of negative affect. However, although the quantitative analysis of social loafing (i.e., off-task behaviours) showed that it was initiated by negative affect, findings from their qualitative data suggested that social loafing and negative affect might have a reciprocal relation, hinting at the possibility that social loafing might engender negative affect.

While Linnenbrink-Garcia et al. (2011) focused on group processes, Zschocke et al. (2016) investigated students' appraisals of various aspects of group work. They reported that students' experiences of negative emotions (i.e., anger, boredom, and hopelessness) were associated with their appraisals of the following group work dimensions: task coordination, assessment aspects, and equal work shares. Moreover, with respect to work shares, students' negative emotion experiences were evoked by perceptions of free-riding (i.e., other members of the group did not contribute to the group work).

Unlike the above two studies, Järvenoja and Järvelä's (2009) study did not examine student emotions elicited during group work. The focus of the investigation was on the socio-emotionally challenging situations that students encountered while undertaking collaborative learning. Of the five kinds of socio-emotional challenges that the researchers presented to the students, work-related challenges (i.e., teamwork, collaboration, work and communication) were more frequently reported than the two other types (i.e., personal priorities, external constraints). The researchers also aimed to verify their assumption that individual- and group-level emotion regulation concurrently take place in collaborative learning situations. The findings of the study differentiated the emotion regulation that students performed in these challenging situations into two forms: self-directed emotion regulation, and shared emotion regulation, where there was joint effort by group members to regulate their emotions to achieve a shared goal.

The aforementioned studies foreground the potential emotiveness of situations involving challenging tasks, social interactions, and group work in school settings.

Strategies. The two studies, by Buric et al. (2016) and Nett et al. (2010),
approached from opposite directions the investigation into strategies that
students used to deal with their emotion experiences within academic
contexts. While Buric et al. (2016) developed categories of strategies from
students' descriptions of what they did to regulate their emotions, Nett et al.
(2010) used predetermined categories of strategies.

Buric et al. (2016) identified five categories of strategies from students'
responses to an open-ended questionnaire about how they regulated the
emotions they experienced when studying, attending classes, and taking
exams and tests. The five categories are:

> 1. Avoiding academic situations which can provoke unpleasant
> emotions (e.g. taking tests); 2. Developing competences and skills
> (e.g. revising the material additionally when feeling insecure); 3.
> Redirecting attention from an event that has elicited unpleasant
> emotion to another object or subject matter (e.g. starting to think about
> something more interesting when bored in class); 4. Reappraising a
> situation that has elicited unpleasant emotion by undermining its
> significance (e.g. reminding oneself of more important things in life
> when feeling upset due to academic failure); and 5. Modulating the
> unpleasant emotional response (e.g. suppressing its subjective and
> behavioural components or reducing the physiological and subjective
> tension through venting, respiration and seeking social support). (p.
> 140)

The researchers noted that these five categories mapped onto Gross's
(1998) model of emotion regulation processes (see Section 2.3.4). This
means that, process-wise, the researchers did not find any new strategies
for emotion regulation.   Furthermore, they observed that students "focused
predominantly" on using strategies to reduce unpleasant emotions, while
"overlooking" strategies to strengthen or sustain pleasant emotions (Buric et
al., 2016, p. 140). In explaining this particular disposition, the researchers
alluded to an instrumental motive related to students' academic goals:
"students view unpleasant emotions as much more debilitating in reaching
their academic goals, and thus most of their effort is directed towards
diminishing the potential disruptive character of unpleasant emotions" (Buric
et al., 2016, p. 140). This disposition to focus on managing negative
emotions was also observed in emotion work in non-school settings (see
Section 3.6 below).

The study by Nett et al. (2010), on the other hand, focused on one affective
state (i.e., boredom) and used existing research as reference to
predetermine strategies for coping with boredom in mathematics classes. In
their 20-item questionnaire, the researchers considered four categories of

strategies that were constituted by combining two dimensions: the first, whether the strategy is approach coping (i.e., directed towards the situation) or avoidance coping (i.e., directed away from the situation), and the second, whether it is cognitive (i.e., involves thinking) or behavioural (i.e., involves taking action). Thus, the four categories of strategies were: cognitive-approach, behavioural-approach, cognitive-avoidance and behavioural-avoidance.

The aim of the research was to identify patterns in students' deployment of these categories of strategies. The researchers were able to identify three main groups of students, based on their patterns of use of these strategies. These three groups of students were distinguished by their preference for using either one of these categories of coping strategies: cognitive-approach, behavioural-approach, and behavioural-avoidance.

The two ways of categorising strategies/processes for regulating emotions, as exemplified in Buric et al. (2016) and Nett et al. (2010), are relatively entrenched in the fields of emotion regulation and coping research (see Section 2.3.4). They have been proven to be robust categorisations and have been featured in many empirical studies. The two aforementioned studies highlight the well-established fact that students do manage their emotion experiences in various school contexts using a variety of strategies. What is lacking are situated elaborations of how students use these strategies, a knowledge gap that is addressed in this study.

Contextual Elements. The final three studies in the table above, featured primary school teachers and students, and explored how the teacher and the school environment impact on students' emotion experiences. All three studies focused on teachers: how two teachers influenced students' responses to negative emotions related to failure (Turner et al., 2003), how one teacher initiated and guided the construction of emotional rules in the classroom (Zembylas, 2004), and how a teacher influenced the regulation of students' emotions (Harden, 2012). Moreover, Harden (2012) and Zembylas (2004) also reported on the role that school structures and interactions with peers played in students' emotion regulation.

Turner et al. (2003) looked into teacher discourse in mathematics classrooms that were identified as having high mastery/high performance achievement goal structure. These classrooms were characterised by high levels of pursuit of mastery goals (i.e., developing ability) and performance goals (i.e., demonstrating ability, avoiding demonstrating lack of ability). The researchers categorised teacher discourse into instructional, motivational

and organisational, and as either supportive or non-supportive. Teacher discourse was considered supportive when it promoted student understanding and autonomy, encouraged student engagement and on-task behaviours, and helped students to "focus on learning via constructive use of errors, persistence, positive affect and peer collaboration" (p. 364). Evidence showed that when teacher discourse was consistently supportive, students reported less negative affect about doing poorly or making mistakes, and used self-handicapping less frequently. Self-handicapping is an avoidance behaviour, where students purposely withdraw effort as a way to obscure low ability and protect self-worth (Nosenko, Arshava, & Nosenko, 2014). When self-handicapping is viewed as a behavioural response to negative affect related to failure, as in the abovementioned study by Turner et al. (2003), self-handicapping might be considered as students' strategy for managing negative emotions evoked by underperformance or failure.

Zembylas (2004) presented evidence on how one teacher cultivated an "accepting and supportive emotional culture" (p. 700) in the science classroom through her pedagogical practices, the organisation of space and material in the classroom, the promotion of classroom ownership for students and of strong bonds with peers, the absence of grading, and the use of qualitative feedback. Moreover, the teacher helped students develop positive emotions (e.g., excitement) towards science and science learning, and deal with situations that elicited negative emotions (e.g., making mistakes, disagreements), by co-constructing with them emotional rules during classroom interactions while learning science. The teacher achieved this co-construction by embedding these emotional rules in her verbal responses (e.g., "okay to make mistakes", p. 707) or in her teaching practices (e.g., "accepted all answers in a completely nonevaluative manner, but she would always ask children to justify their thoughts", p. 700). These teacher moves might be considered as allusion to the teacher's student-directed emotion work.

Harden (2012) focused on how the teacher and school structures acted conjointly to regulate young children's (6-7 years) emotional expressions in the classroom[3]. The teacher used verbal and non-verbal ways to communicate expectations, to enforce good behaviour, and to help the

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[3] Harden (2012) mentioned emotion work once in the article, when referring to children's "management of feelings in order to maintain relationships" with their friends in school (p. 89).

children develop control over their bodies and emotions. Furthermore, the regulation of children's emotional expressions was also achieved through regimented classroom routines, restrictions on movement in different places in school, and explicit guidelines on appropriate appearance and behaviour. Interviews with these young children showed that they were "aware of the imperative to control emotions" (p. 88). Furthermore, classroom observations yielded evidence that the children were aware of "appropriate emotional behaviour in the classroom", and thus, regulated their (and helped monitor their peer's) emotional expressions (e.g., "trying not to cry") (p. 88). The researcher also pointed out that these children's emotional expressions were significantly influenced by "shared meanings" (p. 89), thereby implying that knowledges about emotions and emotional behaviours are co-constructed in school.

The overarching idea from these three studies is this: teacher practices and the school environment convey information about expectations on performance, achievement, and behaviour to students that influences their emotion experiences and the way they deal with these experiences.

Although the nine studies in this subsection provide insights into the various elements of students' emotion experiences, only one of them (i.e., Zembylas, 2004) was situated in science learning. Other researchers have shown that students' emotion experiences are essentially domain-specific (Goetz et al., 2006). There is, therefore, a need for more investigation into students' emotion experiences within the context of science learning. The present study is set within the undertaking of school science open inquiry projects; and there is a paucity of research on students' emotion experiences within this context. Therefore, the inclusion of the next section is warranted by the need to understand what might potentially engender students' emotion work as they undertake science inquiry projects.

3.5 Anecdotal Evidence of Students' Emotion Experiences While Engaging in Science Inquiry

This section presents the results of a survey of research articles featuring students engaged in science inquiry. The intent of the survey is to gather insights into students' emotion experiences while undertaking open science inquiry, which can potentially engender emotion work. As the focus of these studies is not students' emotion experiences, no attempt is made to review their contribution to research on student emotions. Rather, they were mined

for anecdotal accounts that allude to students' emotion experiences. An overview of the selected research literature is given in the following table.

Table 3.2 Summary of research literature featuring students engaged in science inquiry.

Reference	Research Context
Chin & Chia, 2006	Singapore; year 9 students (15-year olds) in a biology class who carried out project work to investigate ill-structured problems; students were observed during project work sessions and selected students were interviewed about their experiences of working on the projects
Chin & Kayalvizhi, 2005	Singapore; 39 primary 6 students who were undertaking four open-ended investigations in eight same-sex groups (four or five members each); four groups were video-recorded while undertaking the investigations, students answered survey questionnaires on their attitudes towards open-ended investigations after the first and the fourth investigations
Grindstaff & Richmond, 2008	United States; four pairs of secondary students (grades 11 and 12) who participated in research projects as part of summer apprenticeships at a research university, with each pair working on a similar project; students answered questionnaires on their perceptions of research work, kept journals and were interviewed about peer interaction and its role in research-related knowledge building
Hume & Coll, 2008	New Zealand; teachers and students (15 to16-year olds) from two year 11 classes who were undertaking teacher-directed practical science investigations; classes were observed, teachers and student were interviewed about students' learning in scientific inquiry
Jordan & McDaniel, 2014	United States; 24 fifth grade students who were engaged in three collaborative problem-solving projects (two well-structured and one ill-structured), the ill-structured project required students to design robots to address an environmental problem; group interactions were audio and video recorded during collaborative work sessions, students were interviewed informally during and formally after the work sessions about their experiences of uncertainty and peer interactions
Krajcik, Blumenfeld, Marx, Bass, & Fredricks, 1998	United States; eight students (13-year olds) in two seventh grade science classrooms who participated in two inquiry (structured and open) projects; the classes were videotaped, researchers observed, students were interviewed about attitudes toward science, group work, and motivation
Oliveira, Boz, Broadwell, & Sadler, 2014	United States; six university students in two small groups of three who were engaged in science inquiry as part of a pre-service teacher training course; audio-recordings of group discussions during inquiry activities
Polman, 2000	United States; one teacher and his students in a secondary school earth science classroom; students formulated their own research question, gathered and analysed data, and made oral and written reports; researcher observed, the teacher and selected students were interviewed regarding their perspectives on projects in general and particular classroom events

Reference	Research Context
Rivera Maulucci, Brown, Grey, & Sullivan, 2014	United States; six middle school students (fifth grade) who participated in a science inquiry programme where they conducted investigations to answer their own questions; student focus group interviews, part of which explored their experiences (including feelings)
Ryder, Leach, & Driver, 1996	United Kingdom; 12 final year students from four university science departments, who were followed as they conducted long-term independent research projects; students were interviewed on and asked to keep a diary of their experiences

The following discussion is organised around these three topics: the open-ended process, the challenges of open inquiry, and working with peers.

3.5.1 Open-ended Process

Open inquiry, a form of science inquiry where students have substantial autonomy in conceptualising, designing and implementing their investigations, has been shown to be emotive because of the open-endedness of the inquiry process. Anecdotal evidence shows that achieving desired outcomes in open-ended activities is not always guaranteed; this uncertainty engendered negative emotion experiences in students. One university student reflected: "At first it was very disheartening but you began to learn that's what research is about, the way you would have to repeat experiments again in different conditions, trying to get them to work…" (Ryder et al., 1996, p. 49). In another study, a university student became so frustrated at getting unexpected and undesirable experimental results that he completely disengaged himself from the inquiry activity (Oliveira et al., 2014). One secondary student in a research internship programme in a university was disappointed when she was not able to pursue the original research project, because a delay in the delivery of materials meant she had to investigate a less comprehensive question (Grindstaff & Richmond, 2008).

Students' lack of control over the outcomes of the inquiry process can mean an increase in the risk of getting poor grades (Polman, 2000), and thus, a resulting increase in the pressure to come up with results (Hume & Coll, 2008). Consequently, some students attempted to get as much guidance as possible from the teacher in order to mitigate the impact of their lack of control over outcomes (Polman, 2000). The teacher, in some instances, was not willing to give the guidance that the students sought as it would compromise opportunities for learning, or simply did not have enough time to give sufficient attention to students asking for help—situations that led to tensions between the students and the teacher (Polman, 2000).

3.5.2 Challenges of Open Inquiry

Open science inquiry presents various challenges to students. Research evidence shows that some students experienced difficulties because they lacked competence (Krajcik et al., 1998) and were not confident in their ability (Polman, 2000) to engage successfully in open inquiry. In one study, students felt "[un]happy, sad, angry, [and] scared" about doing open science investigations—feelings which were attributed to the difficulty of conceptualising the research questions and carrying out investigations, students' lack of knowledge on the investigation topic, and their perception that it was "troublesome and time-consuming" (Chin & Kayalvizhi, 2005, p. 119).

Moreover, the epistemological and teacher-student role shifts that students experience when undertaking open science inquiry can provoke strong reactions from students. For instance, Chin and Chia (2006) reported that a class of 15-year old students taking up biology "showed resistance" to the requirement of conceptualising their own problem for investigation (p. 53). They preferred "the traditional "normal classroom lessons" instead, where the teacher taught the content…before giving them a well-defined project to do" (p.53). In another study, one student was quite critical of her teacher, who she thought "needs to know his information better", because it seemed to her that the teacher was tentative about his facts (Polman, 2000, p. 6). The teacher's pronouncement that he "does not have all Earth Science facts "stored in his head"" but that "his expertise involved "knowing how to find" needed information and use it in inquiry" caused tensions in the class (p.6). The researcher reflected that students' resistance to the abovementioned epistemological changes can cause them to lose faith in their teachers, who might disappoint students for not being "all-knowing" (Polman, 2000, p.6).

3.5.3 Working with Peers

Potentially emotion-eliciting situations when working with peers are related to intragroup conflicts and uneven participation. In one study, for instance, students' experiences of negative emotions (i.e., not happy, sad, angry) were associated with lack of cooperation and disagreements among group mates while working on open science investigations (Chin & Kayalvizhi, 2005). On the other hand, the following journal entry by a student in another study shows how uneven participation by group members can evoke negative emotion experiences:

> So much of research requires you to depend on others to do their parts…There aren't many people in this world I trust enough to

> depend on. This research experience reminds me of being placed into groups in school. Everyone knows that the smart person will do all the work and no one cares about working because they believe that all the answers will miraculously appear before them… [I prefer a career which will be] much more independent, and although your failure is yours entirely, personal disappointments hurts, but I think it hurts more when someone else disappoints you. Other people's failure or inability to complete something doesn't have to reflect upon you. (Grindstaff & Richmond, 2008, p. 262)

In science inquiry, challenges might stem from the fact that open-ended activity puts students in situations that require "authentic and unscripted interaction" (Oliveira et al., 2014, pp. 294, 295), and that collaborative science inquiry involves learning and thinking as "distributed cognitive activities" (Jordan & McDaniel, 2014, p. 524). For example, a student, when faced with his group's inability to achieve a science inquiry goal expressed his "frustration … in the form of impatient and aggressive comments" to his two group mates (Oliveira et al., 2014, p. 293). In contrast, in another study, a group of students can be said to be performing emotion work when, "instead of pointing fingers and blaming each other for their failures, the group persevered" even when they had to "repeat the experiment several times due to mistakes they made" (Rivera Maulucci et al., 2014, p. 1140).

Evidence from these science inquiry studies shows that open science inquiry can be a complex undertaking for students, which can potentially elicit emotion experiences that might prompt students' emotion work.

3.6 Emotion Work in Non-School, Non-Paid Work Contexts

The research literature that is summarised in the following table deals with emotion work in non-paid work settings. The delimitation to these settings is based on the idea that the research context of the present study has more elements in congruence with the research contexts of investigations into emotion work that is not associated with economic activity. A conceptual survey of the selected literature provided insights that informed the conceptualisation of this study and the analysis of data.

Table 3.3 Summary of research literature on emotion work in non-school, non-paid work contexts.

Reference	Focus of the Article, Setting and Participants	Methodology
Chandler, 2012	Self-injury as embodied emotion work Scottish city; twelve people who had self-injured and had no engagement with formal support services	Narrative, life story research exploring the lived experience of self-injury; purposive/snowball sampling from non-clinical community sites; two interviews per participant between April 2007 and May 2008 using the life-grid as interviewing tool to build up their life story (second interview was collaborative and directly addressed self-injury); data analysis using thematic and narrative techniques
Chin, 2000	Emotion work by parents whose children were undertaking the private high school application process A city in the United States; parents from the upper-middle and upper classes; 20 students but the focus was on 10 long-term students and their families with whom the researcher worked for six to 10 months prior to the application process	Ethnography; field notes for when the researcher worked as tutor to the participants' children; unstructured, ethnographic interviews (1 to 2 hours long) with twelve parents, two admissions officers, two tutors and three test preparation company administrators; observation of testing sites and private school open houses on parent-child interaction and informal chats with parents about schools and the application process; analysis of the microlevel processes behind the mobilisation and transmission of capital
Clarke, 2006	Emotion work by mothers of children with cancer Ontario and Quebec, Canada; 49 volunteers	Ten focus groups between February and October 2001; snowball sampling via parents' support groups; qualitative content analysis of focus group transcripts
Enander, 2011	Emotion work by battered women in the context of male-to-female partner violence Sweden; 22 women who had left abusive men	Hermeneutic approach in both methodology and analysis; participant recruitment via women's shelters and public notice boards; 47 qualitative interviews (one to three times per participant) in person or via telephone; data analysis guided by principles of thematic analysis and hermeneutic interpretation
Exley & Letherby, 2001	Emotion work engaged in by two groups of individuals: (A) infertile and/or voluntary childless, and (B) people with a cancer diagnosis United Kingdom; two qualitative projects; 24 women and 8 men interviewees, and 41 women who wrote the researcher in study A; 18 women and 1 man (between 27 and 67 years old) in study B	A – interviews and letters on their experience of infertility and/or childlessness; B – focused interviews exploring experiences of living with a terminal illness over a 12-month period Data collection using life history approach and focused interviews; data analysis using the grounded theory approach

Reference	Focus of the Article, Setting and Participants	Methodology
Fullagar, 2008	Emotion work in the context of leisure practices by women who were recovering from depression Rural and urban Australia; 48 women (ages 20 to 66)	Pilot project, within a larger qualitative study, to explore women's experience of recovery from depression; post-structural feminism as conceptual framework; convenience sampling; nine focus groups and seven individual interviews using leisure as a prompt word; Narratives of recovery from depression were analysed to develop a coding framework and identify themes
Hollan, 1992	Emotion work by an Indonesian people group (the Toraja) in order to achieve the culturally valued state of emotional equanimity Indonesia; 11 Toraja (seven men, four women)	Re-examination of data from an ethnographic study (Hollan, 1988) to see how the members of the group used ethnotheories about emotions in managing strong emotions; open-ended life history interviews; data analysis from an anthropological perspective
Jacobsson & Lindblom, 2013	Emotion work by animal rights activists to sustain commitment and cope with the emotional stress from norm-transgressions Sweden; seven men and 11 women (aged 20 to 60) from various animal rights groups who were vegans and active members	Snowball sampling; 18 in-depth interviews (1 hour 30 minutes to 5 hours long) focusing on activists' life-worlds and experiences of activism; data analysis using a moral-sociological perspective
Lois, 2001	Gendered emotional culture of high-risk takers United States; Volunteer search and rescue group in a Rocky Mountain resort town	Five-and-a-half-year ethnographic field work with field notes from the researcher's participation in various group activities including missions; 21 in-depth semi-structured interviews with rescuers on their motivation for participation and experiences during missions; data analysis using grounded theory approach
Lois, 2010	Temporal emotion work by mothers who were homeschooling their children County in the United States Pacific Northwest	Field notes of the monthly meetings of the support group for homeschooling parents that the researcher attended for 4 years, and of statewide homeschooling conventions; 24 in-depth interviews with homeschooling parents about their experiences (in 2002) and 16 follow-up interviews (in 2008 and 2009); data from other sources (e.g., newsletter, listserv, magazines); data analysis using the grounded theory approach
McCoyd, 2009	Exploration of feeling rules during bereavement and emotion work among women after diagnosis of foetal anomalies and subsequent pregnancy termination United States; 30 women	Data collection by loosely structured interviews (3 to 4 hours long) guided by a narrative approach (some interviews by email); data analysis by coding of the transcripts using a coding matrix and then open coding for emergent themes; peer debriefer, memos, audit trail, data triangulation, member-checking

Reference	Focus of the Article, Setting and Participants	Methodology
Parkhill, Henwood, Pidgeon, & Simmons, 2011	Affect work in the context of risk, with a focus on humour, by people living close to nuclear power stations Two sites close to a nuclear power station in the United Kingdom; 82 participants who lived in these sites	Part of a 5-year mixed methods research project; participant recruitment by a professional agency and additional participants via snowballing; 61 interviews where participants narrated short stories about their life and their lived experiences of risk; interpretive thematic analysis, which focused on humorous talk as emotion work strategy
Schrock, Holden, & Reid, 2004	How interpersonal emotion work and motivational framing created emotional resonance in a transgender community Southeastern United States city; transgender support group; 10 transsexuals who were members of the support group	Researcher observed eight of 12 monthly group meetings (3 hours long) from the summer of 1993 to the fall of 1994 and made field notes; life course in-depth interviews (2 to 3-1/2 hours long) with 10 transsexuals to elicit stories about coming to terms with transsexuality; data from online email lists and forums, community publications, activist speeches, and social movement organisations' recruitment appeals; data analysis using the grounded theory approach
Thornton & Novak, 2010	Emotion work by volunteers in a rural rape crisis centre Midwestern, United States; Rape crisis centre supporting survivors of sexual assaults and their families through volunteer advocates; 14 interviewees	Two-year ethnographic study; full participant observation, with field notes by the researcher who was a volunteer advocate for a period of 20 months; in-depth semi-structured hour-long interviews using open-ended questions (10 face-to-face; 4 written) with one male and seven female volunteers, the program coordinator, and other stakeholders (one social worker, one police officer, three sexual assault nurse examiners); discourse analysis (constant comparative analysis, thematic analysis)
Wiley, 1990	Emotion work and emotion roles in a therapeutic community for schizophrenics City in Southern California, United States; holistic therapeutic community for schizophrenics	Data collection by participant observation over a 22-month period, informal and open-ended interviews with staff members, therapists, clients, and family members; additional data from clients' psychiatric case histories; researcher participated in almost all group sessions; data analysis from a cultural and dramaturgical perspective

3.6.1 Depicting Emotion Work

The various aspects of emotion work. Emotion work has a variety of aspects, as depicted in research literature. Emotion work may involve attempts at the evocation (e.g., Thornton & Novak, 2010), intensification (e.g., Jacobsson & Lindblom, 2013), suppression (e.g., Thornton & Novak, 2010), or mitigation (e.g., Shrock et al., 2004) of emotion in the self or in

other people (e.g., Hollan, 1992). It may also involve efforts to display or express emotion (e.g., Thornton & Novak, 2010), to transition from one kind of emotion experience to another (e.g., McCoyd, 2009), and to eliminate the dissonance between an actual and desired emotion experience (e.g., Enander, 2011). Moreover, emotion work can take place in both public and private spheres (e.g., Thornton & Novak, 2010), and might be performed towards the attainment of instrumental aims (e.g., Jacobsson & Lindblom, 2013) or aims related to psychological well-being (e.g., Fullagar, 2008).

Depicting emotion work as situated. An examination of research literature on emotion work (summarised in the table above) shows that the investigations did not focus on discrete emotions. Rather, situations that engendered emotion work were depicted as complex and could evoke a syndrome of emotions (i.e., they were usually characterised by several emotions that were experienced concurrently). For instance, the study on women's emotion work associated with recovery from depression (Fullagar, 2008) described the situation as follows:

> Women spoke of how they felt emotionally overwhelmed or numbed whether [depression] developed slowly over time or was brought on by a crisis. Depression disrupted their familiar sense of identity and ability to conduct their everyday lives. Depression was often articulated through a range of metaphors that described its affective power to immobilize women's desire to act and often the will to live. These metaphors often evoked self-loathing and deep isolation: "black and gloomy," "in a prison," "dragging yourself through life," "the world is your fault," "everything takes on a different colour and tone," "lack of clarity, an overwhelming sense of weight," and "it's like pulling a blind down in your brain, tunnel vision and earmuffs, and all that's inside is you and crap, nothing else gets in." (p. 40)

The above quote illustrates that people usually talk of their experience of emotions in terms that are meaningful to them and might find it difficult to identify the various discrete emotions that make up their emotion experience. This might be one reason why the researchers concerned themselves not so much with identifying discrete emotions that were elicited in these situations, but with the characteristics of the situation that incited the performance of emotion work. This is not to say that researchers and participants did not use labels of discrete emotions (e.g., anger, sadness), but that references to emotions were usually situation-based and embedded in contextual details (e.g. Thornton & Novak, 2010).

Although some emotion work researchers referred to emotion regulation processes and strategies, the aforementioned research literature gives the impression that generalising processes or categorising strategies that

individuals deploy during the performance of emotion work is not the ultimate goal of emotion work research. Instead, emotion work is depicted by elaborating on the actions of individuals, their aims and motivations for such actions, and the outcomes of performing those actions. For instance, in reporting the emotion work that search and rescue volunteers performed, Lois (2001) organised emotion work in four stages, namely, "anticipating the unknown" before a mission, "suppressing feelings" during a mission, "releasing feelings" immediately after the mission, and "redefining feelings" much later after the mission. These four stages can be mapped, respectively, onto these four emotion regulation strategies: controlled starting of emotion, suppression, venting, and reappraisal (Gross & Thompson, 2007; Parkinson & Totterdell, 1999). However, Lois (2001) particularised the volunteers' emotion work by describing the search and rescue events, the volunteers' feelings, and how they interpreted and managed their feelings. For example, the discussion of "suppressing feelings" included the following excerpt:

> During …urgent missions, clear thinking and rational actions … were seen as especially crucial. However, in such demanding situations, members' capacity for emotional and physical control was seen as more tenuous: Emotions threatened to push them over the edge, preventing them from physically performing at all. Rescuers who were easily scared, excited, or upset by a mission's events were considered undependable. Members employed several strategies to control these feelings during the missions, allowing them to perform under pressure…. [M]en and women managed their feelings of urgency and fear similarly: They suppressed them. For example, the most critical mission I experienced had four casualties. A van had driven off the side of a dirt road and tumbled to the bottom of a 400-foot ravine. Search and rescue was called because the accident was inaccessible to the paramedics, who needed ropes to get down to the victims and a hauling system to get them out. Cyndi told me that while on that mission, she was in control of her emotions, successfully supressing them, because she was working the rope systems up on the road, unable to see beyond the drop-off down to the accident site. She felt differently, however, when one of the accident victims reached the top of the hill in a panicked state….Cyndi's emotional control was threatened when the victim emerged from the trauma scene…She quickly narrowed her focus further, successfully managing her own impending panic by monitoring the victim's behaviour. In this way, she was able to keep her feelings at bay while she continued working. (Lois, 2001, pp. 392, 393)

The above excerpt illustrates the level of details emotion work researchers usually include in their accounts of emotion work. The selected emotion work literature shows that researchers are more concerned about particularising emotion work within the research setting, rather than generalising processes or categorising strategies.

Emotion work in various situations. Studies on emotion work have focused on various social and cultural contexts. Individuals may perform emotion work when they perceive threats in the environment, in the course of performing social roles, and in social interactions.

Perception of threats in the environment. The anticipation or perception of threats in one's environment can prompt an individual to try to manage his or her feelings.   For example, threats such as violent intimate partners (Enander, 2011) or the proximity of a nuclear power plant (Parkhill et al., 2011) engendered fear and anxiety, which were managed in order to restore psychological well-being.

Performance of social roles. The performance of some social roles entails an expectation of appropriate emotion display or expression (Hochschild, 1979; 1998). When performing social roles in the public sphere, the management of emotions can enable one to focus on task performance, and the display of appropriate emotions might be part of the required competency (e.g., Thornton & Novak, 2010). Furthermore, the possibility that a person will lose face necessitates the schooling of one's emotion expression or display, in aid of impression management (e.g., Lois, 2001). Volunteers in a rape crisis centre, for example, must know when was the appropriate time to mirror the anger that victims expressed as a show of empathy, and when to suppress their own anger so as not to create an unhelpful, volatile environment (Thornton & Novak, 2010). Search and rescue volunteers must display "emotional stoicism" at the "graphic sight" of gruesome accidents despite being upset by these because it was expected of them (Lois, 2001, p. 393). In these instances, the dissonance between the required outward emotion display and the actual inner emotion that was felt, in addition to the fear of negative sanctions for inappropriate display or expression of emotion, prompted emotion work.

Some social roles require individuals to look after the emotional well-being of others (e.g., mothering (Clarke, 2006); rape crisis centre volunteering (Thornton & Novak, 2010)). For instance, parents who shepherded their children through the rigours and intricacies of the private high school application process in the United States had to keep their children motivated to do their best throughout the long process, while at the same time help them deal with the possibility of failure (Chin, 2000). The volunteers in the rape crisis centre found that they must keep track of their own and the victims' emotions so that they could respond in way that would be helpful to the victims (Thornton & Novak, 2010). Moreover, they must also manage

the emotional climate that resulted from the victims' interactions with other service personnel, such as doctors, nurses, and the police.

The performance of emotion work is necessary, in some cases, to promote, maintain, or facilitate membership in a social group. For example, the Toraja, an Indonesian people group, down-regulated their emotions in order to attain equanimity, since their social group valued equanimity over displays of strong emotions such as anger (Hollan, 1992). In another study, schizophrenic individuals who were members of a therapeutic community had to learn how to manage their emotions during group sessions, a requirement for participation in the community (Wiley, 1990). On the other hand, recruits into the animal rights movement subjected themselves regularly to images of animal cruelty in order to sustain their commitment to veganism and to the activism that was needed to effect social change in the treatment of animals (Jacobsson & Lindblom, 2013).

Social interactions. Emotion work during social interactions may involve (a) responding to other people's emotion expression or display (e.g., Jacobsson & Lindblom, 2013), (b) the evocation of emotions in others (e.g., Chin, 2000), and (c) an attempt to influence other people's emotional response to situations (e.g., Clarke, 2006). Research participants found that their repertoire of social scripts was sometimes inadequate in these situations (e.g., McCoyd, 2009; Thornton & Novak, 2010), or that there were disparities in the social scripts that they and other people were following (e.g., Clarke, 2006). Thus, it could lead to awkward social interactions and disequilibrium in the social environment (e.g., Exley & Letherby, 2001). For instance, women whose first pregnancy was terminated considered themselves as mothers, but were uncertain whether they should call themselves as such when they were with family and friends, who had differing conceptions of their motherhood (McCoyd, 2009). Thus, certain situations, such as when celebrating Mother's Day, for example, required these women to manage their and other people's feelings during their interactions.

The focus that emotion work literature places on problematic or unpleasant situations arguably suggests that it is this kind of situations, rather than the positive ones, which usually engenders emotion work, corroborating a similar research finding in students' emotion regulation (see Buric et al. (2016) in Section 3.4.2). Research evidence, in fact, shows that negative emotions are more memorable, promotes "more cognitive processing", and have more impact on behaviour than positive emotions; and people try

harder to escape negative emotional states than to evoke positive ones (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001, pp. 334).

3.6.2 Investigating Emotion Work: Review of Selected Literature

Two salient features are noted in the methodologies employed by the aforementioned studies. First, the researchers used participants' personal accounts of emotion work as primary data source. These personal accounts were elicited via interviews, letters, and focus group discussions. Second, the research literature highlighted the importance of the researchers' situated knowledge of the research setting. This knowledge was either developed from prolonged engagement with the research setting (e.g., using ethnography, or as a participating observer), or pre-existent from being an insider researcher (e.g., Thornton & Novak, 2010).

An examination of the selected articles yields three agendas in investigating emotion work: (1) identifying situated strategies; (2) exploring participants' resources for emotion work; and (3) foregrounding social norms related to emotion and how they shape an individual's or group's emotion work. In the following discussion, exemplar studies for each agenda are identified and one of these studies is then reviewed.

Identifying situated strategies. This agenda can be seen in the identification of strategies used by animal rights activists (Jacobsson & Lindblom, 2013), and the temporal emotion work strategies employed by homeschoolers (Lois, 2010).

Jacobsson and Lindblom (2013), for instance, in their case study of animal rights activism in Sweden employed the moral-sociological perspective to understand the emotion work performed by animal rights activists. They analysed 18 in-depth interviews, which aimed to explore "the activists' emotions and emotional processes by focusing on their life-worlds and world-views as well as their personal experiences of activism" (p. 57). Framing animal rights activism using a moral-sociological perspective allowed the researchers to gain a deeper understanding of animal rights activists' emotion work through the exploration of connections between three sensitising concepts: 'moral shocks', 'feeling rules', and 'moral emotions' (e.g., righteous anger, compassion).

The study was able to identify particularised emotion work strategies and their corresponding motivations. In contrast with the generally assumed hedonistic motivation for managing emotion (see Brans, et al., 2013), this particular emotion work context demonstrated the primacy of instrumental

goals for emotion work (in this case, the pursuit of their moral ideals). In micro-shocking, for instance, animal rights activists provoked righteous anger in themselves by exposing themselves to moral shocks (e.g., films of animal repression, news of exploitation of animals). This strategy stirred up their passion and relieved the boredom that could set in in their everyday activities. Another strategy, ritualization, was aimed at maintaining unity and cohesion in the group and managing the alienation they felt as norm-breakers in society. Interaction rituals such as home visits among members, coffee after a protest, and online discussions created a sense of belongingness to a moral community.

The identification of situated strategies highlighted the prominence of instrumental goals in the activists' emotion work. This seems to suggest that considering instrumental goals (Gross, 2014; Tamir, 2011) can lead to insights into the complexities of emotion experiences in socially situated settings (as in the setting of the present study), rather than implicitly assuming that individuals always aim to feel good (i.e., hedonistic goals).

Exploring resources for emotion work. This approach for studying emotion work features in Chandler's (2012) investigation of self-injury as "embodied emotion work", Fullagar's (2008) research on leisure practices as "counter-depressants" within the context of recovery from depression, Schrock et al.'s (2004) examination of how talk in support groups and discourse in online forums facilitated "interpersonal emotion work" for members of a transgender community, and Parkhill et al.'s (2011) focus on humorous talks and their various functions in managing emotions related to living with nuclear risk.

Parkhill et al. (2011) analysed 61 narrative interviews with 82 people who were living close to nuclear power stations. These participants contributed short stories about their experiences of living with nuclear risk. Humour was not part of the original research agenda, but a prevalent theme that was discovered after the main qualitative thematic analysis of data. Therefore, the researchers, in foregrounding humour, had to perform a further three-stage analysis. The stages were locating humour in the narrative interviews, determining the associated affects, and identifying the emotion work that was performed by participants through humorous talks.

By viewing humorous talk as a resource for emotion work, the investigators adopted the perspective that humour was not merely used to achieve "emotional release" or as "coping strategy"; it also served "a variety of social and psychological functions through the way it communicates meaning to

others" (p. 327). By taking this perspective, the researchers located emotion work outside of the individual and foregrounded the social-cultural contexts that influenced the performance of emotion work.

For instance, in discussing humorous talk as a way of "expressing the unsayable", the researchers explicated how humorous talk provided a way for participants to communicate "negatively charged affective states" and "sentiments, expressions, thoughts and feelings which may be deemed inappropriate to air in social settings" (p. 330). Through various illustrative excerpts of participants' humorous talks, the analysis drew attention to the use of wit, sarcasm, and irony to enable participants to communicate the "unsayable", such as their "hatred of the nuclear power station", for example (pp. 330). The researchers related emotion work, in these cases, to the "management of aired affect" that allowed the participants to satisfy the "social norms of behaviour" (pp. 331).

Foregrounding social norms. This research agenda is identified in the following: (1) McCoyd's (2009) exploration of how existing feeling rules related to motherhood and bereavement were discrepant with situations involving women who terminated pregnancy due to foetal anomaly, and, thus, resulted to deficient cultural scripts for the experience and expression of emotion; (2) Wiley's (1990) identification of how the members of a therapeutic community accepted, rejected, or manipulated the therapeutic culture's prescriptions and proscriptions for emotion; and, (3) Hollan's (1992) depiction of how a social group's "preference for emotional equanimity" and "disvaluation and fear of strong emotion" shaped the group's emotion work practices (p. 45).

Hollan's (1992) work is actually a re-examination of data from an ethnographic study of the Toraja people from Indonesia (Hollan, 1988). He analysed data from life history interviews with eleven Toraja to assess the salience of cultural models. To do this, he looked at how members of the group used ethnotheories (i.e., implicit, taken-for-granted beliefs) about emotions to make sense of their everyday experiences; in this case, their management of strong emotions to achieve emotional equanimity. Emotion work, in this case, was explained in the context of the negative appraisal that the group attached to strong emotions such as anger. For the Toraja, strong emotions were associated with physical and social/moral disorder. Using illustrative quotes from the interviews, Hollan (1992) showed how the emotion work of individuals in the group was influenced by this culturally mediated appraisal, as in the following excerpt:

> I once had 100 sheaves of rice eaten by a neighbor's water buffalo. My wife was angry, but I said, "Don't be angry. It's not the water buffalo that's at fault, but the water buffalo's owner. So don't be angry." You may not believe this, but right away [after holding his anger], I started harvesting more rice. Before [the water buffalo incident], I used to harvest only 4,000 sheaves. So why was it that afterwards, I started harvesting much more? Because I wasn't angry and didn't demand repayment for the damage done to me, the gods increased my harvest. That's my opinion. (Hollan, 1992, p. 50)

In examining emotion work from an anthropological perspective, Hollan (1992) drew heavily from his intimate knowledge as an anthropologist who had studied the Toraja people. For instance, he made references to their beliefs about the supernatural (as shown in the above excerpt) and to local historical events, and made comparisons between the Toraja and other Indonesian people groups.

3.7 Chapter Summary

The literature review shows that the research agenda of the present study to investigate students' emotion work fills a knowledge gap. No study with a similar agenda was found so far. The one study that explicitly addressed emotion work in teacher-student interactions did not provide sufficient explication of the emotion work the students performed. Previous research has established that students deploy strategies to regulate their emotions. There is very little research evidence, however, that elaborates how they do this in context. The studies that looked into the social-cultural context of students' emotion experiences focused mainly on the teachers within the classroom setting. In contrast to these studies, the present study features a different setting, the undertaking of extended/open school science inquiry projects. Anecdotal evidence from research literature on students' engagement with science inquiry points to various aspects of engagement in science inquiry that can potentially engender students' emotion work. Furthermore, research literature on emotion work in non-school, non-paid work settings defines the key characteristics of this particular field of study: the study of individuals or groups within the social and cultural context, the use of participants' personal accounts, and the importance of researcher's situated knowledge of the research setting. These insights from the literature had been useful in designing the present study and in analysing the data.

The research questions that guided the present study are explicated in the next chapter.

Chapter 4
Research Questions

This chapter presents and explicates the questions that guided this research.

The following research questions guided the investigation into secondary students' emotion work while undertaking extended/open school science inquiry projects:

1. What do students' narratives reveal about the emotion work that they perform?
   a. What situations engender emotion work?
   b. What strategies do students use when performing emotion work?
2. How is students' emotion work linked to discourses of achievement?
   a. What are the school discourses of achievement, as reflected in school artefacts?
   b. What interpretations of achievement discourses are reflected in students' narratives of emotion work?

4.1 Research Question 1 (Students' Emotion Work)

This research question addressed the aim of developing understanding of the processes and contexts of students' emotion work from students' narratives. In pursuing this research agenda, this study tackled emotion work from the perspective of individuals within a social setting. This approach foregrounded the emotional complexities that young people navigated in this distinctive learning environment.

4.2 Research Question 2 (Discourses of Achievement and Students' Emotion Work)

Individuals' standpoints with respect to the experience and expression of emotion are shaped by social and cultural contexts (Hochschild, 1979), such as, for example, cultural discourses (e.g., Hollan, 1992). In line with this idea, this study proposed that achievement discourses in school were a significant influence in students' emotion work.

The decision to focus on achievement discourses in this study was based on two considerations. Firstly, achievement is one of the main themes in school discourses on the "production of a good student" (Maguire, Hoskins, Ball, &

Braun, 2011, p. 600). Secondly, the context of the narratives was the undertaking of a school project by high-achieving students, and the students' narratives of emotion work in this context were generally linked to their goal of completing their projects. Hence, students' emotion work was arguably influenced by school discourses on achievement.

The term discourses, as used in this research, refers to "socially constructed knowledges of some aspect of reality" (van Leeuwen, 2005, p. 94). When this definition is applied to the context of this study, achievement discourses may be considered as the knowledges about achievement that have been developed in the context of the particular school setting and that "serve[…] the interests" of the members of this school community (van Leeuwen, 2005, p. 94), which included the students that participated in this research.

It is argued that these discourses on achievement can contribute to the construction of feeling and display rules (Hochschild, 1979; explained in Section 2.2.3) within the learning environment. Students can use their interpretations of these discourses to determine whether an emotion experience or display is appropriate or not, and whether or not there is a need to change what they feel. For instance, if a student feels unmotivated and lazy, he or she might determine these feelings inappropriate, because they are contrary to school discourses on achievement that emphasise hard work and persistence.

This research agenda did not explore the possibility that a causal relationship might exist between achievement discourses and students' emotion work. Rather, it sought to understand how socially-constructed knowledges about achievement might shape students' emotion experiences in school.

Chapter 5
Research Methodology and Design

This chapter elaborates on the context and procedures of the research. The various elements of the research design, such as the research approach, the setting of the study, the researcher position relative to this setting, and the procedures for data collection and analysis, are explicated.

5.1 Overview of the Study

This is a qualitative study of students' emotion work, which involved two cohorts of fourth-year students (aged 15 to 17) from a science specialist secondary school in the Philippines. Twenty-five out of 87 students in cohort 1 and 19 out of 89 students in cohort 2 volunteered to participate in the study. There were two main research aims: (1) to identify the situations that engendered students' emotion work and the emotion work strategies that students deployed within the context of undertaking two-year/open school science inquiry projects, and (2) to explore the links between achievement discourses and students' emotion work.

The main data source was the 125 narratives from students, which were collected in two phases. Phase 1 involved remote data collection with the help of research assistants, while the researcher was stationed at the university[4], within the period February to March 2014. Data collection for phase 2 was conducted while the researcher was on field work in the school from July 2014 to February 2015. In phase 1, one written narrative was collected from each of the 25 volunteers (13 female, 12 male) in the first cohort. This took place over a few days towards the end of the school's academic year. In phase 2, 100 serial narratives (43 written narratives, 57 narrative interviews) were collected from 19 participants (17 female, 2 male) from the second cohort from August 2014 to February 2015, with the researcher spending three days in the school every week. School artefacts pertaining to discourses of (student) achievement were also gathered by looking up the school website and taking photos of relevant texts on display in the school premises. Field notes relevant to the data collection process and the research context were kept. Data analysis was inductive and

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[4] This decision to collect data by proxy is due to an immigration advice to limit time away from the university, because prolonged absence (the length of which the university immigration adviser could not specify) might mean curtailment of the leave to remain in the United Kingdom.

iterative, and was guided mainly by principles of narrative, thematic, textual, and discourse analysis.

This research adopts an interpretivist perspective. This perspective allows for an investigation that aims to understand the meanings the students ascribe to their actions from their point of view (Gage, 1989), which would be afforded by written narratives from and narratives interviews with students. Hence, this study assumed a subjective ontology and epistemology, and the research outcomes represent a viable interpretation, but nevertheless only one of the possible interpretations, of students' emotion work based on evidence from the particular data set (Chase, 2011).

5.2 Research Setting

In this section, the school and the academic programme under which the students conducted their science inquiry projects are described. Furthermore, the researcher's position and the procedure for gaining access to the research setting are presented.

5.2.1 The School

The setting of this study was a secondary school in Central Philippines, which was part of a nationally-funded system of STEM (science, technology, engineering, and mathematics) specialist schools.   The school system was selective, admitting students who were high-achieving (i.e., top students in primary school), and had high aptitude in science and mathematics (i.e., in the top percentiles in the school system's admission exam). All the students in this school were recipients of a scholarship that entitled them to free secondary education, free textbooks, and maintenance funds. In return, they and their parents or legal guardians signed a contract, which stipulated, among other conditions, that upon graduation from the school, the students will pursue any STEM undergraduate course. The school in Central Philippines admitted a maximum of 90 first-year students, who were grouped into three permanent sections. At the time of the study, the school system was in transition from a four-year to a six-year secondary curriculum. This research focused on the last two cohorts that were following the four-year curriculum.

The school's grading system employed a grade point scale at increments of 0.25, with 1.0 as the highest grade and 5.0 as the failing grade. Behaviour and character ratings were descriptive, ranging from 'excellent' to 'needs improvement'. Assessment was conducted quarterly; and at the end of the

fourth quarter, a final assessment was made based on academic performance and conduct. Students who failed the annual final assessment lost their place in the school.

The academic year consisted of 10 months (i.e., June to March for the first cohort, and July to April for the second cohort). Classes were held from Monday to Friday.   A typical school day started at 7.30am and ends at 4.10pm. The school was a boarding school with day students. All students must spend the entire school day on campus. The day students were only allowed to leave the campus at the end of the school day.

5.2.2 The Science Research Courses

This study explored students' experiences while they were undertaking two-year science inquiry projects. These projects were part of the two science research courses (i.e., Science Research 1 and Science Research 2) that all students must take during their third and fourth years. The science research courses were facilitated by the school's Science Research Unit. This academic unit was composed of a team of six research teachers representing the various sciences. These teachers acted both as research class facilitators and as research advisers to the students.

The school had a dedicated research laboratory for the use of students who were working on their science inquiry projects. The laboratory housed equipment and materials for performing various experimental and field procedures in the major science areas and sub-areas (i.e., biology, chemistry, physics, environmental science, microbiology). Aside from this, the students also had access to the field-specific laboratories (i.e., biology, chemistry, physics, computer and technology) in the school.

Students on these two science research courses attended classes for three 50-minute periods per week. They worked on their science inquiry projects usually on their own time and occasionally during these class periods. They also had 20-minute weekly supervision meetings with their respective research advisers to discuss their projects and to ask for or receive guidance.

The first science research course. During the first quarter of the first science research course, third-year students individually conceptualised a science investigation problem based on their interests. The final outcome of this task was a concept paper, in which the students set forth their proposed science investigation problem. At the end of this first quarter, students underwent the streaming process. There were two streams, the elite and

the non-elite stream[5]. The students applied if they wanted to be considered for selection to the elite stream. The students who were not selected, as well as those who did not apply, formed the non-elite stream. The selection process was facilitated by the team of research teachers. The streaming criteria were students' competence to work independently and the merit of their proposed science investigation problem. Students in the elite stream were expected to work on their projects with less teacher supervision. They were allowed to work on complex projects that would require access to research facilities outside of school and the guidance of research professionals. Furthermore, they must maintain a grade of at least 2.0 in every quarter; otherwise, they would be transferred to the non-elite stream.

After the streaming, the students decided whether they would work alone or in groups of twos or threes. Groups were formed by self-selection. The students then conceptualised their final individual or group research projects, and worked on their research proposal paper. Group projects were usually based on the concept paper of one of the group members. During the last quarter of the first science research course, the students were expected to perform a pilot testing of their key procedures. Then, they would submit the three-chapter proposal paper (i.e., introduction, literature review, and methodology chapters) and undergo a proposal defence, which was an oral examination by a panel of research teachers. Students who were successful in this oral examination were able to proceed to the data collection stage. Those who were not had to act on the recommendations of the panel and/or undergo another oral examination.

The second science research course. In the second research course, fourth-year students were expected to collect, analyse, and interpret the data for their project. They were also expected to work on a five-chapter research report on the outcomes of their project. Moreover, students were encouraged to participate in national and international research events and competitions.

At the start of the second research course, the competition for several research grants was opened to the students. These financial sponsorships by a multinational corporation were awarded to a select group of students

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[5] Teachers and students referred to the two streams by their institutional labels, which are not used here as they would only confuse the reader. The use of the 'elite' and 'non-elite' labels here reflects the perceived value attributed to these school-based social groups by both teachers and students.

who were undertaking meritorious projects and consistently demonstrated exemplary performance.

By the last quarter of the academic year, as part of the requirements for graduation, students were expected to complete their projects, to present their findings in any one of the school-prescribed events (e.g., school-level research competition adjudicated by research professionals, or a public science event in a local community), and to submit their research report.

The following timeline reflects the approximate timings of the key activities and events in these two science research courses (for a June to March academic year).

Events or Activities	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March
	Science Research 1										Summer Break		Science Research 2									
Conceptualising individual research ideas	▓	▓	▓																			
Streaming/Grouping			▓	▓																		
Conceptualising final research projects				▓	▓	▓	▓	▓	▓													
Pilot testing/ Proposal defence									▓	▓			▓	▓								
Data collection, analysis & interpretation											▓	▓	▓	▓	▓	▓	▓	▓	▓			
Writing of report															▓	▓	▓	▓	▓	▓		
Presentation of findings																					▓	
Research grant competition													▓	▓								
National & international student research events																▓	▓	▓	▓	▓	▓	▓

Figure 5.1 Timeline of key events and activities in the two-year science research course.

5.2.3 Researcher Position with Respect to the Research Setting

During the conduct of the field work, the researcher returned to the school as a PhD researcher and a faculty member who was on study leave for the past four years, following a nine-year teaching stint in the school. She was an insider because she had been a science research teacher (for the last six years) and the head of the science research unit (for the last five of those six years). This insider status was further enhanced by her background as a student in the same school system—albeit in a different campus—who also undertook a similar two-year science research course. Considering this insider status, and the outsider perspective afforded by her time away from the school and by her MPhil and PhD studies at the University of Leeds, her

position can be described as that of a "marginal native" (Hammersley & Atkinson, 2007). The researcher took advantage of this position to shift between insider and outsider perspectives during data collection and analysis. Issues related to insider research, such as familiarity and prior knowledge, are addressed in subsequent sections where they are relevant.

5.2.4 Access to the Research Setting and Participants

Access to the research setting and participants was negotiated with the gatekeepers: the school director, the head of Science-Math-Technology Department, and the head of the Science Research Unit. Permission was sought by email from and granted by the gatekeepers prior to the start of the two data collection periods. Then, during the first week of the field work, face-to-face meetings with the gatekeepers were held, where this permission was reconfirmed and their concerns about this study were addressed (e.g., that parental consent be sought for all participants, not just for the under-16).

5.3 Pilot Study

A pilot study was conducted from 16 to 24 August 2013. It was an exploratory study involving six participants (5 female, 1 male, 16-17 years old) that aimed to gather ideas about the emotion work of students as they undertook school science inquiry projects and to elicit feedback about the proposed data collection methods. The six participants were newly graduated from the school, which was the setting of the research. They were part of the group of students who participated in the researcher's MPhil study, who were all sent a recruitment email inviting them to participate in the pilot study. These six were the ones who consented to participate.

Online interviews via Skype were conducted individually with the participants. These interviews, which were audio-recorded, lasted 60 to 80 minutes. During the interview, four ways of eliciting narratives of emotion work were trialled: 1) an open question; 2) a closed question; 3) open question plus emotion labels as memory aid; and, 4) open question plus science inquiry events as memory aid. The participants were also asked to give their feedbacks about these elicitation strategies. In addition, they were also asked to comment on the following aspects related to data collection: emotion diary, shadowing, real-time interviews, diary-interview combination, the importance of rapport with the researcher, timing of the data collection, and incentives for participation.

The interviews were transcribed and analysed. The following findings from the pilot study informed the research design for this study:

- The pilot study participants depicted the emotion-eliciting situations and the strategies they deployed to manage their emotions in these situations as complex and situated. Thus, the pilot study confirmed that the undertaking of school science inquiry projects would be a rich setting for investigating students' emotion work, and that students' narratives were an appropriate way of obtaining data on their emotion experiences.

- The pilot study participants generally found it difficult to respond to the elicitation prompt patterned after Hochschild's (1979, note 8), where they were asked to identify a specific situation and their attempts to change the way they felt. This prompt seemed to impose structure on their response, which curtailed their responses. On the other hand, posing an open question resulted to very expansive responses, which included a lot of extraneous information and required follow-up questions and redirection from the researcher. This would lead to a substantial volume of data that would pose more work during data analysis. Therefore, a decision was made to use an elicitation prompt which provided some general guidance about the stories that participants would be asked to tell, but was neither too restrictive nor too open.

- Most of the pilot study participants were of the opinion that real-time elicitation of data regarding emotion work experiences would not be effective because they would not have time to make sense of their experiences and their attempts in managing their emotions. Furthermore, they all agreed that it would be too intrusive and would put them off from participating in the study. This feedback led to the decision to consider narrative interview, and emotion diary (later dropped and replaced by written narratives, see Section 5.4.6), but not shadowing or experience-sampling, as possible data collection methods.

- The participants thought that interacting with the researcher occasionally in informal settings in school would allow students to build rapport with the researcher. It would not seem intrusive as long as the researcher made it clear that students were not being observed for the research. This led to the decision to produce a recruitment video that was used in phase 1 (see Section 5.4.3) and the pre- and post-recruitment activities in phase 2 (see Sections 5.4.3 and 5.4.6).

- The participants were unanimous in their opinion that to cover a wide range of emotion experiences, data should be collected across the various stages of the research process. However, since it was not possible to do a two-year field work, a decision was made to time the

data collection for phase 1 at the end of the academic year, when the science inquiry projects were already (or almost) complete; and to conduct an eight-month field work for phase 2.

- The pilot study participants agreed that the psychological benefits of telling their stories would be enough inducement to participate in the study and being offered refreshments would be enough recompense for their contribution. It was decided that no mention about incentives would be made during recruitment for participants. However, the matter about non-cash tokens of appreciation for their participation was included in the participant information brochure that were given to students who indicated an interest to participate in the study.

5.4 Data Collection

5.4.1 The Research Team

The activities for phase 1 data collection were conducted with the help of two research assistants, who also happened to be science research teachers in the school. They were given protocols for the recruitment of participants, the elicitation of one-time written narratives, and the safeguarding of data. A clerk, who was not connected to the school, was employed to digitise the narratives and transmit them electronically to the researcher at the University of Leeds. All three were provided with a copy of the confidentiality agreement, to which they gave their assent.

Data collection for phase 2 was conducted by the researcher herself.

5.4.2 Researcher Position with Respect to the Participants

In both these data collection phases, the researcher presented herself to the members of the two cohorts as a former student in the same school system who also conducted a two-year science inquiry project. Moreover, she also introduced herself as a current PhD student from the University of Leeds who, as part of her PhD research, was collecting secondary students' stories of emotion experiences in school. Although the students were aware that the researcher used to be a science research teacher in the school, this was not mentioned in the introduction in order to downplay power relations. This researcher positioning was intentional because, in the elicitation of narratives, the researcher served as the audience (imagined, in the case of the cohort 1 participants) for the participants' stories. The narrators' (i.e., the participants in this study) conception of the audience (imagined or not) influence the stories that they tell (Riessman, 1993). Hence, the abovementioned position was taken in order to build rapport and engender

an impression of empathy, which could facilitate the elicitation of experience-centred narratives.

5.4.3 Recruitment of Participants

Phase 1. All the 87 fourth year students in cohort 1 were invited to a recruitment meeting. During the meeting, they were shown a 5-minute video that the researcher produced to introduce herself to them and to give them an overview of the study. Then, the research assistants distributed to the students the participant information sheet, the participant consent form, and the parent consent form, went over these materials with the students and responded to students' questions. Although the specific research questions were not disclosed, the participant information sheet provided them with sufficient information to understand what the research was about and what their participation would entail. The students were informed that participation in the research was voluntary and were given at least two days to make their decision. They were requested to signify their willingness to participate by returning the signed consent forms to the research assistants. The students were informed that it would be understood that those who did not return the signed consent forms were not going to participate, and that there would be no further action and no consequences from this decision.

Because the research assistants were also the students' teachers, the research assistants were expressly instructed to be careful that anything they do or say would not be construed as coercive. For instance, the research assistants were asked to provide a secure way of collecting consent forms without having the students hand the forms in to them personally. Also, they were instructed to give general announcements to remind students to turn in their consent forms, but they were not to personally approach any student. Furthermore, in order to protect the participants' identity, subsequent data collection activities were done discreetly (e.g., private venue for meetings).

Twenty-five students from cohort 1 consented to participate. All participants under 16 years of age were asked to provide parents' consent.

Phase 2. Invitation to participate in the research was issued to all fourth year students (cohort 2) after the pre-recruitment activities, which was conducted in order to build rapport with them. For the pre-recruitment activities, the researcher took over two class sessions over a period of two weeks and conducted workshop sessions with all the members of cohort 2 to

help them prepare for their proposal defence[6]. These were non-academic and informal sessions that were designed to meet the needs of the students at that particular time. It was emphasised during these sessions that the researcher was sharing ideas that she had found useful as she prepared for the oral examination for the upgrade process that she had recently undertaken; this emphasis on a common experience with the students was intended to create an empathetic atmosphere. Furthermore, the timing of these activities were scheduled two weeks after the start of the academic year so that the introduction of the researcher to the students as a resource person during the pre-recruitment activities would not be confused with her teacher status; because (new) teachers were introduced to the students at the start of the academic year.

The members of the cohort were invited to a recruitment meeting with the researcher. Students who came to the meeting were provided with a copy of the participant information sheet, the participant consent form, and the parent consent form. They were then briefed about the research and what their participation would entail if they consented to be involved in the research. It was emphasised to the students that participation was voluntary, that their refusal to participate would not be taken against them, and that they would not be penalised for refusing to participate. The students were then given at least two days to make their decision, and they signified their willingness to participate by returning the signed consent forms to the researcher. It was made clear to them that they could withdraw from participating anytime without having to give a reason for such action.

There were 22 students (18 female, 4 male) who initially consented to participate. But during the first month of data collection, two male students withdrew from participating. Also, a female student did not give a notice for withdrawal but did not contribute any narratives. Hence, the final set of participants from cohort 2 comprised 17 female and two male students. All the participants and their parents gave their consent[7].

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[6] This cohort had the distinction of having only one project group (i.e., a group of three students) pass the proposal defence at the end of their first science research course. The rest of the cohort had to undergo a second proposal defence at the start of the second science research course.

[7] Unlike in phase 1 where only the parents of under-16 students were asked to give consent, the parents of all phase 2 participants were asked to give consent. This was in accordance with the requirement of the school director, because, in

Participant profile. The following table provides additional background information on the participants.

Table 5.1 Distribution of participants based on research context-relevant characteristics.

Characteristics	Phase 1	Phase 2
Total number (male, female)	25 (12, 13)	19 (2, 17)
Field of science of inquiry project		
Biology	11	11
Chemistry	8	6
Physics	2	1
Others (engineering, material science, computer science)	4	1
Stream (*elite, non-elite, transferred from elite to non-elite*)	(11,12, 2)	(6, 12, 1)
Work unit size (*solo, pair, triad*)	(1, 6,18)	(0,3, 16)

5.4.4 Briefing of Phase 2 Participants

Phase 2 participants were asked to attend individually a 20-minute face-to-face meeting with the researcher. The meeting had three parts. In the first part, which was audio-recorded, the participant was asked to share something about him- or herself to the researcher. This was done to build rapport and to give the participant a foretaste of being audio-recorded (in case they would choose to contribute their narratives via narrative interviews). At the conclusion of the first part, the participant was asked about how he or she felt about being audio-recorded. In the second part, the participant was given a set of cards containing the elicitation prompts, the procedures for setting up appointments for narrative interviews and submitting written or emailed narratives, and the researcher's contact details. The researcher went over the contents of these cards with the participant. In the final part of the meeting, the participant was asked about

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the school, students under 18 years of age were considered minors, and all the participants in phase 2 were under-18.

his or her preferred mode for contributing narratives, and a first appointment was set for a narrative interview or a schedule was set for submitting a written or emailed narrative.

The participants were offered several modes for contributing narratives: (a) written or emailed narratives, (b) narrative interview, (c) self-produced audio- or video-recorded narratives, and (d) any combination of these. The participants took up either of the first two options, or a combination thereof. They were also given considerable latitude in choosing when and how often to participate. (The number of narratives contributed by the phase 2 participants ranged from one to 10.)

5.4.5 Elicitation of Emotion Work Narratives (Phase 1)

A four-page writing brochure was provided to the phase 1 participants. The front page of the brochure featured the writing prompt, a guide on what they should include in their narratives and other instructions. These are the main points in the writing prompt:

- Please tell about your experience of a challenging situation that you encountered while undertaking your research project (that is, any time between the present and the start of Science Research 1).
- The situation must be challenging enough for you to experience strong feelings and to make attempts to deal with the way you feel.
- It does not matter if you were successful or not in dealing with the way you feel.
- You may tell about an experience that lasted for an instant or persisted over a longer period of time.

The participants were given two options with regards to the writing of their narratives: (1) they could bring the brochure home and write the narratives in their own time, or, (2) they could join a group writing session that would be facilitated by the research assistants. Most of the participants chose the second option. To maintain the confidentiality of the data, each participant was given an envelope, and they were instructed to put the writing brochure in the envelope and seal it before giving it to the research assistants. The participants were assured that the research assistants, who were their teachers, would not have access to their narratives and would not keep documents and records related to this research. A sample of students' emotion work narratives is provided in Appendix A.

5.4.6 Elicitation of Emotion Work Narratives (Phase 2)

Prompts and Memory Aids. Phase 2 participants were given the same prompts that were given to phase 1 participants (see Section 5.4.5).

Furthermore, participants who came for narrative interviews were showed additional memory aids or prompts at various times during the fieldwork. These were cards containing key words related to the various science inquiry activities (e.g., problem, experiment, literature search), image vocabulary cards[8] showing different feelings without the labels, and more specific textual prompts (e.g., one approximating Hochschild's (1979) prompt). The participants were told that they could either use any of them to help them tell their stories or ignore them.

At the start of the fieldwork, an emotion diary (Oatley, 2009) was considered as one of the modes for eliciting narratives. After consultations with the gatekeepers, however, it was decided that asking the participants to keep an emotion diary might be onerous, since the students were also required in their research class to keep a journal. Furthermore, an emotion diary, alongside the research journal, might seem like another school requirement for the participants—an issue that could potentially affect the narratives that these students would produce (Dauite, 2004).

Narrative Interviews. The major steps and the principles for conducting narrative interviews as outlined in Jovchelovitch and Bauer (2000) were followed. The details of how narrative interviews were conducted in this study are given in the table below.

Table 5.2 Steps in conducting a narrative interview.

Steps	Details of Implementation
Initiation	1. At the start of the narrative interview, the participants were reminded about the elicitation prompts (see Section 5.4.6). 2. They were shown the memory aids. 3. They were briefed that they would be asked to tell their story without any interruption from the researcher and should indicate to the researcher if their story had come to its end. 4. They were also asked not to be concerned when the researcher took notes, as she was only taking notes of parts of the story that she would like to ask questions about later.
Main Narration	5. The audio recorder was turned on and the participants were asked to narrate their stories. 6. The researcher did not interrupt and only made nonverbal encouragement to the participants.

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[8] Image vocabulary is a repertoire of images that young people can use to convey their experiences. Resources and guidelines on the use of image vocabulary are available at http://www.howitis.org.uk.

Steps	Details of Implementation
Questioning Phase	7. Once the participants indicated that they had come to the end of their story, the questioning phase commenced. 8. Questions were asked to clarify the story that was narrated and to draw out details that were relevant to the research topic. These questions were posed to the participants using their own words as much as possible and were grounded on their stories. 9. Opinion, attitude and why questions were not asked. 10. If the participants contradicted their own stories or responses, they were not challenged about it.
Concluding Talk	11. The audio recorder was turned off. 12. The researcher talked informally with the participants, probed further about issues that were brought up during the questioning phase, sometimes asked the participants why questions, or responded to questions from the participants. 13. Relevant contents in the concluding talks were recorded in field notes.

Narrative interviews were conducted in a room that research students used but was located away from the classrooms, to minimise the possibility of participants to be identified. The venue was set up to create an informal ambience and to protect the identity of the participant. The researcher and participant were seated across each other, with the audio-recorder located off-centre and close to the participant. During the interview, the researcher positioned herself as an empathetic listener. While the interview was in progress, the room was locked and only the researcher was visible to people outside the room.

Written or emailed narratives. A secure box in a secure location within the school was designated for submitting written narratives. Emailed narratives were sent to a University of Leeds email account that was established specifically for this research. Once the narratives were submitted, the questioning phase of the narrative interviews was approximated by giving the participants immediate feedback and suggestions on what to include in their next stories. Additional clarifications about their written narratives were made during the debriefing interview (see Section 5.4.10). Also, in order to maintain rapport with these participants, the researcher, in the role of a resource person, conducted workshops and consulting sessions (i.e., post-recruitment activities) with all members of cohort 2 (even with non-participants). These sessions allowed the researcher to interact informally with the participants while protecting their anonymity.

Addressing power relations during field work. At the start of the fieldwork period, a request was made to the gatekeepers asking that the

researcher would not be made to take on any responsibility in the school or to participate in school activities, in order to downplay her position as a teacher in the school and to enable the researcher to maintain the status of a "marginal native" (Hammersley & Atkinson, 2007). In addition to this, the researcher deliberately dressed casually to achieve a different appearance from the other teachers, who were dressed more formally or in uniform. During interactions with the participants, the researcher refrained from acting as a teacher or as an authoritative figure. A deliberate non-coercive stance was taken regarding students' attendance in narrative interviews and submission of written interviews. They were not checked up on nor made to feel that they were being sanctioned when they failed to attend a narrative interview or submit a written narrative.

5.4.7 Field Notes

Field notes were produced during the field work. They comprised the following:

- Potentially important contextual information from informal interactions with participant before and after the interviews, and during chance encounters. The participants were informed about the researcher's intention to make a record of what they shared and consent was solicited in every instance.
- Incidents and other school-related details that students referenced in their narratives (e.g., release of quarterly grades, an essay on the notice board that was cited by several participants, awarding ceremony). The location of the artefacts that students referred to in their narratives were ascertained from them and they were either photographed, or described in the notes.
- Notes regarding the stories the students had shared, after they were reviewed—the gaps for which clarification or information would be sought, researcher's understandings that would need to be checked with the participants, and memos about topics that appeared to be a continuing thread in their stories.
- Researcher's actions and decisions that might have potential impact on students' narratives and the researcher's understanding of students' stories (e.g., decision not to hug a teary-eyed participant after she told a distressing story). Notes were also made of instances when the researcher felt that her insider status impacted on her actions and decisions as a researcher (e.g., decision not to act on information about teacher misbehaviours in students' stories).

5.4.8 Collection of School Artefacts

School artefacts that contained ideas on achievements which were conveyed to students (e.g., student code of conduct), or to which students had access (e.g., school website), were collected. The identification of these artefacts were done by referencing the researcher's insider knowledge as a teacher in the school, by eliciting information from two teachers in the school, and by paying attention to references about these artefacts in students' narratives. The school artefacts were downloaded from the school website and other online sources, or were photographed during field work. The school director gave her consent for the collection of these artefacts and their use in the research. The collection of artefacts was done at two different times: (1) during the field work, and (2) during the early stage of the data analysis, after the decision to focus on achievement discourses was made. A list of these artefacts and details regarding them are provided in Table 9.1.

5.4.9 Processing and Transmission of Data Sources

Phase 1. The writing brochures in sealed envelopes and all materials related to phase 1 data collection were collected by the research clerk from the research assistants and were taken to a private office designated solely for the processing of these research materials. All the writing brochures from phase 1 participants were scanned into individual pdf files and labelled with the respective student codes. [N.B. The writing brochures did not contain personal information about the participants.] The pdf files were then sent to the project email account; after which, the writing brochures and all research materials related to phase 1 data collection were stored in a locker in the office. These procedures were performed by the research clerk in the office using a laptop that the researcher provided. The narratives in the writing brochures were then encoded by the researcher as Word documents in preparation for analysis.

Phase 2. Participants in the second phase contributed written narratives and narrative interviews. All these narratives were collected and processed by the researcher. Written narratives were stored as Word documents.

The narrative interviews, on the other hand, were transcribed by two transcriptionists. The two transcriptionists were known personally to the researcher, and both had no contact with or connections to the research participants and setting. They were asked to sign a confidentiality agreement and were provided a protocol for the transcription and

transmission of digital files containing the transcripts. The transcription was done on a laptop provided by the researcher and all transmission of research-related files from the transcriptionists to the researcher were made using this laptop via an email account that was created solely for this purpose. The transcription email account was closed after the transcription was completed. All research materials that the transcriptionists handled bore coded file names, and only the participants' nicknames were mentioned in the narrative interviews.

The narrative interviews were transcribed verbatim. The transcription featured the speaking turns, audible emotional displays (e.g., sighs, laughter), and interjections signifying agreement or disagreement (e.g., uh-huh, uhn-uhn), but omitted those signifying a pause (e.g., uh, um, hmmmm). When the participant started a new thought midsentence, the location of this was marked in the transcript.

All the files containing the narratives were in digital form, identified by student codes, and stored in the university server and in the researcher's laptop. The researcher had sole access to this laptop. Only the field notes were kept in physical notebooks. Furthermore, when transported, the laptop and notebooks were within sight and in the possession of the researcher at all times.

5.4.10 Debriefing of Participants and Egress from the School

As part of the debriefing process, phase 1 and phase 2 participants were given a thank you card containing the following information: (a) the aim and the significance of the study, (b) the importance of their contribution, (c) instruction to see the school's guidance counsellor if they would feel any distress arising from their participation in the study, (d) the project email address to use for communicating with the researcher about further questions or concerns, and (e) information on online resources that they could access for additional help (e.g., the American Psychological Association webpage on "Resilience for Teens").

In addition to the above, phase 2 participants also underwent a 20-minute debriefing interview. The interview had three parts. The first part of the interview featured a common set of questions to all participants to elicit a general description of their emotion experiences while undertaking their science inquiry projects and an overview of the emotional support that they received. The second part were specific questions that were aimed at obtaining information to fill in the gaps and to clarify details in their

narratives. A set of specific questions for each participant was prepared based on a review of all the narratives that they contributed. The third part of the debriefing interview involved posing a common set of questions to all participants to elicit information about their experience related to their participation in this study and the process of telling their emotion work narratives (e.g., how they chose which story to tell, the impact on them of participating in the research). The participants were also given a chance to ask questions from the researcher.

Finally, at the end of the field work period, the researcher joined one science research class attended by all the members of cohort 2 to thank them and to inform them that the field work had formally ended. The researcher also met once more with the gatekeepers to inform them of the completion of the data collection activities and to thank them for their support.

5.5 Data Analysis: An Overview

The details of the data analysis corresponding to the two research questions are explicated in Chapter 6 (Research Question 1) and Chapter 9 (Research Question 2). These two chapters will provide the details on how the principles and procedures associated with the different analytical approaches were used in the analysis of data. A summary of the data sources and analytical approaches is given in the table below.

Table 5.3 Data sources and analytical approaches.

Research Questions	Data Source	Analytical Approach
1. Situations and strategies of emotion work	Narratives (written and interviews) Field notes	Narrative analysis Thematic analysis
2. (a) School achievement discourses	School artefacts Field notes	Foucauldian discourse analysis Textual analysis Thematic analysis
(b) Student achievement discourses and links to emotion work	Narratives	

Although narratives were collected from two cohorts, all the narratives were analysed as one data set. Also, a preliminary data analysis of a subset of the narratives from phase 1 was conducted prior to field work to test the appropriateness of the analytical approach.

5.6 Validity and Trustworthiness

This study adopts an inquiry approach that is underpinned by a subjective ontology and epistemology. The inherent subjectivities in being an insider researcher was also kept in mind during the entire research process. Thus, the researcher's concern was to manage subjectivities and build trustworthiness. To this end, the following strategies (Erlandson, Harris, Skipper, & Allen, 1993) were adopted:

Prolonged engagement in the research setting. The researcher, as an insider researcher, was familiar with the setting and shared similar experiences with the participants. She also spent eight months in the research setting for field work. These afforded the development of shared constructions that enabled the researcher to understand students' emotion work from the students' perspective (Erlandson et al., 1993).

Reflexivity. Because the researcher admitted to having prior knowledge about the research topic and setting, care was taken to ground the study on knowledge from existing literature during the process of conceptualisation and design (Finlay, 2002). The researcher, prior to field work, made an account of her subjectivities as an insider research by answering the research questions based on her experiences[9]. This allowed her to identify shared experiences when listening to and reading students' narratives, and to monitor and manage the impact of these subjectivities, during field work and during data analysis. This also made her more deliberate in noticing aspects of students' experiences that were unfamiliar and were outside her prior knowledge. This awareness allowed the researcher to set aside her prior knowledge and to admit other perspectives (afforded by her outsider position, see Section 5.2.3) when looking at the data at various times during field work and data analysis in attempts to enhance her ability to 'see' the phenomenon, and to lessen the blinding effects of familiarity (Alvesson, 2003).

In addition to the above, reflexive notes were also made during field work (see Section 5.4.7) and an accounting of the impact of these subjectivities on the research was made during talks with her two supervisors.

Repeated engagement with the data. The researcher read all the narratives in their entirety at least four times since the start of the data

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[9] A similar process is described in the quote from Fischer and Wertz (1979) that was cited by Finlay (2002, p. 537).

collection stage. Several cycles of various procedures during data analysis also ensured sufficient engagement with the data and the opportunity to test emergent ideas about the research findings.

Auditing and debriefing. The researcher's actions and decisions were accounted for in the regular reports she gave to her supervisors, and were discussed during the supervision meetings. The evolving process of data analysis was documented using notes, tables, and mindmaps that showed the links between the data and the results.

Member checking. The researcher's understanding of the accounts the students gave about their experiences was checked with the phase 2 participants in two ways: during the questioning part of the narrative interviews and during the debriefing interviews.

5.7 Ethical Issues

The following ethical considerations were addressed elsewhere in this chapter:

- Voluntary participation, and informed consent from young participants and their parents (Section 5.4.3);
- Gatekeepers' consent (Sections 5.2.4 and 5.4.8, for the school artefacts);
- Confidentiality and anonymity (Sections 5.4.3 and 5.4.9);
- Data protection during remote data collection and field work (Section 5.4.9); and,
- Issues related to researcher position and to power relations (Sections 5.2.3, 5.2.4, and 5.4.6).

In addition to the above, these ethical considerations were also addressed:

Participants' welfare. The discomfort that students could potentially experience from sharing their stories were minimised by activities to build rapport, by giving them a foretaste of how the narrative interviews would proceed (see Section 5.4.4), and by researcher positioning as an empathetic listener to their stories. All interactions between researcher and participants were confined only to midweek so as not to interfere with students' activities at the start and end of the school week. A debriefing interview was also conducted with all the phase 2 participants, as part of the disengagement process from their research participation (Section 5.4.10).

Protecting participants from internal exposure. To minimise the possibility that the participants' identities would be compromised within the school, the researcher, with the consent of the gatekeepers, created genuine

alternative identities (e.g., resource person in research classes, consultant to research students, consultant for a teacher project) to justify her presence in the school and her interaction with students. The researcher identity was disclosed only to gatekeepers and the cohort from which the participants were recruited. The students were also assured that they would not be named in any oral or written reports and presentations based on the research, and that any publication of the research findings would take place when they had already graduated from the school. If it would be required, only an abridged version of the thesis would be submitted to the school and information which might be potentially damaging to the participants would be fictionalised or excluded altogether.

Minimising traceability. Information about the specific location and name of the school, and distinguishable personal details of participants were omitted from any report or presentation. The individual narratives were identified by the respective student codes, not by the names of the participants. The url addresses of the websites from where the school artefacts were downloaded were not reported in the thesis (although screenshots were shown to the research supervisors). Extensive direct quotations from school artefacts were also avoided.

Tokens of appreciation. Participants who attended narrative interviews were offered refreshment after the interviews. Furthermore, those who contributed written narratives were also given tokens of appreciation consisting of snack foods every time they turn in their narratives (one-time for phase 1 participants). The refreshments and snack foods offered to participants cost approximately 50p per participant per instance. All phase 2 participants were given an inexpensive (less than £2) non-cash token of appreciation at the end of the field work. Since the majority of the participants came from middle class or well-off backgrounds, and all of them received a monthly stipend from a scholarship grant, the abovementioned tokens of appreciation were deemed to be not coercive.

Ethical review. This research was submitted for ethical review by the ESSL, Environment and LUBS (AREA) Faculty Research Ethics Committee (University of Leeds) prior to the start of data collection. The committee returned a favourable ethical opinion regarding the study (Ethics reference: AREA 13-047).

5.8 Writing Up

The following symbols are observed in the succeeding chapters:

- A three-digit numeral preceded by the dollar sign (e.g., $046) indicates a particular narrative contributed by one of the participants. Nothing in this referential scheme serves as an identifier to a particular participant. For the narratives in phase 2, the numbers reflected the chronological order of the receipt of the narratives.
- [words] - a word or a phrase that was inserted by the researcher to improve the clarity, or to replace identifying details
- […] - words that were omitted by the researcher

The following editorial decisions were also made regarding the excerpts from the narratives that are used in this thesis:

- Passages that were not in English (i.e., in Filipino and/or the local dialect) were translated using a combination of functional and literal translation.
- Passages were corrected for syntax and grammar. English words that were used by students in relation to their colloquial meaning within that particular cultural context (i.e., their meaning is different from the dictionary definition) were replaced by mainstream English words that reflected what the student was saying. To address the incoherence inherent in some participants' way of telling their stories, sentences or phrases were rearranged when the excerpts were edited. Care was taken so that, as much as possible, only minimal corrections were performed and that these corrections did not change the meaning of what the students were saying.
- When literal translation failed to convey the intended meaning of the participant, its functional translation was offered. To optimise fidelity to the participant's meaning, the excerpt was located within the entire narrative, and the context surrounding the excerpt was considered during the translation.

5.9 Chapter Summary

This chapter explicates the procedures and principles that were followed in the conceptualisation and implementation of this study. Details are provided about the research setting, the participants, the researcher position, the collection and analysis of data, and how issues regarding ethics, validity and trustworthiness were addressed.

The next chapter provides the details of the procedures for the analysis of data pertaining to the first research question.

Chapter 6
Overview of the Analysis for Students' Emotion Work
(Research Question 1)

This chapter provides the details of the data analysis that was conducted in order to answer the first research question and its subquestions.

Data analysis for the first research question drew on the principles of thematic analysis (Braun & Clarke, 2006) and narrative analysis. Three main analytical cycles are described in the following sections. First, the procedures for drawing the organising themes and subthemes are explained. Second, the steps that were taken to identify episodes in the narratives that were relevant to the agenda of analysing situations and strategies of emotion work are delineated. Third, the analysis of the episodes is described to show how the final results were obtained.

6.1 Drawing Organising Themes

Organising themes were identified after several rounds of engagement with the narratives. Early rounds of engagement with the narratives took place during: (a) the encoding of the students' written narratives from cohort 1; (b) the making of field notes about the narratives from cohort 2; (c) the preparation of debriefing schedule for each participant from cohort 2 at the end of the field work, when students' narratives were examined to determine gaps that were addressed in the debriefing interviews; and (d) the creation of the database (an Excel file) that summarised the emotion work-engendering situations that students narrated about.

These early rounds of engagement with the narratives developed the researcher's familiarity with the students' narratives. For instance, the following excerpt from a field note entry provided the key points in one student's narrative:

> Research work in conflict with group mates' other activities (group mates applying for COQC [a citizens' army training in school]). During research proposal preparation, division of work was unequal. Participant was disappointed with and mad at her group mates. Participant assumed the bulk of the work. [Note: This response is tied to achievement goals]. This did not work; no outcome. Participant talked with adviser, then with group mates. Group mates realised their shortcomings; problem with unequal work distribution resolved. (Field notes, $027)

The database, on the other hand, was focused on emotion work-engendering situations in order to provide an easy way to organise the narratives and retrieve specific groups of narratives for analysis. The table below illustrates the structure of the database and provides an example where several situations were depicted in one narrative.

Table 6.1 Sample entry in the database for one narrative identifying the details of the emotion work-engendering situation.

Narrative	Author	Emotion-Eliciting Situation	Details
$086	LEY-14	Hindrance	Delay because of external laboratory work
		Aspiration	Unable to join competitions; grades affected
		Task	Research grant application interview; balancing research with other school demands
		Expectations	From adviser

The conceptualisation of organising themes was based on the field notes and database. Several ways of conceptualising a set of preliminary themes for the analysis of the first research question were considered (e.g., based on the various activities in science inquiry such as field work, experiments, supervision meetings, literature search). It was, however, observed that contextual elements underpinning the conduct of extended/open science inquiry projects significantly influenced the stories the students narrated. Therefore, descriptive phrases which are contextually inclusive were used to conceptualise the organising themes. Consequently, students' emotion work was organised into two overarching themes, with corresponding subthemes based on the context of the situations, as shown in the following table. The examples given for each subtheme are drawn from students' narratives.

Table 6.2 Organising themes and subthemes.

Overarching Themes	Subthemes	Illustrative Details from the Narratives
Emotion work within a collaboration context	• Working with peers	• Dealing with uncooperative group mates or with differences in priorities within the group
	• Dealing with adviser	• Coping with unhelpful adviser; responding to adviser's questions regarding the project
Emotion work within a performance context	• Experiencing a hindrance or a setback	• Lack of resources; unproductive laboratory work
	• Personal struggles	• Dealing with pre-existing dislike for research; threats to aspirations or sense of self, such as low grades in research or failure to qualify for a research grant
	• Doing uncommon or demanding tasks	• Working with hazardous substances in the laboratory; defending research ideas; dealing with real-world transactions involving research professionals or field work contacts

6.2 Analysing Episodes from the Narratives with Respect to the Situations and Strategies of Emotion Work

Once the organising themes and subthemes were identified, the narratives were again read in order to extract the episodes that were used for the next round of analysis. This step involved highlighting the elements of the stories that addressed the first research question (i.e., situations that engendered emotion work, and the emotion work strategies). An episode is an extract of a narrative corresponding to a particular subtheme (e.g., 'personal struggle' related to a threat to one student's aspiration, see Section 6.2.4 for an example). The following subsections provide further details for this stage of the analysis.

6.2.1 Principles That Guided the Identification of Episodes of Emotion Work

The unit of analysis (relevant to the first research question) were episodes of emotion work that were extracted from students' narratives. The following principles were used as a guide in identifying these episodes:

(a) The episodes that were extracted for analysis of emotion work contained a situation that the narrator considered to be emotive.

This assumption was meant to reflect the solicited nature of the students' narratives (i.e., a prompt to elicit stories of emotion work was used). Thus, even if the narrated situation might seem to be not particularly emotive to the researcher (and other readers), the narrator's perception of it as such was considered in the analysis. Moreover, the aforementioned assumption was also based on one of the characteristics of stories—that is, the narration of "an event or series of events that will introduce some kind of complication to an initial state of affairs or an equilibrum" (De Fina & Georgakopoulou, 2012, p. 6; see also Kleres, 2010). Therefore, the 'complication' that students featured in their narratives was assumed to evoke their emotion experiences and to engender emotion work (because they told about it in response to the prompt).

The students provided some indicators in their narratives to signal that they would be narrating about an emotion experience. For example, some students framed their stories using explicit statements, such as, "My emotionally challenging research experience happened…". In the absence of this explicit framing, the various ways of talking about emotions that were identified by Heelas (1996, p. 179) were considered as signals to students' accounts of their emotion experiences (see Table 6.3 below). Furthermore, the emotion names listed in Shaver et al. (1987) and Plutchik (2001) were used as additional references.

Table 6.3 Various ways of talking about emotions.

References to Emotions	Illustrative Excerpts from Students' Narratives
Explicit use of emotion names	• I was sad ($054)
Reference to "physiological phenomena"	• I had palpitations ($001)
Reference to "behavioural manifestations"	• I cried ($002); I was not as diligent as I was before ($054, referring to losing motivation)
"Use of bodily parts"	• I hit the wall; I facepalmed myself ($107)
Use of figures of speech (e.g., irony, sarcasm)	• [Sarcasm]: [T]he most challenging stuff I have to deal with is my adviser's appear-disappear mode…. He is like a rare Pokemon that I have to capture every day. ($002)
Contextual reference to emotions	• Two years spent in hell ($002)

(b) The episodes, while telling about a situation, need not feature all the prototypical structural elements of a story.

This condition was established to deal with incoherence in the narratives. This incoherence might be due to variability in the students' narrative ability (Dehn, Merklinger & Schüler, 2014) or their differing stereotypical conception of what a story is. For instance, the prototypical structure of a story consists of "setting+initiating event+reaction+ending" (De Fina & Georgakopoulou, 2012, p.5). Episodes from narratives that lacked either a 'setting' or an 'ending' were still considered for analysis. Moreover, narratives collected during the field work were mostly a series of stories from individual participants. It was observed that, as students developed rapport with the researcher, their narratives became more interactive and loosely structured. For instance, one participant sent a short email, which was not a complete story, to give an update about an event that she told in a previous narrative interview. Hence, a decision was made to admit for analysis individual narratives that were not complete stories in themselves but were part of the serial narrative from a particular participant.

(c) Contiguous actions described by the narrator after telling about an emotion-eliciting situation were considered for drawing ideas about emotion work, regardless of whether or not the narrator explicitly announced the intention to deal with what he or she was feeling.

Intentionality can be established by identifying an action and the object towards which this action is directed (Hutto, 2012). Majority of the narratives, however, rarely conformed to this logical structure: "This is how I felt...this is what I did to change how I felt." To address this lack of explicit intentionality, the above assumption was adopted based on one basic feature of stories: stories "present goal-directed actions and reactions" to deal with a complicating or disrupting event (De Fina & Georgakopoulou, 2012, p. 6). In the case of students' narratives, it was assumed that any actions that they related within the context of an emotion-eliciting situation that they were sharing about was directed towards the situation and their emotion experiences in it.

(d) Actions that the narrator indicated as directed to the self-that-is-experiencing-the-emotions (within the emotion-eliciting situation) were considered emotion work.

In some narratives, the students did not assign labels to their feelings. However, students' emotion experiences were rarely depicted as

disembodied. Hence, in some of the narratives, feelings that students did not explicitly label were described in bodily terms (e.g., "it kept me up at night", "I was trembling"). Denzin (1983) argued that, in view of embodied emotions, "what is being managed is not emotion, but the self-in-the-feeling that is felt" (Note 2, p. 403). Hence, actions that students depicted as directed not to the emotion but to the "self-in-the-feeling" (e.g., "I kept myself busy", "I numbed myself") were considered emotion work.

6.2.2 Analysis for Emotion Work-Engendering Situations

Once the abovementioned episodes of emotion work were extracted, they were organised based on the themes and subthemes (see Table 6.2). The collection of extracts under each subtheme were accounts about a similar situation (e.g., working with peers). The extracts were then examined by subthemes to draw out emerging ideas about the emotion work-engendering situations about which the students narrated. Mind maps were drawn to show the emerging ideas. For instance, under the 'working with peers' subtheme, one emerging idea was 'uneven participation in group work', with the following ideas depicted as branches in the map: (a) actions of group members with respect to project work, (b) the different aspects of uneven participation, (c) the reasons for the emotiveness of perceived uneven participation, (d) the emotions that were named or described in the narratives, and (e) other factors that influenced the emotiveness of the situation. The result of this analysis was the elaboration of five thematic groups of emotion work-engendering situations (see Figure 7.1).

One key principle that was followed in the abovementioned analysis and in subsequent stages of analysis of data from students' narratives is this: When considering accounts of the same situations from different narrators, and students' narratives vis-à-vis researcher knowledge, the analysis was not concerned with establishing the truth value of the narratives or the primacy of one account over another.[10] The adoption of this principle came about because it was observed that some students (e.g., students who were group mates) told of the same situation, but had different versions of it. Furthermore, some students' interpretations of their experiences varied with the researcher's insider knowledge and observations in the field. These differences in accounts and interpretations, and the contradictions therein, in such cases, were admitted as part of a multiple reality.

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[10] This perspective was suggested by Yanow (2000, p.60).

6.2.3 Identifying Emotion Work Strategies

For the analysis related to the strategies of students' emotion work, the extracted episodes of emotion work (see Section 6.2.1) were read again in order to identify the emotion work strategies that students recounted in their narratives. As an aid in this identification process, a list of sensitising ideas that were drawn from literature on emotion regulation, achievement-related behaviours, and academic coping was used (see Table 6.4 below).

The adoption of this eclectic list of sensitising ideas was based on an observation during the early rounds of analysis. An initial list of universal strategies from emotion regulation literature (Parkinson & Totterdell, 1999; Gross & Thompson, 2007, cited in Gross, 2013) could not sufficiently account for some of the ways that students dealt with their emotion experiences. The strategies that students deployed in many situations were related to the independent project and academic achievement contexts, and to dealing with emotional challenges over a long period of time (i.e., coping). In view of these, ideas from literature on achievement-related behaviours and academic coping were adopted and combined with the aforementioned strategies from the emotion regulation literature. The utility of this eclectic list of ideas is illustrated in Section 6.2.4 below. This eclectic approach and situated framing of emotion work have also been employed by researchers on emotion work in other contexts (e.g., Jacobsson & Lindblom, 2013, on animal rights activism).

This list served as a resource during an intermediate step in the analysis. The descriptions (second column in the table below) for each strategy label (first column) helped in promoting awareness of the emotion work strategies that the students narrated about and facilitated the labelling of these strategies for analytical purposes. Hence, although it is admitted that some of the strategy labels have similar meanings (e.g., problem solving and strategising, disengagement and escape), these overlapping terms were included in the list because the nuances they depict were useful in promoting such awareness.

Table 6.4 Summary of strategies for managing emotion experiences.

These were drawn from literature in the following research areas: emotion regulation, academic coping, and achievement-related behaviours.

Strategy	Explanation
EMOTION REGULATION	
Confrontation	• An engagement strategy that involves "actively addressing concerns or feelings" (Parkinson & Totterdell, 1999, p. 285).
Acceptance	• A passive engagement strategy of accepting what has happened (Parkinson & Totterdell, 1999).
Self-blame	• This involves ascribing blame about what happened to oneself (Garnefski & Kraaij, 2006).
Other-blame	• This involves putting the blame for what happened on the environment or on other people (Garnefski & Kraaij, 2006).
Reappraisal	• This is a cognitive change strategy directed to the emotion-eliciting situation (Parkinson & Totterdell, 1999), which "involves changing a situation's meaning in a way that alters its emotional impact, either by changing how one thinks about the situation or about one's capacity to manage the demands it poses" (Gross & Thompson, 2007, p. 20).
Putting into perspective	• This entails dismissing the seriousness of a situation by considering it to be less severe relative to another situation (Garnefski & Kraaij, 2006).
Problem solving	• An engagement strategy, usually situation-directed, wherein one thinks about how or take action to solve a problem (Parkinson & Totterdell, 1999).
Help-seeking or comfort-seeking	• Seeking help or comfort from others (Parkinson & Totterdell, 1999).
Rumination	• A cognitive-engagement strategy where one is "passively and repetitively focusing on one's symptoms of distress" (Brans et al., 2013, p.2), or "repetitively focus[ing] on [one's] experience of the emotion and its causes and consequences" (Aldao, Nolen-Hoeksema, & Schweizer, 2010, p. 219).
Reflection	• A cognitive-engagement strategy which involves "positive self-reflection driven by epistemic curiosity" (Brans et al., 2013, p. 2), in order to gain understanding about the situation.
Social sharing	• A behavioural-engagement strategy "which involves openly talking with someone else about the circumstances and/or emotional reactions related to a particular emotion-eliciting event" (Brans et al., 2013, p. 2). A related term for this is venting (Parkinson & Totterdell, 1999).
Disengagement	• A diversion strategy where one either avoids thinking about the problem (cognitive) or avoids the problematic situation entirely (behavioural) (Parkinson & Totterdell, 1999).
Distraction	• A diversion strategy where one thinks about other things or do some other activities (Parkinson & Totterdell, 1999) in order to move "one's attention away from the emotion-eliciting event" (Brans et al., 2013, p.2).

Strategy	Explanation
Suppression	• This behavioural-disengagement strategy involves "the conscious inhibition of expressive or behavioural components of an emotion" (Brans et al., 2013, p. 2). This could also be considered a response modulation strategy (see below) (Gross & Thompson, 2007).
Thought suppression	• This refers to the effort to not think about a particular distressing thought (Sullivan, Rouse, Bishop & Johnston, 1997).
Intentional forgetting	• This refers to the attempt to voluntarily forget unpleasant and emotional events (Payne & Corrigan, 2007).
Situation selection	• This antecedent-focused strategy "involves taking actions that make it more (or less) likely that one will end up in a situation one expects will give rise to desirable (or undesirable) emotions" (Gross & Thompson, 2007, p. 14).
Situation modification	• An antecedent-focused strategy where one "directly modify the situation so as to alter its emotional impact" (Gross & Thompson, 2007, p. 16).
Concentration or "controlled starting" of emotion	• An attentional deployment strategy where one focuses attention on the "emotional features of a situation" (Gross & Thompson, 2007, p. 19). "Attentional deployment refers to how individuals direct their attention within a given situation in order to influence their emotions" (Gross & Thompson, 2007, p. 18). For example, focusing attention on possible threats could help reduce the strength of negative emotional responses in the event that the threats do occur (Gross & Thompson, 2007).
Response modulation	• This strategy involves "influencing physiological, experiential, or behavioral responding as directly as possible" (e.g., anxiety-reducing exercises, suppressing an emotional behaviour) (Gross, 1998; Gross & Thompson, 2007, p. 22).
Humour	• This refers to a way of looking at situations with "sympathetic, tolerant, and benevolent amusement", which also implies "not taking oneself seriously" and "a sort of philosophical detachment in one's outlook on life" (Freud, 1928, cited in Samson & Gross, 2012, p. 376)
ACADEMIC COPING	
Strategising	• This refers to a way of coping where one make "attempts to figure out what to do to solve problems or prevent them in future encounters" (Skinner et al., 2013, p. 805). Similar to "problem-solving" in emotion regulation (see above).
Help-seeking	• This strategy is deployed when students go to "teachers or other adults for instrumental aid in understanding material or in figuring out how to learn more effectively" (Skinner et al., 2013, p. 805). A more generic definition is given in emotion regulation literature (see above).
Comfort-seeking	• This strategy involves "turning to others for emotional reassurance, consolation, and cheer" (Skinner et al., 2013, p. 805). Also one of the emotion regulation strategies (see above).
Self-encouragement	• This refers to "attempts to regulate one's flagging emotions by bolstering confidence and optimism" (Skinner et al., 2013, p. 805).

Strategy	Explanation
Commitment	• This refers to "attempts to remind oneself why challenging academic work is personally important and worth the effort" (Skinner et al., 2013, p. 805).
Passivity or resignation	• This involves an acceptance of the situation and a decision not to do anything about it due to a belief that the situation is outside of one's control (Spirito, Stark, Grace, & Stamoulis, 1991).
Escape	• This refers to "attempts to mentally avoid or remove oneself from difficulties and poor outcomes"; equivalent terms are "cognitive avoidance", "distancing", "withdrawal", and "denial" (Skinner et al., 2013, p. 806).
Concealment	• This refers to "attempts to prevent others from finding out about the occurrence of negative events" (Skinner et al., 2013, p. 806).
Self-pity	• This involves "feeling sorry for oneself and one's tribulations" (Skinner et al., 2013, p. 806).
Rumination	• This refers to the "preoccupation with the negative or anxious features of a stressful situation"; associated terms are "internalizing" and "anxiety amplification" (Skinner et al., 2013, p. 806).
Projection	• This is a way of coping which involves "blaming other people for the negative outcome" (Skinner et al., 2013, p. 806).

ACHIEVEMENT-RELATED BEHAVIOURS

Strategy	Explanation
Self-compassion	• This is a "self-attitude that involves treating oneself with warmth and understanding in difficult times and understanding that making mistakes is part of being human" (Breines & Chen, 2012, p. 1133). This has been linked to psychological well-being.
Social comparison	• The act of comparing oneself to others is theorised to be motivated by the need "to establish that one's opinion [about oneself] is correct and to know precisely what one is capable of doing", and to reduce feelings of uncertainty (i.e., in the absence of objective information with which people may evaluate themselves, they "turn to others for social information") (Buunk & Gibbons, 2007, p. 4).
Self-affirmation	• This is defined as "an act that demonstrates one's adequacy" and is a strategy that is deployed in the presence of psychological threat, "the perception of an environmental challenge to the adequacy of self" (Cohen & Sherman, 2014, pp. 335, 337). It is motivated by the need to feel that one is "good enough", to be admirable and praiseworthy, and to maintain the integrity of a particular self-definition (Cohen & Sherman, 2014, p. 336).
Psychological disengagement	• This refers to the process of detaching one's self-esteem from a negative evaluation or outcome (Lesko & Corpus, 2006). It may be deployed in two forms: (a) when individuals devalue the domain within which an outcome occurs "so that outcomes received in that context are no longer viewed as relevant or important to how the person defines or evaluates the self" (Schmader, Major, & Gramzow, 2001, p. 95), and (b) when individuals discount the "validity of an evaluation" they received (Schmader et al., 2001, p. 96), making it appear to be an inaccurate measure of their ability (Lesko & Corpus, 2006).

Strategy	Explanation
Excuse making	• This is "the process of shifting causal attributions for negative personal outcomes from sources that are relatively more central to the person's sense of self to sources that are relatively less central, thereby resulting in perceived benefits to the person's self-image and sense of control" (Snyder & Higgins, 1988, p. 23).
Reduction of effort or motivation	• This refers to the "tendency to reduce effort or motivation associated with an evaluative activity or its preparation", which is motivated by the need to "protect one's self-esteem and sense of personal competence from threat" and allows individuals to attribute any failure or negative outcomes to non-ability sources (Ryska, Yin, & Cooley, 1998, pp. 48, 51).

The achievement-related behaviours that are featured in the table above were compiled from research literature in the fields of personality, psychology, educational psychology, and sociology that reported on individual behaviour within an achievement context. Emotion-eliciting situations in achievement contexts are usually related to psychological threats (e.g., perceived failure). By drawing situational interpretations (as opposed to personality interpretations[11]) of these achievement-related behaviours within the context of emotion-eliciting situations, the students' achievement-related behaviours were interpreted as emotion work strategies that were deployed in order to regain psychological and emotional well-being. The achievement-related behaviours featured in the table above do not make a comprehensive list. These behaviours, however, were selected for inclusion because they resonated with behaviours that some of the participants described in their narratives.

6.2.4 Illustrating the Utility of the Sensitising Ideas for Identifying Emotion Work Strategies

The use of the above list is illustrated in the following episode from a student's narrative interview. In the excerpt below, the student told about the time when he did not qualify for the elite stream (see Section 5.2.2 for more details about streaming). The panel's decision not to admit the student to the elite stream was considered by the student to be a personal failure,

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[11] Personality interpretation would mean looking at the students' action through the lens of personality (e.g., neuroticism) and linking these behaviours to a personality concept. Situational interpretation, on the other hand, as in this case, would rely on information about the situation that students narrated in making sense of their achievement-related behaviours. This approach (situational interpretation vs personality interpretation) was suggested by ideas in Jellison, Jackson-White, Bruder, & Martyna (1975).

which threatened his self-definition (note how the student referred to the stream as a social identity label), and, thus, generated strong emotions. [N.B. Consultations refer to supervision meetings with the research adviser. Texts in square brackets are the researcher's annotations.]

The identified emotion work strategies, based on the aforementioned sensitising ideas, are listed in the table immediately after the excerpt.

Excerpt from the narration part

I resolved in my mind that I would work hard in research. So I was diligent—attending consultation, I really listened to what the teachers were saying. **[1]** That's why I got high scores. Then, I really wanted to excel in research, so I was diligent and I got a high grade. Then it was time for streaming during the second quarter. I really wanted to be in the [elite] stream. Also, I was expecting to be in the [elite] stream because I'm independent. I was able to write a concept paper that was acceptable; it was accepted early. Then, I was also praised sometimes [by the teacher]. […] Then, the results came out and I was in the [non-elite stream]. It's like, I was downgraded [embarrassed laugh]. **[2]** It got me thinking that all things/ that there are some things that you want that you won't get. **[3]** So, I was really depressed and, then, in the succeeding quarters my grades went lower and lower. That's it, it's just sad. Because I wanted to be in [the elite stream] but ended up in [the non-elite stream]. […] They told me that if your concept paper is good, you will be accepted [in the elite stream], if the study that you presented is good, you will be exempted from the quarter exam. I was exempted, I also got a high grade. But still I went to [the non-elite stream]. **[4]** But they said, they repeatedly said that [the elite] and [the non-elite streams] are the same. I believe that; but when I learned that I was in [the non-elite stream], I really did not want to be in [the non-elite stream], because I want to be in [the elite stream].

Excerpt from the questioning part; R and S refer to the researcher and the student, respectively.

R: Did you understand why you were in [the non-elite stream]? Did you talk about it…? [N.B. The researcher meant to ask if the student asked his teacher why; but he seemed to get the drift, so he cut in.]

S: No I did not…**[5]** But now, I'm thinking that I became [a member of the non-elite stream[12]] because my friends, we have the same emotions about this—that we wanted to be [members of the elite stream] but we became [members of the non-elite stream], **[6]** we had the same adviser during the first quarter because our topics were similar. […] The only thing I could think of why I became [a member of the non-elite stream] is so that the three of us would be together [in one group]. So that's how I understand it based on why they say

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[12] The student used, at this point of the narrative, the shared social labels for referring to members of the elite and non-elite streams.

you are placed in [the non-elite stream]…I don't get why I became [a member of the non-elite stream] because, for example, other [members of the elite stream] also have similar studies [with other students]. But I feel I became [a member of the non-elite stream] because perhaps my concept paper might not have been fixed so as to really target a certain goal, perhaps it's like that.

R: How did you deal with that depression?

S: **[7]** I accepted it because you can no longer change it. But my diligence in the first quarter did not really come back. That's why I said that I really wanted to get back my diligence. […] But I don't think I would ever excel in research again; I no longer have the motivation. […] My grades are just low. Actually my first quarter grade was 1.25, the highest in the batch[13]. Then it became 1.5 in the second quarter, 1.75 in the third and fourth quarters. And now for the first quarter of fourth year, it became 2.0. […] I really became lazy in research, because I did not get what I wanted. […]

S: **[8]** I accepted it because some of my friends also experienced the same; they also dreamt of being in the [elite] stream, yet they went to the [non-elite] stream. And since we were in similar straits, we commiserated with each other. So as time passes, the pain disappeared; but it reappears every now and then when I remember. So that's it. ($054)

Table 6.5 Summary of identified emotion work strategies in the illustrative excerpt.

The passage numbers determines the relative location of the supporting section in the excerpt.

Passage	Emotion Work Strategy	Reference
1,3,7	• ***Reduction in effort and motivation*** (The student lost his interest in research and was no longer diligent after his stream assignment.)	Achievement-related behaviour
2, 7, 8	• ***Resignation*** (The student seemed resigned at not getting into his desired stream.)	Emotion regulation
	• ***Acceptance*** (This acceptance, though, was a maladaptive strategy, because, it led to disengagement.)	Academic coping
	• ***Self-compassion*** (The student consoled himself with a metaphysical saying about not getting everything that one wants.)	Achievement-related behaviour

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[13] The highest possible grade is 1.0; the second highest is 1.25.

Passage	Emotion Work Strategy	Reference
4	• **_Psychological disengagement_** (He tried to devalue the status of the elite stream by referencing others' opinion that the two streams were equal.)	Achievement-related behaviour
5,8	• **_Social comparison_** (He compared himself to his friends, who were in the same situation, in order to feel better about his situation.)	Achievement-related behaviour
6	• **_Excuse making_** (The student tried to shift attribution for his failure to get into the elite stream from his ability and personal qualifications to the teachers' management decision on grouping. He, however, contradicted the merit of this excuse immediately, and changed his excuse to the quality of his concept paper.)	Achievement-related behaviour
	• **_Reappraisal_** (The student's attribution of the teachers' management decision on grouping seemed to be an attempt to reframe the situation so that it was no longer a personal failure.)	Emotion regulation
8	• **_Social sharing_** (The student implied that he talked about his emotion experiences within this situation to his friends.)	Emotion regulation
	• **_Comfort seeking_** (The student sought consolation from friends who were in a similar situation.)	Academic coping

6.2.5 Analysing Emotion Work Strategies

Once all the extracted episodes had been examined and the emotion work strategies had been identified, the various strategies that were identified in the narratives were summarised in a list. From this list, families of emotion work strategy were identified based on: (a) similarities between strategies with respect to how students dealt with their emotions, or (b) the intended outcomes for using the strategies. Four families of emotion work strategies were identified (reported in Section 8.2). Then, the extracts of emotion work episodes were again referenced to construct a mindmap for each family of emotion work under each of the five thematic groups of emotion work-engendering situations (i.e., 5 groups of situations x 4 families of strategies = 20 mindmaps). These mindmaps showed how students deployed a particular family of emotion work strategies within a specific group of situations. These mindmaps were used for gaining insights into students' emotion work strategies. The results of this analysis are reported in Chapter 8.

6.3 Chapter Summary

This chapter explicates the analytical procedures to draw insights from the narratives about the situations that engendered students' emotion work and the emotion work strategies that students used. The analysis was guided by principles of thematic analysis and narrative analysis. Several analytical cycles were undertaken, and mindmaps were constructed as an aid, in order to draw themes and subthemes. The results of the analysis are reported in Chapters 7 and 8.

Chapter 7
Situations that Engendered Students' Emotion Work

This chapter presents the results of the analysis of students' narratives with respect to the situations that engendered emotion work.

7.1 Overview of the Chapter

The chapter has three main parts: (a) an overview of situations that engendered emotion work (Section 7.2), (b) the conditions involved in situations that engendered emotion work (Section 7.3) and (c) the different kinds of situations that engendered emotion work (Section 7.4 to Section 7.8). At the end of the chapter, a vignette featuring one student's account of the various situations that engendered emotion work is included.

The following figure provides a summary of the five groups of situations that engendered students' emotion work and a guide to their location in the following discussion.
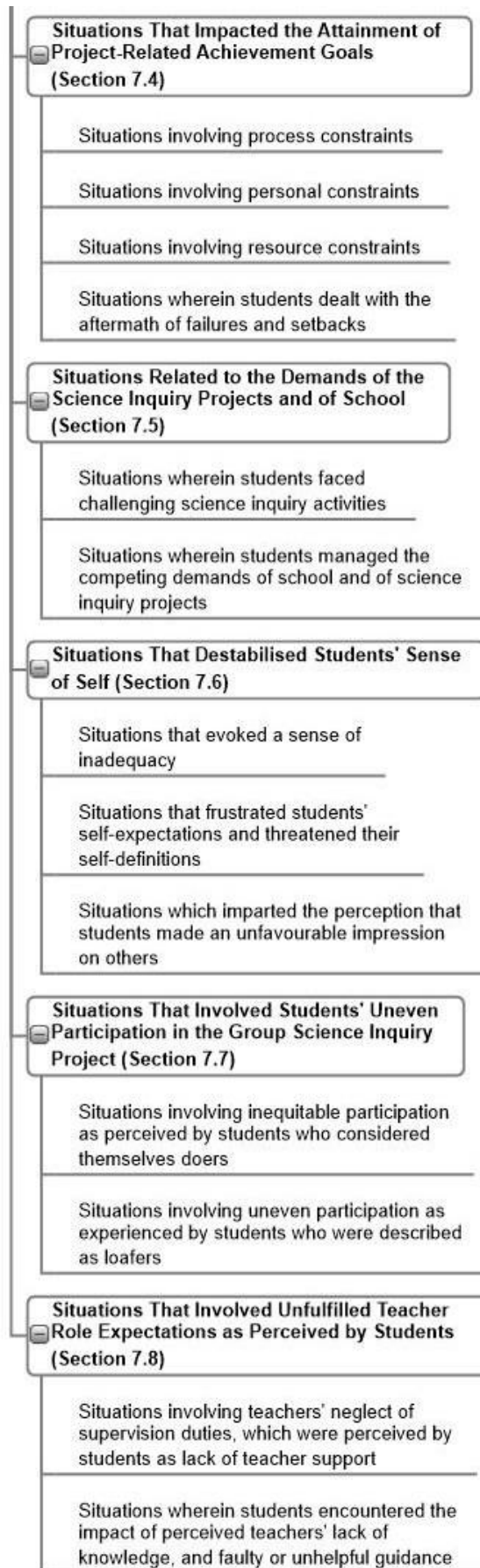
Figure 7.1 Five groups of situations that engendered students' emotion work.

7.2 Overview of Situations That Engendered Emotion Work

Three sets of thematically related situations were identified from the various situations that students narrated about as having engendered emotion work (refer to Chapter 6 for the analytical procedures). The three sets of situations are listed in the table below, while the specific situations that constituted each set are provided in the tables that follow.

Table 7.1 The key situations that engendered emotion work and the number of participants in the two cohorts who narrated stories related to each key situation.

One participant from cohort 1 was working on his project alone, so only 24 of the 25 participants from cohort 1 were working on group projects, and thus considered in the second key situation. The table numbers in the first column point to the subsequent table presenting the details for each key situation.

Key Situations	Participants		Total (out of 44)
	Cohort 1 (out of 25)	Cohort 2 (out of 19)	
The undertaking of extended/open science inquiry projects within an achievement context (Table 7.2)	19	19	38
Students' uneven participation in the group science inquiry project (Table 7.3)	16	14	30
Unfulfilled teacher role expectations as perceived by students (Table 7.4)	4	7	11

It should be noted at this point that further analysis resulted in the elaboration of the first key situation in the table above (i.e., 'The undertaking of extended/open science inquiry projects within an achievement context') into three key situations related to (a) the attainment of project-related achievement goals, (b) the demands of the science inquiry projects and of school, and (c) the students' sense of self (see the first three groups of situations in Figure 7.1 above). Thus, beginning Section 7.4, the discussion focuses on five groups of situations, instead of the abovementioned three sets of thematically related situations in Table 7.1.

[N.B. All but two narratives were included in the analysis for the abovementioned situation-focused themes. In one of the excluded narratives, the student narrated about an event that was only tangentially related to the undertaking of a science inquiry project; in the other, the

student was not narrating about her own personal experience, but was empathising with the emotion experiences of peers.]

The following three tables provide a survey of specific situations for each of the three key situations (see Table 7.1) that engendered students' emotion work.

Table 7.2 Specific situations that are related to the undertaking of extended/open science inquiry within an achievement context.

The findings reported in Sections 7.4, 7.5, and 7.6 were derived from these accounts.

Specific Situations Related to the Undertaking of Extended/Open Science Inquiry within an Achievement Context		Source Narratives
Setbacks, obstacles, hindrances, or lack of progress	Resource related (missing or broken equipment, missing materials)	3, 6, 11, 62, 67, 70, 74, 96, 99, 101, 107, 118
	Performance related (errors, oversights or failures during data gathering, unexpected outcomes or situations, lack of special skills, lack of motivation)	3, 5, 11, 14, 15, 17, 18, 19, 20, 41, 43, 50, 70, 72, 75, 81, 86, 95, 102, 103, 109, 112, 113, 115, 118, 134
	Concept or design related (uncertainty about or changes in the elements of the investigation, failed defence, unfeasible or faulty research problem, missing information or lack of knowledge)	3, 6, 12, 33, 34, 38, 42, 47, 48, 58, 59, 66, 69, 76, 83, 88, 93, 101
Demanding tasks	Decision- making (choosing elements of the inquiry problems, selecting from options, selecting group mates)	8, 12, 56, 110
	Presenting research/communicating ideas to others, writing a proposal paper	1, 28, 59, 68, 118, 144
	Conceptualising investigation problem, designing an investigation	4, 8, 12, 31, 52,
	Managing competing demands or priorities, deadlines, academic pressure	5, 10, 11, 14, 16, 22, 26, 45, 48, 50, 55, 67, 70, 71, 77, 80, 83, 86, 90, 95, 96, 101, 103, 109, 113, 134
	Questioning, knowledge building, information processing	12, 19, 26, 28, 29, 30, 36, 38, 42, 56, 59, 65, 66, 68, 78, 86, 89, 92, 93, 97, 104, 106, 109, 130, 144
	Conducting field work, laboratory work, data collection and analysis, real-world transactions	13, 18, 44, 61, 67, 71, 74, 101, 102, 107, 108, 115, 118, 129

Specific Situations Related to the Undertaking of Extended/Open Science Inquiry within an Achievement Context		Source Narratives
Achievement-related challenges	External evaluation, personal evaluation related to the merit of the project, negative feedback	17, 22, 28, 51, 60, 63, 69, 72, 85, 87, 98, 105, 108, 116, 144
	Competitions, grades, grants, awards, stream	5, 12, 13, 16, 25, 28, 32, 38, 41, 46, 47, 50, 53, 54, 69, 75, 77, 82, 84, 87, 88, 89, 94, 101, 103, 105, 106, 107, 111, 116, 125, 143, 144
	Interest, abilities, attitude, motivation, self-efficacy	28, 29, 30, 31, 32, 37, 40, 41, 54, 55, 56, 60, 62, 90, 104

Table 7.3 Situations involving students' uneven participation in the group science inquiry project.

Note that some situations are quite similar (see the first four items in the table below, for example). Similar situations are featured separately, however, to reflect the nuances in students' accounts. The findings reported in Section 7.7 were derived from these accounts.

Specific Situations of Uneven Participation	Source Narratives
Inequitable contribution to the group work	5, 17, 24, 35, 66, 91, 92, 113
Left the work to group mate/s, or was left to do the work alone	5, 9, 15, 18, 20, 22, 23, 24, 27, 31, 35, 39, 44, 52, 57, 63, 66, 72, 73, 80, 81, 93, 95, 115
Chose to do easier tasks, left the more difficult tasks to group mate/s	1, 33, 102
Chose to do the difficult tasks	104
Lack of engagement in the group work (knowledge, effort, initiative, interest, enthusiasm, concern, commitment, sacrifice, cooperation, motivation)	11, 22, 24, 27, 31, 35, 38, 49, 57, 63, 66, 80, 81, 95, 108, 111, 114, 125
Did not accomplish assigned part of the group task	29, 35, 44, 46, 50, 55, 57, 62, 66
Produced or alleged to produce subpar group outputs, or not satisfied with the quality of group mate's work	17, 28, 32, 38, 55, 104, 117
Poor or incompatible work values	8, 35, 108, 114, 145
Prioritised other things over science inquiry project	2, 8, 14, 19, 27, 73
Positioned self as de facto leader of the group	31, 57, 104
Positioned self as inferior to other group mate/s in terms of knowledge or skills	1, 33, 102
Exclusion by group mate from group work	20, 21
Excluded group mate from group work, or worked alone by choice	50, 109
Did not participate in group activities (e.g., consultation meetings, field work, preparation for defence)	64, 84, 118

Table 7.4 Situations involving accounts of unfulfilled teacher role expectations as perceived by students.

The findings reported in Section 7.8 were derived from these accounts.

Specific Situations of Unfulfilled Teacher Role Expectations	Source Narratives
Teachers' erratic availability	2, 16, 22, 111
Teachers' neglect of supervision responsibilities	2, 6, 32, 34, 36, 68, 91
Teachers' faulty or unhelpful guidance, or lack thereof	6, 34, 36, 40, 42, 68
Teachers' lack of knowledge	28, 36, 64
Teachers' lack of concern	33, 103

The episodes from students' narratives that depicted the specific situations enumerated in the tables above were studied further in order to extrapolate the characteristics of situations related to the undertaking of extended/open science inquiry projects that engendered students' emotion work. The findings are presented in Section 7.3.

It should be noted that the situations that engendered emotion work that the students shared in their narratives generally focused on negative emotion experiences. There was only one account of emotion work done on a positive emotion experience—when a student suppressed her joy in attaining her achievement goal so as not to cause offence to peers who failed. Accounts of students' positive emotion experiences were included in the story, but they were not the target for students' emotion work. Students' focus on negative emotion experiences was a result of giving them a prompt to elicit stories about emotion experiences wherein they needed to deal with what they felt.

A caveat is needed at this point to call attention to the fact that some of the illustrative excerpts provided in this chapter might not include specific accounts of deployment of emotion work strategies (reported in Chapter 8), because the focus of this chapter (and the accompanying excerpts) is on situations that engendered emotion work, not on emotion work strategies.

7.3 The Conditions Involved in Situations That Engendered Emotion Work

Situations (associated with the undertaking of extended/open school science inquiry projects) that engendered emotion work were a conflation of conditions related to the following contextual elements: (a) the process of

science inquiry that the students were undertaking, (b) the students' position as novice researchers, and (c) the school context. The following table provides a summary of these conditions, which were identified from students' narratives. They are discussed further in the subsections that follow.

Table 7.5 Conditions involved in situations that engendered emotion work

Contextual Elements	Conditions
The process of science inquiry that the students were undertaking	• Open-ended • Extended • Indeterminate and stochastic • Boundary crossing • Collaborative
The students' position as novice researchers	• Psychological resources • Social support • Abilities and characteristics • Personal costs
The school context	• Achievement markers • Demands of school • School structures

Students' narratives about their emotion experiences while undertaking extended/open science inquiry projects depicted the richness of the contexts within which they performed emotion work. The analysis of students' narratives showed that certain conditions influenced their emotion experiences in situations wherein they performed emotion work. The following subsections attempt to untangle the complexity of these situations by providing an explanation of these conditions and a brief discussion of how these conditions were relevant to the situations that engendered students' emotion work, based on evidence drawn from students' narratives. Furthermore, by foregrounding these various conditions ahead of the discussion of the various situations that engendered emotion work (Section 7.4 and following), the illustrative excerpts for these situations would be better understood in context.

It might seem that the following discussion is merely a recapitulation of details about the research setting that were given in Section 5.2. However, one way of looking at the conditions discussed in Sections 7.3.1 to 7.3.3 is this: these are students' depiction of the contextual elements within which they situated their accounts of emotion work.

7.3.1 Conditions Related to the Process of Science Inquiry Being Undertaken by the Students

Open-ended. The elements of the problem and the design of the investigations were neither predetermined nor prescribed (to the students), and the outcomes of the investigations were not known beforehand. To conceptualise and implement their projects, the students engaged in substantial knowledge building, critical thinking, information search and processing, and decision-making.

Extended. The period for conducting the project spanned across two academic years, wherein students experienced the whole range of science inquiry activities from problem finding to writing a research paper.

The long-term conduct of the project meant that students' emotion experiences while undertaking school science inquiry had far-reaching impacts and cumulative effects on other aspects of students' experiences in school (e.g., engagement, well-being, achievement).

Indeterminate and stochastic. The elements of the investigation were not fixed; random variables or unexpected events influenced the process that the students underwent and the outcomes they achieved. Since open science inquiry is a multistage process, the occurrence of random variables or unexpected events at a particular stage were consequential to the subsequent stages.

The students dealt with the uncertainty and unpredictability in the process, and the consequent feeling of loss of control. The stages of the inquiry process such as the definition of the elements of the problem, the design of the investigation, and the conduct of the investigation involved repetitive activities and many changes.

Boundary crossing. The students interacted with the world outside the school environment and with members of the scientific community in the course of conducting their projects. For instance, they accessed scientific information, which was more sophisticated than secondary school science content, from online and external sources. Furthermore, students conducted laboratory procedures and field work in research centres and locations outside of school. They communicated and worked with science professionals in universities and research centres. They transacted business with local and international suppliers of scientific materials and equipment.

Students found it challenging to engage with real-world environments. Operating within these environments required the learning of new skills. In many instances, students' failure to understand how time and activities proceed in these environments, and how best to obtain help or results from the people therein, was detrimental to the successful conduct of their own science inquiry activities. The students, some of whom were as young as 14 years old when they started working on their projects, interacted with adults in various real-world situations. These interactions demanded a variety of social and interpersonal skills, which the students sometimes lacked. The conduct of their projects was also affected by real-world conditions outside of their control, such as business decisions, government policy, and weather disturbances.

Collaborative. The students collaborated with peers (as group mates) and teachers (as advisers) in order to complete their extended/open school science inquiry projects. In some cases, the collective aims also included participating in competitions, winning awards, and getting high grades. The idea of interdependence was relevant in the sense that students were aware that their personal achievements and aspirations partly depended on the achievements and aspirations of other members of the group and of the collective. Some students even related how one group member's emotions could influence the emotion experiences of others in the group[14].

The conduct of extended/open science inquiry projects within a collaborative setting required individual engagement and contribution of time, effort, and resources for the attainment of collective goals. As they worked with each other, teachers and students assumed roles. Thus, over time, variability in levels and quality of contribution and engagement, as well as role expectations and performance, presented issues. Within this context, students' interpersonal and group work skills determined their ability to deal with issues related to working with their peers and teachers in a collaborative setting, and, by extension, their emotion experiences.

Another significant factor was the idea that, in collaborative work, students were performing before an audience of peers and teachers, within an evaluative context. Hence, students' emotion experiences were affected by the value they ascribed to other people's perception of them.

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[14] This phenomenon is called emotional contagion (Bull Schaefer & Palanski, 2014).

7.3.2 Conditions Related to Students' Position as Novice Researchers

Psychological resources. The students made reference to such resources as optimism/pessimism, confidence, faith in God, positive thinking, ability to perform under pressure, self-esteem, motivation, drive, and interest. Moreover, there were also allusions to perception of control, mastery, self-efficacy, and emotional competence.

These resources affected the students' emotion experiences in three ways. One, some of these resources were helpful in dealing with negative emotion experiences (e.g., positive thinking, faith in God). Two, students identified the depletion or loss of some resources (e.g., confidence, motivation, perceived control) as part of their emotion experiences either as cause or effect. Three, some resources seemed to underpin students' ability to perform emotion work (e.g., emotional competence, ability to perform under pressure).

Social support. The primary sources of support for the students were group mates, advisers (teachers), parents, and friends. Students also accessed support from relatives, siblings, and friends of family, and used family connections to gain access to other people (e.g., experts, suppliers). Some parents, who had research and science backgrounds, were also able to provide additional support.

The presence or absence of social support seemed to be associated with students' emotion experiences. Social support from group mates, teachers, family, and close friends were often mentioned as a resource in emotion work. In some cases, vicarious experiences gained by observing or talking with peers and the students ahead of them in school were a valuable resource for emotion work. On the other hand, loss of support from these significant others, especially in situations where students expected their support, was contributing factors in situations that engendered emotion work.

Abilities and characteristics. Students referred to their knowledge, skills, competence, and experience, or the lack thereof. Knowledge of the inquiry process and their investigation topics were crucial to their undertaking. The ability to understand specific scientific concepts, and competence in scientific procedures or techniques for laboratory or field work, were also important. Moreover, the various activities associated with undertaking their projects required some facility in information search and processing, critical

thinking, scientific writing, time management, project management, decision making, independent work, and public speaking.

Students referred to personal characteristics as part of the frame for their stories. For example, they mentioned diligence, passion, perseverance, laziness, tendency to procrastinate, and dislike of research.

Students demonstrated awareness of the abilities and characteristics that would enable them to undertake their science inquiry projects successfully. They were also aware of the expectations that they would develop these abilities and characteristics in school. Students' deficiency with respect to these desired abilities and characteristics fostered a sense of inadequacy, and was implicated in some situations that engendered emotion work.

Personal costs. Students referred to the expenditure of time, effort, hard work, and resources (i.e., material, physical, emotional, and cognitive). The demands of undertaking their science inquiry projects limited their time for leisure, family and friends.

Students referred to personal costs from an investment perspective. Considerations of personal costs impacted negatively on their emotion experiences when they perceived that the rewards or compensations they obtained from undertaking their science inquiry projects were not commensurate to their investment of time, effort, and other resources. Situations which involved a perceived waste of these resources (e.g., repeating a laboratory procedure) were especially emotive, and engendered emotion work.

7.3.3 Conditions Related to the School Context

Achievement markers. Students associated the undertaking of science inquiry projects with indicators of progress and superiority as well as symbols of distinction and approval. These achievement markers were instituted by the school (e.g., grades, streams, graduation honours and awards), established by the teachers (e.g., science inquiry process-based milestones, teacher feedback and evaluation), or offered by external sponsors (e.g., grants, competition prizes). They were either tangible (e.g., money from grants), or intangible (e.g., verbal feedback from experts). Some of these achievement markers affected all students (e.g., grades, streams), while others were elective (e.g., grants, competitions).

Students' associated their emotion experiences while undertaking science inquiry projects to the consequentialness of these achievement markers. For instance, the attainment of project-related milestones was used as basis

for assigning grades, and the completion of the science inquiry project was a requirement for graduation. For many students, these achievement markers were closely intertwined with their personal goals and dreams, beyond getting good grades or graduating. Thus, the pursuit of some of these markers (e.g., stream, grants, competitions) placed additional pressure on students in terms of higher standards and expectations, strain on students' resources, the threat of failure or of loss of reward, and the responsibility to demonstrate (and maintain) deservingness.

Demands of school. The science inquiry projects that the students were undertaking were an academic requirement in one of the eleven academic subjects they were taking. Hence, students were working to satisfy the requirements and standards related to their science inquiry projects alongside those of other subjects (i.e., attendance in classes, examinations, homework, and projects).

Aside from their science inquiry projects and other academic subjects, the students were also pursuing co-curricular and extra-curricular activities. Some of them were in positions of responsibility in school clubs and were representing the school in academic competitions related to other subjects.

Undertaking a research projects alongside these other subjects and activities resulted in competing demands for students' resources (e.g., time, attention, focus). When students were unable to satisfy the demands of both the science inquiry project and other subjects and activities, and were forced to prioritise one over another when allocating resources, the competing demands became a stressor. When the science inquiry project was perceived as less desirable or pleasurable, prioritising it over other pursuits was considered by students an act of sacrifice. The perception of making a sacrifice engendered emotion work for some students. On the other hand, when students perceived other subjects and activities as easier or more fun than working on the science inquiry project, they were sometimes used as a distraction from project work; hence, an emotion work resource.

School structures. Students' narratives of emotion work included mentions of the following: master and class schedules; deadlines for student output; provision of resources; school policy (e.g., on student monitoring and progression), regulations (e.g., when working in external research sites), and procedures (e.g., use of laboratory equipment); student grouping (e.g., streaming, formation of groups for project work); and, assignment of teachers as advisers in students' science inquiry projects.

The imposition of school structures on the open-ended process of science inquiry created tensions for students. For instance, although students were working on their own projects at their own pace, they must still reach some teacher-determined milestones in time for the quarterly assessment. Inversely, some aspects of school structure were modified to accommodate the peculiarities of the open science inquiry process. For instance, unlike the heavy reliance on testing in other academic subjects, assessment of student achievement with respect to their science inquiry projects was mainly portfolio-based; and students were allowed to negotiate with their teachers on some of the expected outcomes. For some students, managing the shift from the school structures they had been used to, as well as the differences with school structures in other subjects, could be challenging.

School structures could be perceived by students as constraints—thus, a source of stress. Deadlines, for example, figured in many accounts of situations that engendered emotion work.   There were also instances when students either inadvertently or intentionally contravened school regulations (e.g., regarding class attendance, securing official permit to do project work outside of school) when they were under pressure to achieve project-related goals.

School structures contributed to students' confusion with respect to their and their teachers' roles. Teacher supervision, for instance, limited student autonomy (although students were expected to demonstrate facility in independent work), and created an imbalance of power in teacher-student interactions within a collaborative setting. For instance, students were aware that the teachers who were collaborating with them in conceptualising their investigations were the same teachers who evaluated their academic performance.

Sections 7.4 to 7.8 elaborate on the five groups of thematically related situations that engendered students' emotion work. It is, however, worth noting at this point that the categories are not mutually exclusive. Hence, one might find that particular accounts are used to illustrate more than one situation. This is so, because, students might experience one event in various ways. For instance, a delay in the completion of an inquiry task might be perceived by a student both as a threat to the completion of his or her project, and as an instance of underperformance that destabilised the student's sense of self.

7.4 Situations That Impacted the Attainment of Project-Related Achievement Goals

For the students, progression through milestones in the science inquiry process at the appropriate time was important. Situations, such as setbacks and delays, impeded their progression from the initial problem finding stage to the final stage of writing a report on the outcomes of their investigation. Students' narratives showed that the delays and setbacks they experienced were due to: (1) process constraints, (2) personal constraints, and (3) resource constraints.[15] Furthermore, students' encounters with these constraints sometimes led to failure to attain some achievement goals. Situations involving setbacks, delays, and failures engendered emotion work.

7.4.1 Situations Involving (Open Science Inquiry) Process Constraints

Delays and setbacks were inevitable in open science inquiry, especially for novice researchers, because of the open-endedness and indeterminacy of the science inquiry process that the students were undertaking (see Section 7.3.1, for additional explanations). For novice researchers, the process of defining a problem and designing an investigation involved a transition from the unknown to the known, which required time and the performance of repetitive activities.

One student, for example, went through at least seven activity cycles, over a six-week period during the process of problem finding, so that her broad idea could be transformed into an investigable problem. Each cycle consisted of submitting a concept paper, waiting for teacher feedback, and revising the concept paper based on teacher feedback, as described in the following excerpt:

> I revised my concept paper at least seven times because I couldn't seem to understand my study. It was a good thing I had a classmate who was working on a similar topic, she helped me, she gave me some relevant articles. […] My first topic was about echinoderms. After three or four revisions [of the concept paper] […] [my adviser] told me to narrow it down because it was too broad. […] I felt awful

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[15] Aside from these three causes, students also mentioned some random events that caused setbacks and delays. For instance, a student got hit by a motorbike whilst transporting samples for testing to the school. The tubes broke and he lost the data for that particular day. Another student forgot to record the data, so the group had to repeat one episode of laboratory work to make up for the missing data.

> because I couldn't understand what was wrong with it. Of course, my adviser pointed out to me what was wrong and what needed to be done, but he himself did not seem to understand my topic because his field of expertise is different. […] [My adviser] sought help from other advisers. As for me, I just followed the comments on my concept paper. Then, after a day or two, I would again go to my adviser. Then my adviser would say, "Revise this again", because they saw another loophole. So I was really feeling awful. I was already doing what they told me to do, why do I need to repeat and repeat this. It seemed a waste of time. […] At first, […] I did whatever my adviser told me to do, because I had no experience making a concept paper. Doing a second revision was still okay, because, of course, it was just normal to have errors. But when it came to the third, fourth, fifth, sixth. Oh no, what's happening, why do I need to do this much revision when I was doing all that I can do. So, I was feeling more and more awful, until I couldn't take it anymore, I just kept on doing the work. […] I was scared, I was hopeless […] that I wouldn't be able to pass a concept paper until the fourth quarter, that I wouldn't be able to graduate. ($058)

Although they may be necessary in the science inquiry process, repetitive activities can convey a sense of stagnation and consume a lot of time, a limited resource for students. The student's reference to graduation in the above excerpt indicates her awareness of the consequentialness of delays on academic outcomes.

The consequence of some setbacks, however, can be more immediate, such as for example, the students' ability to progress to the next science inquiry activity. Science inquiry activities are ordered, such that some activities are prerequisites for others. Hence, as some students experienced, when prerequisite activities were not successfully undertaken, progress to the next one could not take place, as the following excerpt illustrates:

> What I disliked the most in our research was that it was time-consuming. Just the finalization of the research proposal took us several months to finish and we had changed our methodology at least three times. That was the time when I felt really nervous and I felt scared that maybe we wouldn't be able to finalize everything and go on with our data gathering. ($003)

The open-endedness of the science inquiry process the students were undertaking meant that students did not have full control over the outcomes at every stage. Thus, in some cases, progression could not be achieved at will. When students perceived that the cause of delays and setbacks were outside of their control, the perception of loss of control could lead to negative emotion experiences. This student, for example, told of her hopelessness:

> [No matter] how hard we tried, we couldn't seem to follow the schedule. Every task depended on the task before it. Every time that we couldn't accomplish one task, the entire schedule was moved.

> This was really frustrating. The first task where everything depended [on] was the gathering of [a sample of marine organisms], and this was mostly where our problems occurred. We couldn't control the weather. I know that we were supposed to do our data gathering last summer, but we were not so prepared back then. June came and it was the start of the rainy season. I thought we would only find it difficult to collect [the marine organisms]. I didn't know that the real thing was that we would not find any […] at all. I felt restless and hopeless. It wasn't our fault that different storms suddenly decided to hit the country consecutively. It was so hard to be facing a problem with actually no solution. All we had to do was wait. Every weekend, we would go to different places just to see if there were any [marine organisms]. We would go around [two islands]. But every single time that we went out, we always came back empty-handed. I hated the feeling. You sacrificed your weekend for nothing. I should have just gone home and spent time with my family or studied instead. […]. I guess I felt like, with the effort we were spending, we should have at least had a little reward. This went on for the entire first quarter of the school year. No accomplishments at all. No work progress. ($017)

If one looked closely at the foregoing excerpts, it is apparent that delays and setbacks could not be blamed solely on the science inquiry process. These statements— "I revised my concept paper at least seven times because I couldn't seem to understand my study", "we were supposed to do our data gathering last summer, but we were not so prepared back then"—suggest that students' personal constraints also contributed to their experiences of delays and setbacks.

7.4.2 Situations Involving Personal Constraints

The personal constraints that students implicated in the delays and setbacks they encountered are discussed below.

The open-endedness of the science inquiry process the students were undergoing required the students to engage frequently in decision-making; insufficient decision-making skills, therefore, led to delays. Consider, for instance, this student who could not make up his mind about what topic to investigate:

> First, I presented about […] medicine against bacteria […]. I also suggested to try studying about viroids […]. Then, [weeks] passed and I still didn't have a [final] topic, so I was really nervous because others already had their topics. ($004)

Students' problematic attitudes and lack of work ethic were another reason for their lack of progress. For example, this student told about her procrastination when she was supposed to write a concept paper on her proposed investigation problem:

> I abhor writing […] so I decided to take a rest from writing […]. I slacked off. […] During the first quarter I did not do any work, did not

> accomplish anything, when I should have already written my concept paper. […] [I told myself] that [the deadline] is still far-off, so it was okay if I take my time. ($037)

There were instances when <u>legitimate constraints limited the students' availability to work on their science inquiry projects</u>. One student was unable to work on her project because she had to be away from school for an extra-curricular activity:

> We already planned to conduct data gathering sometime this week, but there was a conflict with the schedule because I joined a competition, which is still ongoing. When I learned about [the conflict], I became all the more stressed. ($103)

Furthermore, because of their inexperience, <u>the competence of some students fell short of the level of competence required by particular tasks</u>, which meant that they encountered failures. For instance, a student, who had already spent one school year working on the research proposal, confessed his lack of understanding:

> When the [proposal] defence came, there were a lot of questions from the panel that we did not know how to answer. […] So I told [my adviser], "Sir, honestly, I don't understand anything about our study at present, so we decided to change our study". ($012)

7.4.3 Situations Involving Resource Constraints

The undertaking of science inquiry involved the use of information, materials, and equipment. Students' narratives provided insights into the resource-related delays and setbacks that they encountered at various points in the science inquiry process (followed by illustrative excerpts):

- *when information could not easily be found during the conceptualisation of the problem and research design*;

  [W]e're not making any progress since we couldn't find one simple equation. ($013)

- *when resources were deemed to be unavailable or inaccessible, which led to the conceptualised investigation to be abandoned*;

  [O]ur study was not feasible because the materials needed were not available in the Philippines, so it was a hassle to pursue it; that was why we took [the] risk to shift [to] another study despite the time constraint. ($048)

- *when real-world conditions impacted on students' access to resources that were located or sourced from outside the school during data collection; and*

> [For] three months we're not able to go back to [the marine reserve (i.e., the study site)]. There were many problems along the way, reasons why we were not able to go back. [...] [One of those] was that recently there was a shooting incident between the marine reserve guards and the fishermen who [illegally] entered. So our safety would be at risk if we would conduct data gathering there [while there were tensions]. ($070)

- *when equipment broke down during laboratory or field work.*

> When we started the preparation [of the culture media], the SCT meter did not work, and [the laboratory technician] told us to wait for a while, he would just inform us when [it was repaired]. [...] We were stuck at the media [preparation stage], that's why it's taking too long. ($072)

Resource-related constraints seemed to present a double-edged impact on students' emotion experiences. On the one hand, they were tangible constraints. Because they were tangible, their presence or absence was unambiguous; and it was easy for students to recognise and deal with them. On the other hand, if these constraints were not dealt with successfully, students reached an impasse, wherein science inquiry activities that were associated with the missing resources could not proceed.

7.4.4 Situations Wherein Students Dealt With the Aftermath of Failures and Setbacks

Students dealt with the aftermath of failures and setbacks at two levels— one, reversing setbacks and failures and mitigating their effects, and two, responding to the psychological challenges they presented.

Reversing setbacks and failures and mitigating their effects. The work of reversing setbacks and mitigating the consequences of failures required students to exert more effort and expend more resources than they normally would. This taxed students' resources and engendered stress-related emotion experiences.

Reversing a setback due to constraints in resources, for instance, required a search for other sources, alternatives, or workarounds. One student, whose group could not proceed with data gathering because the chemical they needed was not available in the school laboratory, described their efforts to find a supplier over a period of six weeks:

> We found out it was not available [in the school lab]. [...] We called [external] laboratories. They kept on saying that there was [none] available. [...] We also asked former students where they sourced their chemicals. One of them said that when they were doing their

own research project, they bought some from a lab near [this] university; so we went there. The lab was closed on Saturdays and Sundays, so we went back during the weekdays. But that did not pan out. […] We searched [in the city] and found three labs, but they also didn't have the chemical. We walked around until 4pm, [then] we decided to stop and begin again the following day. The whole [semestral] break, we were doing that. […] One morning we were lucky because we found a lab. […] We went inside and asked about the [chemical]. They said it might be available, but they have to get it [from another island]. They will have to make a call and inform us if it is available. […] So we walked around again until [my other group mate] phoned to tell me that he called one university, based on a tip from one [science] agency, and the university lab has the chemical. […] One week later, we learned that the university lab had a similar chemical, but not the exact one that we needed. So we called the other lab; but they never called us back. I broke down. I cried and cried. I had a breakdown because it piled up, hearing many times that there was no chemical, for more than a month […] Then a friend of mine [from school] accompanied me to see her research adviser, who gave us the contact numbers [of suppliers]. We called all the numbers. […] We were about to give up when only four numbers remained, and I was thinking that we might have to buy from a supplier abroad, or maybe change treatments because I was already too tired to search further. It was good that one of them said that they have the chemical. So we called to place an order. ($099)

Dealing with failures could mean facing the impact of regression. For example, some students failed the proposal defence and had to conceptualise a new investigation. For these students, this meant going "back to square one". Students seemed to accept up to a certain point that, in open inquiry, indeterminacy is inherent and setbacks are part of the process. However, the regression that the students found particularly emotive happened late in the process, when they had already invested substantial effort and resources. This student described the emotional impact of being asked to conceptualise a new investigation after the group's previous proposal was deemed to be scientifically unsound by the proposal defence panel:

I was really, really disappointed then. I felt very sad and depressed. After the defence, I felt that all of the efforts that we exerted were wasted. […] [W]e really felt tired, exhausted and depressed after our defence. We stayed in the classroom for the whole afternoon. I was ashamed to go out. I was ashamed to see the panel, our research adviser, and our classmates. […] I can't stop myself from crying […] It was a long time before we went to our adviser for consultation after the defence. We were afraid to face our adviser. […] [A]fter the defence our interest for our study was lowered. Maybe because we needed to start again. ($059)

Mitigating the consequences of failures and setbacks entailed sacrifices and extra effort. One student described his response after getting a low grade due to a lack of progress in their project:

> I got a 2.75[16] for the first quarter. It was when we were really down in our research [project], when we're not making any progress, since we couldn't find one simple equation. […] It was like being crushed by both heaven and earth. […] Well, that didn't stop me from striving so hard to regain my lost grades. I worked hard to finish outputs on time […] After sacrificing leisure hours for research, it was like a success after we [i.e., he and his group mates] got a grade of 2.0/2.25 in the second quarter. ($013)

Responding to psychological challenges. Dealing with the aftermath of failures and setbacks did not mean dealing only with tangible challenges (e.g., finding a missing chemical). It could also mean dealing with the psychological challenges that went with these experiences.

For some students, facing the reality of having failed was already a challenge—

> (*After a failed defence and being required to conceptualise a new problem*) [A]fter the defence our interest in our study was lowered. Maybe because we needed to start again and we really didn't know what to do and where to start at that time. Then we finally decided to face the truth, to move on and to face more challenges that awaits us. ($059)

Others had to adapt to changes—

> (*On developing her interest in a new study*) I had to be interested [in the new] study, because what's the use of pursuing it if you are not interested in it. […] It was really a hassle [..] because at the start [i.e., in conceptualising the previous study] you had to pick your own interest, learn to follow your own interest. […] Then, you had to [do the work] again until you become interested [in the new study]. ($056)

Or, make some hard choices—

> (*When proposal defence revealed their insufficient knowledge about their proposed research, and their knee-jerk reaction was to change to an easier one.*) [I and my research partner] were feeling awful. That moment when we had to choose between continuing with our old study, or giving up to pursue the new one that was easier. […] [By] the end of that day, we decided [to continue] with our old study. ($012)

Or, deal with divided cognitive resources.

> (*After a negative teacher feedback about lack of progress.*) I was anxious again because my partner and I still had a lot to do. It

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[16] The student referred to this as "substandard grade". In the school's grading system, the lowest acceptable grade was 2.5. Substandard grades during the quarterly assessments must be improved to avoid getting failing (final) grades at the end of the academic year.

triggered my pessimistic side. My subconscious was telling me that we must accomplish something and finish data gathering. At one moment earlier, <u>I was so anxious that I could not concentrate on my physics quiz. Even in the middle of taking the quiz, I was still thinking about our dratted research [work] that needed to be finished</u>. ($051)

Dealing with failure also required students to come to terms with their thwarted aspirations,—

(*After the delay due to a missing chemical resulted in not having complete data in time for a competition.*) [I was] shattered. We had lots of hope of winning—best in developmental [research], best researcher. <u>We wanted to win at least one. Then we realised that, "No! It cannot happen to me."</u> We had done so much work and this is what happened to us, we are so delayed." ($107)

and to exert effort to maintain the right disposition.

(*After getting a substandard grade*) "I was really down […] <u>I tried to be optimistic</u> […] but there were times when I cracked under pressure and my bad side came out." ($012)

This section explicates one group of situations that engendered emotion work—that is, situations wherein students experienced failures, setbacks and delays due to various constraints, and dealt with their aftermath. The next section elaborates on demand-related situations.

7.5 Situations Related to the Demands of the Science Inquiry Projects and of School

Students encountered situations that made heavy demands on their resources, and that challenged their ability to adapt, or cope with these demands. Some of them used the words "stressed", "pressured", "exhausted", "burdened", "depressed", and "overwhelmed" when telling about these situations.

An examination of episodes where students narrated about these situations yielded insights into two kinds of demand-related situations: (a) challenging science inquiry activities, and (b) competing demands of school and of science inquiry projects.

7.5.1 Situations Wherein Students Faced Challenging Science Inquiry Activities

There were three activities related to the science inquiry process that presented students with demanding situations: (1) conceptualising the research problem and design, (2) questioning, and (3) data gathering.

Conceptualising the research problem and design. For the students, one of the challenging tasks in the process of conceptualising their investigation

problem and the subsequent research design was knowledge building. Since they were engaged in open science inquiry, the starting point for students involved a lot of unknowns, so students were required to develop substantial knowledge. As one student put it:

> [W]hen we already started doing the actual "Research Work" [*quotation marks hers*], I can say it was challenging. You needed to know every single detail about that certain topic. You needed to know what it is, where it came from, when [it] was last studied, why it is important, and many more about [it]. ($030)

As novice researchers, students initially did not possess sufficient knowledge to tackle these tasks. One student estimated hers and her group mates' as follows:

> Our [individual] knowledge of the topic, if added up, did not even reach one-fourth or one-sixteenth [of what we needed to know]. ($042)

Developing sufficient knowledge about the field of study was important because it was needed for the definition of the elements of the problem and the design of the investigation. This required a search for very specific, and sometimes specialist, information, which was not an easy task for some students:

> We encountered a lot of difficulties—how to measure the [chemical] content [in the sample], what were the materials needed, which laboratory would enable us to perform [the testing]. ($033)

Information search could require the expenditure of much effort, as this student experienced:

> I still remember those sleepless nights, all day long […] I was sitting […] in front of the LCD monitor and searching and searching and searching for [the] best articles that would support our study. ($026)

Moreover, some students encountered difficulties when searching for information because its availability was not always guaranteed:

> It was hard looking for relevant articles for our kind of study […], especially on [our topic]. We tried looking for more articles on the internet. We tried looking at […] upperclassmen's works. ($008)

When they did find source materials for the information they needed, some students discovered that the information they accessed was not comprehensive, and that information processing was not an easy task. One student cited the limitation of research articles to explain why they found it hard to know what to do in a particular laboratory procedure:

> The information from the articles was sometimes not clear. They're abridged, summarised. […] It was hopeless to rely on the articles […] They did not provide the step-by-step details for the process. ($076)

Another student described the investment of time and cognitive resources that was required for processing scientific information:

> Reading [scientific] literature, it requires a lot of time. You really have to sit down and think and take notes and really read. It requires really your full attention. Sometimes it could get tedious, so I wait for an auspicious time to do it. ($104)

Furthermore, the work to gain understanding of a previously unknown topic could be daunting, as one student discovered:

> Days passed and I tried very hard to figure things out about the [microprocessor] programming thing. It was horrible. Every night, I tell myself I have to make progress, but nothing. I got nothing. I give my best effort but it was never enough. For so many times, I rant to myself, "WHY ENTER A WORLD YOU KNOW NOTHING ABOUT?" [*emphasis hers*] […] I know nothing about [microprocessor] programming. I don't even know how to install libraries or drivers, etc. I cry the frustration I get. I feel so stupid. Depression. It hurts. ($078)

Finally, after engaging in the tasks required to conceptualise a problem and research design, some students could still fail to develop a sufficient grasp of their research topic and problem. For instance, one student conveyed a state of confusion, which persisted over a long period of time, in this excerpt:

> [I felt] lost with [regards to] my proposed problem back then. I had continued to be lost until the end of the school year and [during] the summer. ($031)

Questioning. The second challenging task for students was questioning. Questioning took place during consultation meetings with the research adviser (and in some instances, with professional researchers) and during proposal defence before a panel of teachers. This activity within evaluative contexts evoked negative emotion experiences in students.

One student feared meetings with her adviser because she "felt like [she was] being interrogated". Another student described her and her group mates' interaction with a scientist as "intimidating" and depicted their interaction as follows:

> She threw us a barrage of questions, she was scary. […] Then, she asked us if we knew how to perform [a certain laboratory procedure]. […] We were given a formula, and she gave us a problem to solve […]. It took us some time [..] So she said, "You are from [this school], yet you don't know how to solve a simple chemistry [problem]. She told us that she would tell our adviser that we should not be allowed to graduate because we don't know how to solve. […] Then, we gave her two possible answers. She scolded us, because it seemed to her that we were treating it as a guessing game. We thought she was joking, but she was not. My group mate was on the brink of tears; because it was our first time to encounter that kind of scientist. It was scary. But she did not really want to give us the answer, so we solved it again […] until we finally got it right. ($109)

However, for the students, the most challenging questioning took place during proposal defence. This was indicated by their negative framing of their experiences of questioning. Some students described questioning during proposal defence as a "grilling" and a "bombardment" of questions. One student described its negative emotional impact:

> After presenting our study, we were bombarded [with] questions, [such] that [we] were barely able to keep up. After [the] defence, our self-esteem [was] so low that I even proposed to change our study. ($019)

The high level of emotional demands that the proposal defence placed on students was indicated by the anticipation anxiety they experienced before it took place. One student was "nervous days before the defence", another could "barely eat and think of other things but research", and a third student experienced "too much pressure and felt like throwing up, felt like crying, and a mixture of other feelings".

Some students also experienced the loss of sense of control during proposal defence. Since it was an evaluative context, students aimed to demonstrate knowledge and competence. However, some were asked difficult and unexpected questions that they could not answer, which unnerved them. Moreover, since questioning was an interaction with members of the panel, this interaction could leave students with the impression that they were unable to demonstrate their knowledge convincingly. One student described her experience as follows:

> It was a disaster. The panel was throwing us questions but we couldn't seem to satisfy them or to convince them with our answers; and so they always ended bringing up the question over and over again. It was terrifying and very nerve-wracking. It took a lot of effort to stand straight and to keep myself from sitting on the floor and just collapsing or [taking] any means to escape from that room. I felt really frustrated and nervous at the same time. I felt disconnected from my body. ($093)

Finally, one student found that she could never be fully prepared for questioning:

> During the defence, I expected that I would be able to answer the questions because I studied very well. But it turned out that no matter how much you studied, you would always have blind spots; there would always be aspects of your study that you would not know thoroughly. So things were a blur that time; we were panicking. ($065)

Data gathering. Some tasks related to data gathering were challenging for two reasons. One, they could be tasks that students found aversive, such as handling mice when one was "terrified of them". One student told of her experience when she assumed the responsibility of handling a hazardous

chemical in the laboratory after her two group mates withdrew from performing the task out of fear:

> I felt assured because there were safety precautions. I was wearing gloves, mask, goggles and long clothes, such that no part of my body would be exposed. […] So I was confident that I would be safe. However, once I was [actually doing it], I was so scared; because I might make a mistake, drop it and cause it to splatter onto my skirt or skin. ($074)

Two, data gathering tasks could be challenging because they required a certain level of dedication from the students, as the series of examples illustrate. For instance, field or laboratory activities could involve:

- *protracted, repetitious tasks*;

> I was excited at first [to perform the laboratory test]. But when I had to do it again and again, I became bored, because I could do the work even with my eyes closed. ($115)

- *long monitoring*;

> We were doing filtration and there was nothing to do; we were just observing what happens to it. It was so mindlessly boring. ($071)

- *excessive work demands*;

> In four hours, we were only able to process three [samples]. […] Can you imagine [processing] 180 [samples]? Oh my God, it would be a miracle if we could last 24 hours. ($102)

- *working outside of school hours (i.e., after classes, at night, overnight, during weekends and holidays[17]).*

> I hated [working during the Christmas break]. […] It's like as if I were still going to class. It's a time when my parents were a bit big on their religious stuff. So, every morning we woke up at 4 to attend the

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[17] The science inquiry projects the students were undertaking required much independent work; thus, the need to work outside of school hours. During the conceptualisation stage, the teachers usually made the students aware of the time commitment required to conduct a particular science investigation. Students were free to conceptualise and pursue an investigation that was not too time-intensive. However, some students chose time-intensive projects. Many students also ended up working over the Christmas holidays. This was the holiday period that fell between the third and fourth quarter of the school year, and was a relatively long break. Thus, for students who procrastinated, or who experienced delays, this period was their last chance to concentrate solely on data gathering, in order to meet the deadline for the completed research paper in about two months' time.

Christmas pre-dawn mass. Then we go home by 5.30am. Then after 5 to 10 minutes, I'm off again [to go to the school lab]. I go home every day at 6pm. […] I couldn't even feel it's Christmas because I had to go back to school. ($107)

7.5.2 Situations Wherein Students Managed the Competing Demands of School and of Science Inquiry Projects

The emotional impact of competing demands was due to a conflation of the following conditions, as the students' narratives showed:

- The science inquiry project was only one among the many school works that students must attend to.
- Time, along with other resources (e.g., physical and psychological resources), was a limited resource for students.
- The task of allocating their limited resources required students to prioritise.
- Students' aspirations and academic goals influenced how they allocated their resources among competing demands.
- The decisions students made in managing these competing demands could have adverse consequences.

This conflation is depicted in this students' account of her encounter with the competing demands of the science inquiry projects and other aspects of school:

Our main problem is that we don't have enough time to balance our other activities with research[18]. I and my [research] partner are always busy. […] I also have [other] responsibilities. And sometimes, we neglect our research. But we still make an effort to [meet our adviser] for consultation every week and take time to talk to each other to plan out the future of our research. I am still in the process of adjusting; I couldn't find the right mix of effort and time management to make our research easier to handle. […] I have sacrificed a lot because of research. Sometimes I even skip lunch or dinner because I don't have any spare time. And not only that, my five-hour sleeping time is reduced to four, three, two hours because of assignments in other subjects plus the requirements of research. My research partner and I have goals in research and one of these is [to win a grant], so [for] a start we [must] finish all the needed outputs [so that] we can apply. [T]his week we have to start our data gathering [in order] to have a good grade by the end of the quarter. That is why all

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[18] Students in this particular school used the term "research" in two senses. First, "research" as a school subject (i.e., the two science research courses described in Section 5.2.2) and, second, "research" as it referred to their science inquiry project. This student seemed to use these two senses of the term in this excerpt (see the first and second mention of the word in the excerpt above). However, no editorial changes were made to differentiate these, because, doing so might introduce meanings to the story that the student did not intend.

> our weekends are consumed by research, reviews [for competitions in other subjects], [university] entrance exams, and many other activities. I am a [boarder] and [I] need […] to go home every weekend to spend time and bond with my family. But now it is quite impossible; I cannot go home […] because my weekends are full of tasks to do. I now miss my family. […] We are just doing our best to finish our data gathering. I cannot focus well on research now because second quarter exams are approaching and many, many requirements are required by our teachers in different subject areas. ($048)

The emotional demands of such situations could be engendered by a sense of 'being pulled in different directions', as the following excerpt (from two related accounts given by one student) shows:

> During our last field work we were not mentally prepared. Our minds were not on data gathering but on [sport week]. I would call it the "hell week" [*quotation marks his*]; because, before the sport week, we were doing last-minute work on projects [in other subjects]. [I]t was [sport week] the following week, which we were facilitating[19]. But that week, we were still on field work to gather data. So while in the field, we were working on projects [in other subjects] and preparations for the [sport week]. […] Research seemed to be a burden then because we didn't have time; yet we really needed to gather data, so we had to do the field work. ($096) I recently prioritised my co-curricular [activities]. I just felt that they were easier to do and more fun, so I focused on them for a moment. I slowed down a bit. But now my mind is telling me to go back, to prioritise my research [project] again because it is more important. ($104)

There were times when students' ability to successfully manage the competing demands was severely tested. When they failed, it made the situation even more emotive:

> We woke up early to [start work on] our samples [in the lab], [even] though we slept late last night; because we did our assignments and studied [for] our long tests the next day. I really thought that we would survive schoolwork plus data gathering. […] We had a test in maths and we just [asked to be excused from time to time] to go to the lab [to check on our samples]. I did not take the test seriously. I was thinking of our samples in the lab. I lacked sleep; so I couldn't concentrate on anything. I passed my test paper without reviewing or caring. I ran to the lab after hearing my group mate say that our samples were [ruined]. […] I was hoping we could still recover the samples, but we still had other classes. […] I laughed while I cried. ($005)

The emotional impact of competing demands could also be heightened when students' achievement goals were affected. In the following excerpt, the student focused on the impact of deadlines on how he allocated his time

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[19] The student was president of the sport club in school, and his group mates were members of the club.

among the different school subjects. Notice the irony of "doing schoolwork in school" for other subjects because off-school hours were devoted to the science inquiry project:

> [A] scenario that evoked stress or "a great emotional challenge" [*quotation marks his*] was the ever unavoidable deadline. Although some are reasonable, there are just those deadlines that force you to balance or prioritise a subject over another. But, in my case, why make research your first priority when you can't get a higher grade in it, in comparison to physics or chemistry where I can get a 1.0. After all, [they are all] one-unit subjects. One thing about me [though] is I have to really focus to get something done. And I just get surprised that I utilised all my time for studying on research. I just make up for the other subjects by doing schoolwork [in] school, so I can have the weekends off. ($014)

7.6 Situations That Destabilised Students' Sense of Self

There were three kinds of situations that destabilised students' sense of self and engendered emotion work. These were situations that (a) evoked a sense of inadequacy, (b) frustrated students' self-expectations and threatened their self-definitions, and (c) imparted the perception that they made an unfavourable impression on others.

Students' sense of self refers to how they think about their (past, present and future) personal characteristics and the impressions they make on other people (Harre, 1998). Evidence from the narratives showed that the aforementioned situations had impact on their views about their traits, skills and beliefs, and about how they positioned themselves with respect to others or were positioned by others (see Skaalvik, Norberg, Normann, Fjelltun, & Asplund, 2016).

7.6.1 Situations That Evoked a Sense of Inadequacy

Situations that evoked a sense of inadequacy in students were associated with evaluative and performance contexts such as proposal defence, consultation meetings, competitions, questioning, data gathering, and knowledge building. Furthermore, evidence from the narratives shows that a sense of inadequacy was also fostered in situations where students, or their science inquiry projects, were evaluated by themselves (or, by others) according to actual or imagined standards. The perception of underperformance, of deficiency in performance-related characteristics, and of lack of cognitive competence could engender emotion work (discussed below).

Underperformance. Students could feel that they did not do well, did not do enough, or did not do something worthwhile: (a) when they compared their achievements to the achievements of their peers; (b) when they reflected on their performance during proposal defence, consultation meetings, competitions, and interview for the grant; and (c) when they or others evaluated their science inquiry projects.

Upward social comparison (i.e., when students compare themselves to peers who are better than they are) (Brown, Ferris, Heller, & Keeping, 2007) could evoke negative emotion experiences. The excerpt below is an account of a student's reflection after watching a video of a 15-year old from another country who presented his research:

> I compared my research to his; his project was so huge for a 15-year old. Our study, it is only good at the school level; while his study really made a contribution to society, it has huge significance because it could benefit people in the world. […] I felt bad because we are of the same age and he was able to conceive that huge a project for such a young mind. While our ideas were only up to this level. […] What I'm saying is, we are from this school and so much is expected of us. Everyone is saying that if you are from this school, you are intelligent. It is painful because so much is expected of you and you are able to come up with only this much. There were so many, many possibilities for a research project and we only were able to come up with something easy. It's painful. ($108)

Negative evaluation by significant others (e.g., teachers, scientists, competition judges) could also have negative emotional impact. For instance, the project by one student and her research partner involved euthanising mice, which was the reason for the negative feedback:

> One judge [at the competition] told us that our study was unethical. When the [judge] said that […] I felt that something fell on me and all my energy was pulled away by gravity. […] Then we began thinking that our study was wrong, we doubted our research, we lost confidence. […] We forgot to feed our mice that day because of the depression, the sadness. […] We asked our adviser, "If ever we are going to change our study, can we still make it?" […] I really thought we had no hope. Every time I opened my laptop, I couldn't bear to open the folder for research because it was wrong anyway. We were stuck for two weeks; we did not work on our paper. […] My head was so heavy and I couldn't even smile. ($098)

Deficiency in performance-related characteristics. To the students, situations that highlighted their lack of diligence, team work, time management skills, research skills, and independent work skills, could be emotionally challenging. The following excerpt is from a student's account of his first experience of field work, when his and his group mates' lack of diving skills led to their research adviser and the local divers that accompanied them performing much of the data gathering work:

> After the data gathering, our feeling was, "Why did we pursue this study? It seems were are not capable of doing this. We did sloppy work, which showed that we are not able." So while we were on the boat, my [two group mates] were pushing for us to change our study. On my part, I was ashamed that it was our study, but others did the work. […] We lost hope that we can do our study. ($090)

Lack of cognitive competence. Some students felt stupid if they were not able to answer questions satisfactorily, or if they had difficulties in learning advanced science content. For one student, a sense of inadequacy was engendered by a persistent feeling of being "wrong all the time", which she described in her reflection on science inquiry as a critical process:

> I enjoy doing research; I enjoy meeting new people when I'm out doing research. However, you also get to be criticised for what is not right and what is not good [about your project]. So, it's a harsh, unfriendly learning environment for us who are first-time researchers. You become afraid to raise questions because you feel that you are always wrong. Research, as an experience, is good; because you get to bond with your group mates, meet new people, and experience working in the field rather than the classroom. […] But once you go back to the classroom, and when you meet with your adviser, you lose sight of all the good things that you experienced, because you are repeatedly told that this is wrong, that is wrong, while you understand nothing. […] We are wrong all the time, we can't do anything right. […] We already feel that we are inept. Our study is so simple, we only aim to identify a [microorganism], while others are studying […] biocontrol. Our research seems stupid and yet we are constantly wrong. ($116)

7.6.2 Situations That Frustrated Students' Self-Expectations and Threatened Their Self-Definitions

Students' sense of self became unsettled when situations contradicted their self-expectations and self-definitions. Students' self-expectations were related to their achievement goals such as getting good grades, qualifying to the elite stream, winning a grant, and doing a noteworthy project. These self-expectations were based on their achievement beliefs (e.g., when you give your best, you will be rewarded), their academic track record (e.g., no grades below 1.75), and their current performance (e.g., gave 150% effort during the data gathering). Some self-expectations were expressed as something they envisioned for themselves (e.g., dreamt of winning a grant). Students' self-definitions, on the other hand, were either expressed positively (e.g., I belong to the most hardworking group), or negatively (I don't work well under pressure), and were achievement-focused.

Students experienced negative emotions when their achievement outcomes did not align with their self-expectations, as the following account of a student's failure to get into the elite stream shows:

> I was diligent [in research]—attending consultation, I really listened to what the teachers were saying. That's why I got high scores. I really wanted to excel in research, so I was diligent and I got a high grade. Then, it was time for streaming during the second quarter. I really wanted to be in the [elite] stream. Also, I was expecting to be in the [elite] stream because I'm independent. I was able to write a concept paper that was acceptable; it was accepted early. Then, I was also praised sometimes [by the teacher]. […] Then, the results came out and I was in the [non-elite stream]. It's like, I was downgraded [embarrassed laugh]. […] So, I was really depressed and, then, in the succeeding quarters my grades went lower and lower. That's it, it's just sad. Because I wanted to be in [elite stream] but ended up in [the non-elite stream]. They told me if your concept paper is good, you will be accepted [in the elite stream], if the study that you presented is good, you will be exempted from the quarter exam. I was exempted, I also got a high grade. But still I went to [the non-elite stream]. ($054)

Situations that put students' self-definitions to the test, or negated them, evoked negative emotion experiences and emotion work. One student told of an instance when competing demands from the science inquiry project and school work tested her work ethic:

> I have a habit of scheduling tasks and working on them promptly. But the time after the quarter exams, I was exhausted. Then when I looked at my [to-do list], I still have a pile of work left to do [for research]. […] I got dizzy with the stress. I was exhausted and losing hope. I felt that I could no longer work because I was exhausted. […] It was not a normal experience for me. Usually, I have already scheduled things and have worked on them with time to spare. I think it was the only time that I experienced working at the last minute and going without sleep. I cried just to relieve myself of what I felt inside. ($113)

7.6.3 Situations Which Imparted the Perception That Students Made an Unfavourable Impression on Others

Students cared about the impressions they made on significant persons, such as their research adviser, the proposal defence panel, the interview panel for the grant, the scientists that who acted as consultants or jury in competitions, their group mates, and their parents. They formed their ideas about how these significant others perceived them by interpreting cues from their interactions and from the explicit messages they received. Three instances are featured below.

Students were sensitive to evaluative cues from their teachers, and used these to form an idea about how their teachers perceived their academic performance. One student described her perception of her research adviser's feelings towards her group's underperformance:

> I think [our adviser] is frustrated with us, because we have not really achieved much, we are not doing anything. So he pushes us so that

> we would be motivated in our research. […] Sometimes, I am also disappointed when I see that [our adviser] is disappointed. ($029)

Interactions with group mates was a context where the adverse impact of negative impressions could be immediately experienced by the students:

> With the paper works [aspect] of research, I admit I'm a total failure. I'd rather just sit with my group mates and run errands for them [so that they would] have ease [in] doing the papers; but with the real paper work, I guess I really am not good. Because of this, my group mates think I'm lazy or incapable of doing the papers; and sometimes it hurts when they do the papers without informing you; and you end up doing nothing at the end of the day. ($020)

For some students, the idea that they had made a negative impression on science professionals generated self-conscious emotions:

> Last week, we went to [a science agency] to interview [experts] in order to find out the answers to questions raised by the [proposal defence panel] about our research. [The experts] laughed at our research [because of faults in the design]. […] I was so ashamed because we were laughed at, as if we were really that slow. ($069)

7.7 Situations That Involved Students' Uneven Participation in the Group Science Inquiry Project

Situations characterised by variability in group members' engagement in the group project engendered emotion work. In this study, 43 of the 44 students were working in groups of twos or threes. Within this collaborative context, some students were perceived to exert less effort relative to the other members of the group, a phenomenon which researchers in the field of group work refer to as social loafing[20]. In order to distinguish the positions of the members of the group within the context of uneven participation in group work for the science inquiry projects, the terms "doers" and "loafers" will be used in the following discussion to refer, respectively, to students who were (perceived or claiming to be) doing more and less than their group mates. Of the 43 participants who worked in groups, 15 described themselves as doers, 11 were either positioned (by doers) and/or self-identified as loafers, and four identified themselves as alternately doer and loafer on occasions.

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[20] A classic definition of social loafing is the reduction in an individual's effort and motivation when working within a group, compared to the effort expended when working alone (Karau & Williams, 1993). In natural settings such as in schools, however, it is arguably difficult to make this comparison relative to a particular individual's performance. Thus, in this study, perceived social loafing was established based on the comparison of an individual member's effort to that of the other members of the group (see also Linnenbrink-Garcia et al., 2011).

Both doers and loafers told of situations that engendered emotion work (discussed in the following subsections).

7.7.1 Situations Involving Inequitable Participation as Perceived by Students Who Considered Themselves Doers

Various forms of perceived inequitable participation. The perceived differences in individual contributions to the group effort provoked feelings of anger, resentment, and frustration, among other emotions. For example, some students, in many instances, claimed to have done a lot of the work, or all of the work.

The abovementioned perception of differences, however, cannot be depicted simply as "less or more effort". Evidence from students' narratives suggests that loafers should not be considered to be simply engaging in "off-task behaviour" where the "non-participating student is not assisting the group" (Linnenbrink-Garcia et al., 2011, p. 18). Rather, uneven participation was depicted in students' (i.e., the doers') narratives as differences in the following aspects:

- *Knowledge contribution*

  Some doers felt that they alone knew about their research, and that loafers did not contribute sufficiently during knowledge building (e.g., during consultation with their adviser).

- *Difficulty of tasks undertaken*

  Some doers took on the more cognitively demanding tasks (e.g., learning a programming language), while loafers did the easier tasks (e.g., running errands and performing clerical work).

- *Work values*

  Some doers complained that their group mates lacked initiative or drive, and were contented with mediocre quality work. Others cited differences in work values. One doer claimed that she was someone who "always passes [her] requirements on time" while her group mate, the loafer, was "the type of person who likes to wing it".

- *Engagement*

  The most common complaint regarding loafers' engagement was their lack of participation in the various aspects of the project work. For instance, some doers performed inquiry-related tasks (e.g., data

collection) without help from the loafers. Loafers were also perceived to be less emotionally or psychologically engaged in their projects. One doer, for example, hoped in vain for her group mates to "show that they cared or were excited about their research project".

Perception of inequitable participation engendered students' emotion work. The emotion work that the doers performed was related to the following aspects of situations involving uneven participation: (1) the extra responsibilities that arose from uneven participation, and the resulting additional academic stressors; (2) the unfairness of collaborating with loafers; and (3) the incongruence between the doers' expectations and the loafers' behaviours, within the context of their multiple relationships. These are elaborated below.

- *Tackling the extra responsibilities and the resulting additional academic stressors*

Students found it stressful when their group mates were less engaged in the work of the group, because it created additional responsibilities for them. Doers, for instance, had to take the loafers' portion of the work that was left undone or was not done satisfactorily:

> How do I cope […]? I just do our research without me [bothering] them. If they won't do it, I will do it just to finish the whole thing. If we will not move, how will this thing end? That's why I'll do this alone if they don't want to. […] I know I can't do this alone; but I'm trying to do so, just to forget the [matter] of [my group mates] leaving me to do this alone. I always do multi-tasking just to finish the stuffs on time. ($080)

Some of the doers assumed the responsibility of managing the loafers' contribution to the group effort:

> All the […] incompetence of my group mates made me angry and made me have a different outlook. I decided to be stricter, they should help. So my plan was, next time, I would lay down individual tasks that they would not have trouble passing […] satisfactorily. So some time after, I started acting on my plan, I made them do the detailed stuff like searching for [the definition of] terms and I was doing the creative part where you needed to think, like the impact of the study. ($023)

Other doers, on the other hand, felt the necessity of managing the loafers' attitude towards the project work:

> I felt pressured to show that I was really dedicated in my [research work], so that I could motivate my group mates. …[A]t the time, I was not really tired, but I was finding it hard to keep it up, to continue being that way… ($057)

- *Dealing with the unfairness of collaborating with loafers*

Doers perceived the unfairness of loafers' actions within the context of collective achievement. One student regretted that, because of her fear of giving the loafer the appropriate peer rating in all the quarterly assessments (which would also have signalled to the teachers about a problem in the group), the loafer got a high grade that he did not deserve.

Some doers resented the idea that the loafers did not make the same sacrifices or underwent the same difficulties that they did. Two students belonging to the same group told about staying in the school laboratory during Christmas to finish gathering data. In the story that one of them told, the student complained that, although the loafer (i.e., the boy group mate referred to in the following story) did not make the same sacrifice that she and her girl group mate did, he somehow enjoyed the fruits of their sacrifice when he joined the two girls in an international competition:

> [Our adviser] told us that he wouldn't allow us to go [and join a competition] with missing data [N.B. they forgot to record some data]. I cried. I cried. I cried. I couldn't just tell my mom that we would repeat everything. This meant spending more money and time for research. I knew that my group mates also wanted to join [the competition]; so when my girl group mate said that she was willing to sacrifice her Christmas break, I immediately agreed that I wanted to repeat our data gathering. The parents of my boy group mate didn't want him to spend Christmas in school. I felt so angry. He was the one who didn't help and now he had the guts not to attend the data gathering. It felt like I had sacrificed a lot and he didn't do anything to convince his parents that this data gathering [missing word]. His parents said that it was already fine that we had experienced the data gathering once and we didn't have to repeat it. I got really mad. I spent my Christmas in school. My dad got mad [but] my mom luckily understood me. We finished our data gathering on time. […] We [all] went to Malaysia to participate in the [international competition]. ($005)

- *Managing the incongruence between the doers' expectations and the loafers' behaviours, within the context of their multiple relationships*

At the time they started undertaking the science inquiry projects, the students had been classmates with their group mates for the past two years. Thus, the students' current relationships as collaborators in science inquiry projects were intertwined with their pre-existing relationships and relational history.

Friendship, as a pre-existing relationship between group mates, added a personal dimension to the impact of uneven participation in group work. When the expectations between friends--that a friend would be a companion, would provide help, and would be someone to trust and rely on (Bukowski, Hoza, & Boivin, 1994)—were not fulfilled within the context of

group work, inequitable participation was no longer just a work-related issue, it also became a personal affront. One doer described such a situation involving his two group mates:

> Every time I ask my group mates to work is emotionally challenging. There are/were times where I felt sad or disappointed when my […] research group mates ignore or delay my requests, especially if that group mate is a close friend of yours. It took us a really long time to reconcile, and we had the aid of our adviser. […] [I]t's frustrating that you count on a person to do something, and they shrug you off, playing video or computer games, completely ignoring your trust. These situations lead to a feeling of distrust, frustration and disappointment, which I admittedly never got over completely. ($014)

Previous relationships also meant that the students had some prior knowledge of the abilities and work values of their group mates based on their previous interactions, as well as relational history, that could colour their present working relationship. The following excerpt illustrates how prior knowledge and history with a group mate created mixed expectations that exacerbated one student's negative emotion experience. The long excerpt is included in its entirety to preserve the broad picture of a doer's experience of uneven participation that the student provided:

> I thought that research would be better if I had a group mate. My "frenemy[21]" asked me if I would be her group mate. Even if I kind of disliked her, I knew that rejecting her would be very painful on her part, because she thought of me as a very close friend, so I said yes. I already imagined what our research life would be [like]. I would be doing most of the data gathering part and since she was a good writer, she would be doing most of the paper; but of course, we would still be helping each other. Still, I didn't trust her, because my best friends and I already had a personal problem with her; and I wasn't wrong. We decided to proceed with her concept paper […]. I thought that, since it was her concept paper, she would have more knowledge about her topic […] and she would share all of it with me. I was wrong. I was sad, angry and frustrated, so I did my own research and read a lot of articles. In the end, I was still the one who wrote most of the research paper and [did] the data gathering. Our consultation periods were always on Mondays, 9 to 9.30am. I always asked her if she […] had read and had [an] answer [to] the question that our adviser asked us [to find an answer to] during our previous consultation; and she would always say yes. During [the] consultation, I would always do the talking and answer the questions that […] our adviser would ask us and she would just agree [with] everything that I was saying. In my head, I was like, "What the fudge, I thought you've read stuff about this, why aren't you talking and sharing it with us?" It really annoyed me when I knew that she was just lying and I got "smoking" angry every time I caught her lying. I really wanted to tell her, "There's only

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[21] A term denoting someone whom you are friends with and dislike at the same time.

the two of us in this group. Being lazy and lying would do us no good. Aren't you ashamed of yourself? You do nothing but bring us down. What you're doing makes me hate you more and if you keep on being an ugly, lazy, and giant liar, I'm going to pull all your hair out and do more bad and imaginable things to you." I didn't want to start a fight with her and risk our research grade; so I decided to keep it all to myself. […] Good thing I had my best friends, [to] whom I could vent out about the things that she did. They could relate to me because they had experienced the same thing with her, but in other subjects. […] While writing this, I felt like my heart was going to literally burst because of too much anger, frustration and regrets. I wanted to shout a lot of curse words and punch her till her face became unrecognizable and uglier. I really hated her and I'm mad at myself for making the worst decision in my high school life. ($024)

Situations involving uneven participation evoked negative emotion experiences not only in doers but also in loafers (discussed below).

7.7.2 Situations Involving Uneven Participation as Experienced by Students Who Were Described as Loafers

Loafers' perspectives on their inequitable participation in group work.
Loafers were either aware or unaware of their inequitable participation. There were some participants who belonged to the same group and who were positioned as doer/loafer pairs; their accounts provided two-sided perspectives to the situations involving uneven participation. The two examples below feature contrasting cases.

In the first example, the loafer depicted what he perceived to be shared negligence within the group. When his account was compared with that of the doer, it was apparent that the loafer did not seem to be aware that there was a disparity in his and his group mate's contribution to their group work. In the excerpt below, he framed the situation as group negligence, and seemed to be unaware of the undercurrents that the doer described (in the excerpt that follows):

> ***Loafer***: I felt very happy back then. I got to know my group mates pretty well, and we spent almost every weekend making research at [the doer's] club house. […] There were times that we're very productive; however, most of the time we just neglected our research. It became more of bonding moments for us, which was actually a good thing; yet the bad [thing] was, we're not actually doing something productive at all. Most of the time, we were just hanging out, eating, reading, playing computer games and watching anime, to name a few. […] Looking back on it, […] I laugh at our ignorance, and how happy-go-lucky we were. For the whole third year, that was the only thing that we did, we went to [the doer's] club house, did research 30% of the sessions, and chilled. ($019)

> ***Doer***: In my head, my group mates were lacking in a lot of things to make our research good—like missing consultations, not doing their job satisfactorily, not having any drive to help me with our research

work and no gratitude for me doing the work. […] Research life then was dull and sad, how I really envied those with good research partners. I hated it whenever it was time for research-related things: consultations, research classes, meetings with group mates. Whenever I would meet up with my group mates, there was this tense atmosphere and I got the feeling that my group mates were blaming me for the [way] things were; but in my head, it was their incompetence [that was] to be blamed. ($023)

In contrast, the next example features accounts by the loafer and the doer which showed concurrence on the matter of inequitable participation. However, the loafer's account of his thoughts and feelings (in the excerpt below) seemed to indicate that he was not an unconcerned slacker, as the doer depicted him (in the excerpt that follows):

Loafer: Sadly, our third data-gathering trial was on Christmas break and I wasn't allowed to do data-gathering on Christmas day; so I left my group mates [in] the lab on Christmas day. It was sad because I should be the one pushing for great efforts in data-gathering; but still I went home because of my family. With this happening, I felt useless and weak, because I did not sacrifice [as] much as my group mates [did]. […] I lost the [research] grant and the [opportunity to participate in a national competition] because of how people thought of me as a researcher; it really was depressing to be left behind by your group mates in prestigious awards and competitions. ($020)

Doer: The parents of my boy group mate didn't want him to spend Christmas in school. I felt so angry. He was the one who didn't help and now he had the guts not to attend the data gathering. It felt like I had sacrificed a lot and he didn't do anything to convince his parents that this data gathering [missing word]. ($005)

These illustrative examples suggest that the emotion experiences of loafers within situations of uneven participation can vary depending on the perspective that they take of their problematic engagement, with full acknowledgment of inequitable participation clearly engendering negative emotion experiences, as in the second example above. In the first example, it can be argued that the student's framing of his inequitable participation could be a strategy in managing emotion experiences that might otherwise be negative. The following discussion presents loafers' accounts of situations that engendered emotion work.

Situations that engendered emotion work in loafers. Being a loafer was a position that was assigned to a student (by him- or herself, or by others) as a result of social comparison of his or her contribution to the group work relative to the contribution of the other members of the group. This social positioning reflected a negative evaluation (either by self or others), which could evoke negative emotion experiences. Students' accounts showed that

various social interaction processes could lead to students taking up the loafer position. Four different cases are discussed below.

In the first case, the account of one student showed that the loafer's inequitable participation was not merely due to the loafer's unwillingness to match the doer's contribution. The student intentionally positioned herself as a loafer within the group from the start, in conformity with her negative self-evaluation of her traits and abilities. This positioning, and the resulting deficient contribution to the work of the group, evoked self-conscious emotion (i.e., shame):

> There are three of us in the group, and I am the least smart, the laziest, and somewhat useless. The only work I do is print articles, submit our output, and pay the printing charges. Honestly, I feel shame towards my research group mates because there's nothing I can do to help. But what can I do, I am not adept or diligent like them. ($033)

In the second case, the inequitable participation of another student was a result of the exclusionary actions of his group mates that marginalised him. His emotion experience was markedly different from that of the student above, because he felt that the position that his group mates assigned to him was not justified:

> [A]s time went by, I realized that I was starting to be an outcast in our group. My other two group mates went on with simple decisions without even consulting me. I felt a bit betrayed. We are a group after all. During discussions, my suggestions would fall on deaf ears as my other group mates proceeded with what they wanted without even considering my thoughts. It's as if they'd keep on rejecting every thought I had. I felt lonely. I felt like I hate being in this group. ($021)

The final two cases illustrate that the doer/loafer positions can be fluid in the course of the life of the group. The two contrasting cases that follow show that the shifts in students' positioning can have an emotional impact.

In the third case, the student was self-described as a doer in earlier stories. In this instance, however, she positioned herself as a loafer. In her case, the inequitable participation was unwittingly imposed by her lack of competence for the science inquiry task at hand. The context of the following account was their laboratory work; because part of the data collection for the student's group project involved the use of microscopes for identifying microorganisms in samples that they collected during their field work. This is a task in which she thought her two group mates were more competent, because they had taken an elective microbiology course the previous year. In the excerpt below, the student (S) described to the researcher (R) her

inequitable contribution during this part of the group work, and her feelings which resulted from her recognition of herself as a loafer:

> **R**: What were you feeling during the time when you had to deal with all the samples and you were working with your two group mates?
>
> **S**: The two of them handled the microscope because they had microbio[logy], I just put the samples on the slides. I felt helpless; I was just sitting and waiting for them to finish, then I would prepare a new slide. In a way, I was not helping to speed up the process. Then, if I made a mistake, I threw away the slide. [...] That was my only work and I still made mistakes! I felt helpless; and the two of them were really tired because they started the previous night [N.B. while this student stayed at the research site to do one last session of field work]. But because they are better than I am with the microscope, I couldn't offer to take their place. […] If I did that, we might be even more delayed. So I took care of cleaning up, bringing food; that's what I did, because I couldn't do anything else to help them.
>
> **R**: Do you think they were okay with that division of labour?
>
> **S**: Actually, I didn't say that they should do the viewing, they were the ones who sat in front of the microscopes. They would ask me if the photos [that they took of the microorganisms] were okay and I told them if they were. So, in a way, we helped each other; but they were the ones who were hands on with the microscope. I think it's okay with them, because they had not complained.
>
> **R**: How did you feel about that role?
>
> **S**: I don't feel comfortable with the role where I have less work compared to others. I am not comfortable, that you are just doing this much, such that if the three of you were observed, you would appear to be the laziest in the group. […] I don't like it, that you are just waiting for them to tell you that they are done and to store the slide and prepare a new one. ($102)

In the fourth case, the student (in contrast to the above) described herself as a loafer initially. Later, she purposely assumed the role of the doer when, in the course of their project work, her two group mates became the loafers. Her emotion experience was partly due to her perception that the inequitable participation by one of her group mates was actually an act of retribution for her earlier deficient participation:

> For the past two weeks, I did all the work. […] I got so frustrated because I was doing all the work. I'm okay with doing all the work; but I just want them to cooperate, so that we will not be delayed. […] But they did not help, not even to give a suggestion. […] Before, it was I and another group mate who had to be persuaded to work; but now, I'm the one doing the persuading, and the two of them are being lazy. Oh my gosh! I now know how my group mate felt when he had to persuade the two of us to work. ($081)

Two weeks later, she shared that there was no change in the situation:

> I was furious because I was doing all the work; they no longer have any motivation to work. It isn't fair that everything is on me. [I told

> them] that they are not the only ones with problems, I also have problems. […] You know, I previously gave my group mate a hard time. But it seems so unfair that his retaliation is so extreme, that they left all the work to me, and they never help. ($095)

Aside from students' collaboration with peers, the collaboration between students and teachers was also a significant context for emotion work.

7.8 Situations That Involved Unfulfilled Teacher Role Expectations as Perceived by Students

The teachers who served as advisers to students as they undertook their science inquiry projects were principal characters in some situations that engendered students' emotion work. These situations implicated them in two issues connected to teacher support: (a) teachers' neglect of supervision duties, and (b) teachers' lack of knowledge, and faulty or unhelpful guidance.

7.8.1 Situations Involving Teachers' Neglect Of Supervision Duties, Which Were Perceived by Students as Lack of Teacher Support

Teacher support was crucial to students, more so probably because the open science inquiry process that students undertook gave them substantial autonomy. Unlike the more predictable teacher-student dynamic in traditional classroom settings, the shifting student-teacher roles during open science inquiry-related interactions could be challenging to students. These conditions required students to adjust to a new dynamic between themselves and their advisers, which was different in many respects from the interactions that they had learned in traditional classroom settings. Within this context, two concerns related to teachers' supervisory role emerged from students' narratives: (a) issues with teacher accessibility and (b) problematic teacher behaviour[22].

Issues with teacher accessibility. Students told about teachers not being present for, or who were busy with other things during, previously set consultation meetings. Consultation meetings were an important venue for a student and his/her group mates to solicit and receive teacher support for themselves and for their projects. Students, for example, needed their

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[22] A caveat is warranted at this point. Students' account of problematic teacher behaviours should not be taken as evidence of stable negative teacher traits. Students had also given accounts about improvement in their interactions with the teachers, and accounts of teacher support from the same teacher whom they depicted negatively in other accounts.

research adviser's help in planning tasks at a particular stage in the science inquiry process, and feedback on their draft research papers. Thus, when work progress and academic outcomes were already at risk, students' inability to access teacher support added to students' academic stressors and engendered emotion work. In the following excerpt, for example, the student and her group mates needed teacher support while working on a second concept paper, after their first research proposal was disapproved during their proposal defence:

> For a week, we had been regularly going to him to consult about our concept paper. And he always said [to see him] later or tomorrow. Isn't that part of his responsibility as our research adviser? It seems that he does not care that our work is not progressing and our grades are low. If we go to him for consultation, he says he's busy but he only goes to the [canteen]. It's really sad. [I was] depressed plus angry. […] I wanted to throw plates but I'd get scolded […] I wanted to shout at him but you are a mere student. ($034)

Problematic teacher behaviours. When teacher behaviours were discrepant with respect to students' expectations of how teachers should act in their role as advisers, the resulting situations engendered students' emotion work. Students' accounts focused on three teacher activities: (a) consultation meetings with students, (b) support during students' proposal defence, and (c) engagement with students' output. The following are examples of students' experiences of problematic teacher behaviours in the three aforementioned contexts:

- (*Consultation meetings with students*) One student wrote that his adviser played computer games when he should have been meeting with the student and his group mates for consultation. The student felt that their [computer game-focused] interaction with the teacher had "no relation" at all to their inquiry project. This made the student "mad".
- (*Support during proposal defence*) A teacher did not know that his advisees were undergoing proposal defence had he not chanced upon them outside the venue. One of his advisees said: "I felt really bad… like, 'my God, what will happen to this'? Even just support from him [the teacher], there's none" ($068).
- (*Engagement with students' output*) Students complained that teachers did not read their output. One student offered this evidence: the teacher pronounced as "okay" one draft, which students intentionally littered with wrong information and incorrect grammar as a test if the teacher was reading their work. Another student said that, by not reading their work, her adviser did not seem to appreciate the "sweat and blood" that she and her research partner invested in their work.

7.8.2 Situations Wherein Students Encountered the Impact of Perceived Teachers' Lack Of Knowledge, and Faulty or Unhelpful Guidance

Students expected to be guided by teachers in their undertaking of science inquiry projects. Teacher support, however, could be uncertain due to (a) teachers' lack of knowledge and (b) faulty or unhelpful guidance. The resulting situations engendered students' emotion work.

The impact of teacher's lack of knowledge. Teachers' lack of knowledge affected students' engagement with the knowledge building process, teacher-student interactions, and students' output. Some teachers' lack of knowledge was easily evident to students because they recognised that they had been assigned to advisers whose subject specialisations did not match their proposed science inquiry problems[23]. Although students were understanding of teachers' limitations in this respect, this did not keep them from negative emotion experiences in situations where they encountered the impact of teachers' lack of knowledge:

> Every consultation, there is that feeling, while talking to your adviser, at the same time you are thinking, "Does he [the adviser] really understand what I'm saying?" Because our adviser's forte is [another field, not the student's research topic]. […] So we wonder, and we simplify what we are trying to get him to understand, because he might give us the wrong advice. […] I'm afraid we might start all over again. Previously, there were [students] who made a mistake in their method and they had to repeat from the start. That might happen to us, too, if he gives us wrong advice. […] There are moments that I doubt him. I would have wanted to tell him about things that we don't understand […] but I just keep quiet. […] We are afraid to ask him questions […] so the things that we do not know pile up until we are unable to complete our work, because we cannot ask him about the things that we find really difficult to understand. So when we submit [our output], it's lacking some things. ($064)

The impact of teachers' faulty or unhelpful guidance. The teachers' questionable ability to guide students in conceptualising science inquiry problems and designing investigations had been implicated in situations that engendered emotion work. Students' emotion experiences in situations

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[23] This was unavoidable, because it was difficult to predict at the start of problem conceptualisation how the students' science inquiry problems would turn out. Furthermore, sometimes, a known mismatch would still be allowed to continue because of the need to distribute equitably the student supervision load among the teachers, and because teachers were expected to collaborate with other teachers and to know how to guide students in order to compensate for their lack of expertise in students' inquiry topics.

involving failures and setbacks were heightened when they felt that the failures and setbacks they experienced were brought about by the teachers' faulty or unhelpful guidance. Three instances are presented below.

In the first example, a group of students had to redo their research proposal, because of flaws in the research design and lack of scientific soundness in the science inquiry problem, which were discovered only during proposal defence (i.e., a time when there should have already been ample opportunities for the advisers to provide guidance to students). Aside from apportioning some of the blame to her teacher, one student also took offence that the teacher laughed at their failure:

> While we were choosing our research topic, I told our adviser […] many times not to choose this topic, because I sensed something wrong with it, but I just couldn't exactly point it out. But in the end we were given this topic to pursue. We were actually confident before our defence because we felt that we knew everything […] there was to know for our research. But our confidence evaporated when we were asked by one member of the panel [during the defence]. As in "duh", this is it, the "something wrong" that I couldn't point out. We were really depressed and devastated because, of course, one year of research wasted. After the defence, [our adviser] came to us and he laughed. Yep, he actually laughed. We quite accept that our research is faulty and it is our fault. But my point is, he's a genius when it comes to [this field of research] and we've been consulting him about our research for about half a year, how come he did not see this super major error? Perhaps he just did not care about our research, that's why he did not exert enough effort to somehow think about it. ($034)

In the second example, the student blamed the teacher's deficient guidance for her and her group mates' distressing experience during proposal defence due to their unpreparedness for questioning. The following excerpt underscores the student's taken-for-granted expectations of helpful teacher support, the mismatch between this expectation and the support the teacher provided, and the student's desire for the challenging kind of teacher support that would prepare them for the challenging task of answering questions during the proposal defence:

> Other teachers ask a lot of questions; so you would know immediately what is wrong with your study. They really grill you, so that when you go [before] the panel [during the proposal defence] you are ready. But the problem with [our adviser] is that, when we pass [an output] to him, either he tells us "this is already okay" or his questions are not deep; they are rather superficial questions. […] [Even up to] the end, we are still having difficulty, because we are not sure if our [work] is really correct, since he just approves it. […] I get really mad, as in annoyed, like exasperated. […] Outside the consultation room, we go "Arrrghh". […] Other students hope to have him as adviser because they say he does not grill to the point of pain; but for us, we want to be grilled, so that we will know our errors. There was a time during

> our first [proposal] defence last year, we had no idea about the possible questions because our adviser had not posed questions to us. He just told us, "You can do it, just study well, […] read your paper again and again". But he had not asked possible questions […] so that we would be ready [to face] the panel. The panel really grilled us; we were sweating profusely, because we never expected those questions. [...] Then we were asked why we proposed to test [this] but not [that]. But the [truth] was, our goal was to test [both]; but our adviser said that, "if possible, [test] only [one]". We didn't know how to answer [the question]; because you could not put the blame on the adviser. ($036)

It is worth nothing that the reference to "you could not put the blame on the adviser" in the last sentence of the above excerpt is an indication of unequal power relations.

In the third example, the student attributed to the teacher's unhelpful guidance her group's slow progress from one stage of the science inquiry process to another:

> The advice that [the teacher] gives is not very helpful. He suggests, "just Google about this"; but not everything can be found by Google. […] Even just the basic things, for example, how to organise in our minds the [ideas] for the background [of the study] so that it will be clear, he says, "just understand it, read what others had written". […] What we really need is for him to teach us which is the right path for our research. […] I want to tear my hair out because I'm so frustrated. I want to be able to move on from this step [of the science inquiry process] […], have a clear direction for our research […] I'm tired of remaining in this step […] Sometimes when I get so frustrated I throw my things around. I'm so tired of research. ($042)

All the above examples of problematic teacher-student interactions point to students' taken-for-granted expectations of appropriate and effective support from teachers in school. At the same time, they also underscore the various kinds of support the students need while undertaking extended/open school science inquiry projects, the limitations in teachers' capability to provide the kind and quality of support that meet students' expectations, and the potential emotional impact of perceived lack of teacher support on students.

7.9 Vignette of One Student's Encounter With Various Situations That Engendered Emotion Work

Students encountered various challenging situations that engendered emotion work over the two years that they worked on their science inquiry projects. For some students, these challenges could seem like a deluge of unfortunate circumstances. As one student put it, "There seems to be no end to problems in research" ($070).

The following vignette is about one student's encounter with the many situations that engendered emotion work. Piecing together details from the series of stories this student shared revealed a catalogue of distressing circumstances. The vignette is included for four reasons. First, it shows a sample of the various challenges that undertaking open/extended science inquiry projects might present to students over time. Second, it illustrates the multitude of factors that can result in emotion work-engendering situations. Third, it provides a longitudinal view of one student's experience of these situations. Fourth, it gives insights into facets of students' experiences that would otherwise be hidden from others, especially in schools, where the focus is generally on student outcomes.

The background of the story. The student and her two group mates were doing a project on marine microorganisms that could be found on the roots of a certain coastal plant. Data gathering procedures involved both field and laboratory work. By the middle of the second quarter of the academic year, the student and her two group mates were conducting a preliminary trial run of the laboratory component of their project[24], which they started three weeks before classes commenced in the first quarter. This was already their second year on the science inquiry project. At this point the student reported a setback:

> We have been doing the prelims for a long time and now we are still at the prelims stage. […] We repeated the prelims several times before we realised that there was indeed something wrong with it. ($072)

A series of unfortunate circumstances. These are the details of her experiences and the circumstances that led to their "stagnating" in the trial run stage:

- They made a mistake in the units they used to calculate the mass of their chemicals and ended up using the wrong proportions.

- They used one kind of water, based on the advice of a professional researcher, who later on recommended that they use another kind. They had to search for a source of this water before they could proceed with another round of trial run.

- The SCT meter did not work, so they could not measure the pH of a solution they were supposed to use. The laboratory technician asked

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[24] A preliminary trial run of key procedures in the methodology was required before students were allowed to do the final data gathering procedures. This was also one of the milestones that were considered basis for grading.

them to wait for it to be repaired. However, their adviser suggested that they find another method that would do away with the step that kept giving them trouble. The broken SCT meter spurred them on to look for a new procedure.

- The search for a new method was not immediately fruitful. Some of the alternative methods still involved the problematic step that they wanted to avoid; others did not work.

- Their adviser referred them to another teacher who had a laboratory manual containing a possible alternative method. They were not able to borrow the manual because it was lost.

- When they finally found a promising alternative method, they did not execute correctly the technique for preparing the specimen for viewing under the microscope; so the adviser told them to do another round of specimen preparation.

- When eventually they were able to prepare a specimen for viewing, they showed it to their adviser, who told them that what was visible on the slide was not the microorganisms they wanted to study.

- Their adviser asked them to search for a research site, where they could find the coastal plants whose roots serve as host to the microorganisms they wanted to study. The search took a long time.

- One time, after they collected some field samples, they were not allowed into the laboratory by the school guards because their permit to work off-hours was not signed, a fact which they failed to notice. There was a time window for processing the samples, which they failed to meet; so the samples were ruined. Another time, the special microscope they were using did not work.

- The adoption of a new method necessitated a modification in the objectives of the investigation, which resulted to a simpler project. Earlier, the student appreciated this change, which their adviser and another teacher helped them make. She said that it helped revive their motivation and improved their chances of completing the project on time. Later, however, when they saw that their project was the simplest among all the groups, they lost interest in their project.

- After four months of failing to complete a successful trial run, they lost their drive. She said that their adviser was frustrated with their slow progress. The student also lost her hope of joining competitions with their project.

- Work on their project was suspended for a time because the student was busy with extracurricular activities. She left the work for the project to her two group mates, who did not take up the slack.

- They failed to meet the requirements for second quarter assessment by failing to find a research site and performing a successful trial run in the laboratory in time for the quarterly assessment. She got a low grade (2.0) for the quarter—the lowest she ever received in her whole school life— an outcome which threatened her aim of graduating with highest honours.

- She was anxious that they might not finish their project in time for graduation. They were "panicking because there was no change in [their] situation". She was in "constant fear".

- She called her summer internship mentor, a scientist who was working in a research centre, and asked if her mentor knew of an expert on the microorganisms they were studying. Her mentor gave her the mobile number of a colleague. The students, however, did not use the number immediately. They first tried to contact the expert through her official email, because school policy required students to make initial contact with professional researchers through official channels. Their email bounced back, and it took them one more month to summon the courage to disregard school policy and use the scientist's personal mobile number. When they finally met the scientist, she taught them a new method and allowed them work in her laboratory at the research centre.

- The adoption of this new method meant that they could not use their samples from two previous rounds of field work. They must find the time to schedule another round of field work.

- They were not able to conduct a scheduled field work because of a typhoon. The resulting delay necessitated the scheduling of field and laboratory work over the Christmas holidays. This meant foregoing a youth camp and a family reunion that she was looking forward to attending. By this time, they were already on their sixth month since they started the trial run. According to her, she had a "sad" Christmas.

- During the field work with her group mates, adviser, and grandparents (who acted as chaperons), they found out they had the wrong equipment because she gave her grandfather (who procured the equipment for them) the wrong specifications. She also forgot to arrange for a local guide to their research site, which was located on another island. This again caused some delay; and she felt bad,

because her grandfather scolded her in front of her adviser and group mates.

- Despite working over the holiday and giving her "150% effort", they failed to complete their data gathering in time for the third quarter assessment. Thus, the low grade she got for the second quarter dropped even more in the third quarter. (Although, she also admitted that she deserved the grade because they failed to submit some class work after inadvertently overlooking some deadlines.) She considered this "shameful" and a "slap-in-the-face". She said she hit "rock bottom", and her "self-esteem lowered considerably". According to her, "I don't know how to tell my parents that I got [a grade of] 2.5 in research. [...] If I did tell them, they might no longer be proud of me ($116)." With only one quarter left, she realised that she would not be able to improve her grade substantially. Thus, she bade goodbye to her "dreams" of having their project qualify in a competition and of graduating with highest honours.

The way the student and her group mates persevered through this series of distressing circumstances is indicative of the significance of emotion work in sustaining students' long-term engagement in a challenging academic project.

7.10 Chapter Summary

This chapter presents the findings related to the situations that engendered students' emotion work in the context of undertaking extended/open school science inquiry projects. Evidence from students' narratives showed that these situations were a conflation of conditions related to (a) the process of science inquiry that the students were undertaking, (b) the students as novice researchers, and (c) the school context. Furthermore, these situations could be classified into five groups, namely, (1) situations that impacted the attainment of project-related achievement goals; (2) situations related to the demands of the science inquiry projects and of school; (3) situations that destabilised students' sense of self; (4) situations that involved students' uneven participation in the group science inquiry project; and, (5) situations that involved unfulfilled teacher role expectations as perceived by students.

The next chapter discusses the emotion work strategies that students deployed in dealing with these situations.

Chapter 8
Students' Emotion Work Strategies

This chapter presents the findings on the strategies students deployed when they performed emotion work.

8.1 Overview of the Chapter

The chapter has five main sections. An overview of the four families of emotion work strategies that students deployed is given in Section 8.2. Then the next four sections discuss these families of emotion work strategies in detail. Finally, a chapter summary is provided at the end.

In the discussion of the four families of emotion work strategies, the connection between some illustrative excerpts about emotion work strategies in this chapter and excerpts about emotion work-engendering situations in Chapter 7 is referenced, in order to direct attention to additional contextual details. Also, the use of 'psychological' labels for the various emotion work strategies is kept to a minimum in the following discussion. Instead, a descriptive approach to identifying strategies is adopted to minimise ambiguity.

8.2 Overview of the Emotion Work Strategies Deployed by the Students

The episodes of emotion work that were identified from students' narratives, which were referenced for the analysis of situations that engendered students' emotion work, were further examined to identify the various emotion work strategies the students deployed. The identification of emotion work strategies was facilitated with the use of the conceptual guide comprising a list of strategies described in Table 6.4. Once identified, the various strategies from the episodes were collated, which then yielded four families of strategies, as summarised in the table below.

Table 8.1 Families of emotion work strategies featured in students' narratives.

Elaborations of the individual strategies included in the 'Examples' column below are provided in Table 6.4. The section where each family is discussed in this chapter is noted in the first column.

Family of Strategies	Description	Examples
Expression-related *(Section 8.3)*	These strategies were concerned about the exhibition or inhibition of observable elements of an emotional response.	Expression, suppression, response modulation, comfort-seeking, social sharing
Perception- and attitude-directed *(Section 8.4)*	These strategies involved adopting particular perceptions about or attitudes towards situations that engendered emotion work, or changing existing perceptions or attitudes.	Reappraisal, reflection, putting in perspective, self-compassion, self-encouragement, commitment, controlled starting of emotion, psychological disengagement, rumination, acceptance, passivity, self-blame, other-blame, excuse-making, social-comparison
Disengagement-focused *(Section 8.5)*	These strategies were aimed at distancing or detaching oneself from situations that engendered emotion work.	Avoidance, escape, distraction, reduction of effort and motivation, intentional forgetting, positive refocusing
Situation-directed *(Section 8.6)*	These strategies consisted of acts that were done in order to influence or change the situation that engendered emotion work.	Problem solving, strategising, situation modification, self-affirmation, help-seeking

The following table provides a view of how frequently the abovementioned families of strategies featured in students' narratives, in the five groups of emotion work-engendering situations that were described in Chapter 7. Because of the variation in the number of narratives that tackled the different situations, comparing students' use of a particular family of strategies across the various situations would be problematic. It is be noted, however, that, generally, students mentioned more instances of using perception- and attitude-directed strategies and situation-directed strategies than expression-related and disengagement-focused strategies, within each group of situations. The repetition of narrative numbers across two or more families of strategies within a group of situations (e.g., 107 under the column 'Delays, Setbacks, and Failures, and their Aftermath') attests to the fact that, in many cases, students deployed multiple strategies in one particular situation.

Table 8.2 Students' reference to the various emotion work strategies in their narratives.

The numerals in the cells refer to the numeral identifier for the individual narratives. The column labels are the five groups of situations that engendered emotion work, which were discussed in Chapter 7.

Situations *Family of strategies*	Delays, Setbacks, and Failures, and their Aftermath	Challenging Inquiry Tasks and Competing School Demands	Threats to the Sense of Self	Students' Uneven Participation	Unfulfilled Teacher Role Expectations
Expression-related	5, 11, 14, 15, 28, 47, 59, 74, 83, 86, 93, 99, 103, 107, 112, 144	12, 26, 36, 42, 65, 68, 71, 74, 77, 78, 86, 89, 92, 93, 97, 106, 107, 109, 113, 117, 129, 139	12, 29, 32, 38, 43, 54, 55, 63, 69, 75, 85, 87, 90, 94, 98, 102, 104, 105, 107, 116,	2, 8, 9, 21, 22, 23, 24, 27, 35, 38, 44, 46, 50, 52, 55, 57, 63, 81, 108, 111, 114, 117, 118, 145	6, 16, 32, 34, 36, 42, 64
Perception- and attitude-directed	3, 11, 13, 15, 17, 18, 37, 41, 46, 47, 51, 55, 56, 59, 62, 66, 67, 69, 70, 72, 74, 75, 77, 81, 82, 83, 86, 93, 96, 99, 103, 106, 107, 112, 115, 118, 129, 143, 144	3, 4, 5, 11, 26, 28, 36, 38, 42, 44, 45, 48, 52, 61, 65, 66, 67, 70, 71, 74, 77, 78, 83, 86, 89, 90, 92, 93, 96, 101, 106, 109, 110, 113, 115, 118, 129, 130, 134, 144	12, 13, 16, 17, 22, 25, 26, 29, 32, 37, 40, 43, 48, 53, 54, 60, 62, 63, 69, 75, 82, 84, 85, 87, 88, 90, 94, 98, 102, 104, 105, 107, 108, 116, 125	5, 9, 17, 18, 20, 21, 22, 23, 24, 27, 31, 33, 35, 38, 39, 44, 46, 49, 50, 52, 55, 57, 62, 63, 66, 73, 80, 81, 95, 113, 114, 115,	2, 6, 16, 22, 34, 36, 64,
Disengagement-focused	3, 11, 19, 58, 59, 69, 72, 74, 82, 83, 88, 96, 99, 101, 107, 111, 143	28, 33, 36, 45, 49, 65, 71, 74, 86, 89, 92, 93, 104, 107, 109, 115,	31, 32, 37, 47, 50, 53, 54, 60, 69, 82, 87, 88, 98, 107, 116	21, 23, 28, 38, 39, 44, 50, 62, 63, 73, 80, 81, 95, 115, 117, 145	2, 42, 64, 91
Situation-directed	3, 5, 6, 11, 13, 14, 15, 16, 17, 19, 20, 34, 37, 46, 47, 51, 56, 57, 58, 59, 67, 69, 70, 72, 74, 75, 77, 86, 93, 96, 99, 100, 101, 103, 107, 111, 113, 115, 118	1, 4, 5, 8, 10, 12, 14, 16, 17, 18, 26, 33, 38, 42, 44, 45, 48, 56, 59, 65, 67, 70, 74, 76, 77, 78, 86, 89, 92, 93, 104, 110, 118, 129, 134	25, 29, 37, 43, 45, 47, 53, 54, 60, 63, 85, 88, 90, 98, 104, 105, 107, 108, 116, 125	2, 5, 8, 9, 14, 18, 20, 22, 23, 24, 27, 31, 32, 35, 39, 44, 49, 50, 55, 57, 66, 80, 81, 84, 95, 102, 113, 114, 115, 118,	2, 6, 16, 28, 36, 42, 64, 68, 91

8.3 Expression-Related Strategies

This section elaborates on students' accounts of emotion work involving the expression, suppression, and modulation of emotional reactions.

8.3.1 Students Expressed Their Emotions on Their Own or to Others

Students' narratives featured accounts of expressions of emotional responses in all but one kind of situations (i.e., except for situations involving students' perception of making unfavourable impression on others). Students "cried", "broke down", "sulked", "ranted", "lashed out", "vented" (orally or in writing), "pouted", "screamed", "threw something", and "hit the wall". While it could be argued that some of these emotional expressions do not constitute emotion work, but were merely reactions to unpleasant situations, some students explicitly positioned their emotional expressions as emotion work.

Venting. Some students stated that they cried in order to relieve sadness, frustration and anxiety, and to release negative emotions related to stress— in situations involving delays and setbacks, knowledge building, questioning, off-hours data gathering, uneven participation of group mates, and competing school demands. This cathartic release of emotions is called venting (Parlamis, 2012).

Aside from crying, students deployed other modes of venting, sometimes with instrumental motives. One student lashed out at and ranted to her parents, when, after a long search for a missing chemical, the only supplier that assured them of its availability pulled out at the last minute, leaving them unable to perform the laboratory work needed to complete their data in time for a competition (see excerpt $099 in Section 7.4.4 for the backstory). Her explanation showed that venting facilitated the deployment of another emotion work strategy (i.e., problem solving; see excerpt from narrative $107 in Section 8.6.2 under subsection 'Support from experts' for details about the student's problem solving):

> I think [lashing out and ranting] helped, because I calmed down after and my anger disappeared. I only worried then about our [project]; one hour after, I was just thinking about what we should do. ($107)

In another account, while telling about her teacher's inability to provide helpful guidance during consultation meetings, the abovementioned student described venting as a means of preventing herself from engendering negative teacher-student interaction:

> I vented so that [the feelings] would not fester inside me; so that every time I entered the consultation room, I would not be tempted to answer back [to the teacher]. Because I have a tendency to talk back when I get really mad. So [I and my group mates] really try to vent before entering the room […] by screaming outside or talking with each other until our anger or irritation goes away. ($036)

Within the context of uneven participation by group mates, there were only two doers (out of nineteen) who demonstrated aggressive expressions of emotion that were explicitly directed at the loafers (as opposed to passive ones, see entries in Table 8.8 for 'Strained interpersonal relationships within the group' in Section 8.5.1 and the discussion in the subsection 'Emotional reactions that maintained equilibrium in social interactions' within Section 8.3.2). One student berated her group mate on social media (i.e., via Facebook chat) in order to release her frustration and stress-related emotions. Another student's account depicts her expression of emotion as a way to incite her group mates (i.e., the loafers) to participate in the group work, and illustrates, at the same time, the risk of negative impacts on interpersonal relationship when students confronted peers about uneven participation:

> I told them what I felt. I didn't want to hide my feelings because they would just worsen. I was annoyed that they were not working. [I told them], "Please do something. I don't want to see our grade plunging again. Do you want to be like them whose grade is 3.0?" […] After that, it's as if nothing happened. Right now, it's common for us to cycle through an argument, then I get angry; it's on repeat. […] So, I push them because, then, they might give in. [It helps to deal with my frustration] because when I see them getting irritated, I push them all the more so that they would become more irritated. Then the next day, they would tell me that they were really annoyed with me, because I kept on nagging them. […] But then, they gave in; so that means something changed in them. […] [Their failure to help] is really a downer on my mood. I feel somewhat guilty for doing that to them and for being annoyed with them at the same time. I don't want it to cause some conflict that might affect our research. So I really try my best not to have a bad mood; because once I have a bad mood, something bad might happen. […] There was a previous case of two really close friends who quarrelled and their friendship ended because they did not share [their feelings]. I don't want that to happen to us. So if I get annoyed with them, I tell them. So that even if we give each other the evil eye for a time, after some time, it would blow over. ($081)

[Note: The above student was previously a loafer who later on became a doer. For additional details, see 'the fourth case' presented in Section 7.7.2 within the subsection 'Situations that engendered emotion work in loafers'.]

Some students vented privately (e.g., one student wrote down what she felt); however, as the above examples show, students also expressed their feelings to other people. The following subsection on social sharing discusses this further. While it could be argued that venting to other people is social sharing, the above examples on venting were featured separately to emphasise the cathartic effect that students aimed for when they deployed the strategy. In contrast, social sharing is deployed to elicit from other

people beneficial "socio-affective responses" such as "social support, understanding and validation" (Nils & Rime, 2012, p. 679).

Social sharing. Students' narratives showed that social sharing figured in all groups of emotion work-engendering situations that were discussed in Chapter 7. The act of "communicat[ing] openly with one or more persons about the circumstances of the emotion-eliciting event and about [one's] own feelings and emotional reactions" is called social sharing of emotion (Rime, 2009, p. 65).

Of all the strategies, social sharing is unique because it requires the active participation of another individual. According to their narratives, students connected with three groups of people for social sharing: (1) group mates; (2) other peers—identified as classmates, best friends, roommates (in the school dormitory), and school friends (and a non-school friend, in one case); and (3) one or both parents (or, the immediate family, in one case).

Note that teachers (specifically, the research advisers) are not included in the aforementioned list. It was noted that students approached teachers primarily to seek help for problem-solving (see Section 8.6.2), and not to share about their emotion experiences. In these accounts, students talked to their teachers primarily about the problems and issues that needed to be addressed or solved. Evidence from three accounts showed that students shared about their emotion experiences, only if teachers directed the talk to these topics (e.g., see "heart-to-heart talk with adviser" within the subsection 'Teacher support' in Section 8.4.4).

There was a comparatively larger number of accounts of social sharing with group mates and peers than with parents. This might be indicative of the significance of perception of experiential or emotional similarity in eliciting social sharing of emotion. Several students assumed similarity with their peers based on the following:

- Shared experiences – e.g., undergoing questioning during proposal defence
- Shared circumstances - e.g., having the same problem teacher as their adviser
- Shared affinity– e.g., mutual dislike of a particular student

The perception of experiential or emotional similarity seemed to encourage students' spontaneous social sharing:

> Some of my friends experienced the same; they also dreamt of being in the [elite] stream, yet they went to the [non-elite] stream. And since we were in similar straits, we commiserated with each other. So as time passes, the pain disappeared. ($054)

> I really hate research. Since all our classmates know that we all hate research, I was able to pour out my feelings to them. ($038)

In contrast, a perception of lack of experiential or emotional similarity could inhibit social sharing. Uncertainty about sharing the same feelings with her group mates was how one student explained why social sharing was not part of their group dynamic for the better part of two years:

> It was our first time today to really talk about research. We hardly ever shared about our feelings about research. We didn't tell each other that we were already finding it difficult, that I couldn't anymore bear the weight, that I wanted to rest. […] Perhaps [not talking about it] was [our way of coping]. Because they might not feel the same, and if you shared with them, they would fret about it and it would become a burden to them. It could be that you were the only one who knew about [the problem], so telling them about it would just make their life harder. ($116)

The accounts of other students provided evidence that, although they engaged in social sharing, it did not happen spontaneously in some cases. According to one student, social sharing required some effort and intention:

> Because of the numerous issues I have with research, […] I'm losing confidence in myself; because I feel I'm incompetent […]. It's hard to open up about these things to my family because I'd be needing to explain everything from the start. But I tried and it was a good thing that they somehow understood. ($032)

Students' attempts at social sharing did not always obtain positive outcomes for emotion work. One student, who spent the holidays doing field and laboratory work, reported:

> I called my parents because I wanted to tell them that I want to go home; because, emotionally, I was down. But that time, my dad nagged me about my passport renewal, […] my younger sibling talked about her new dress, and my older sibling scolded me for being a spendthrift. I was annoyed; because when I talked to them, instead of clearing my mind, my problems multiplied. ($109)

Social sharing within the context of uneven participation by students could be problematic. Four students framed social sharing negatively as backbiting and backstabbing, when the subject of the talk was a group mate who was a loafer. Two of them, however, justified their engagement in social sharing as necessary for preventing further interpersonal conflict and for minimising the risk to academic outcomes:

> We [she and one of two group mates] are backbiting our other group mate just so we could vent. Because if we bottle up our emotions, we might have a shouting match [with the loafer] inside the classroom. ($038)

> I was really full of her [the loafer's] monstrous behaviour. Good thing I had my best friends, [to] whom I can vent out about the things that she did. They could relate to me because they had experienced the

same thing with her, but in other subjects. What we're doing may be called backstabbing but it's the most silent way to lessen the weight of my problem without risking my research grade. My best friends asked for my permission to talk some sense into her; but I said no, because I know that she would be offended and she wouldn't take it lightly. ($024)

The abovementioned cases of strategies provide evidence to the recurring theme of students failing to directly address uneven participation issues with group mates (especially with relationship-oriented strategies).

Emotional expression as channel for social support for emotion work. Students' venting and social sharing, in some cases, resulted in social support that facilitated the deployment of other emotion work strategies (indicated inside the parentheses below), as the following examples show:

- (*Distraction*) After one student lashed out and ranted to her parents about a delay that jeopardised her chances to join a competition, her parents took her out to see a show, so that she could cool down.
- (*Problem solving*) When a student broke down in her friend's presence about her fruitless search for a missing chemical, her friend brought her to a teacher [i.e., her friend's research adviser], who provided her the contact information of suppliers.
- (*Confrontation*) After a student told his mother about his problem with regards to insufficient support from his research adviser, her mother went with him to talk to his research adviser.

8.3.2 Students Suppressed Their Emotional Reactions

Students inhibited their emotional reactions. Students' deployment of this strategy seemed to be connected to certain social outcomes (English & John, 2013, have a similar idea). Furthermore, their use of suppression as emotion work strategy hinted at their awareness of: (1) inappropriate emotional display in social settings; (2) emotional reactions that maintained equilibrium in social interactions; and (3) the necessity of public display of emotion that was dissonant from their actual feelings.

Inappropriate emotional displays in social settings. Crying in front of an audience was the prevalent emotional display that students suppressed. Some students stopped themselves from crying in front of schoolmates, teachers, and staff members in a university laboratory, and during questioning associated with proposal defence and research grant application. Others kept themselves from displaying certain emotional reactions:

- screaming in the classroom after learning that their laboratory samples were ruined,
- walking out on an intimidating scientist during a consultation,
- venting in the presence of adviser and experts about their embarrassment and hopelessness at their incompetence to do field work, and
- physically collapsing while being questioned during proposal defence.

The fact that some students did cry, scream, and rant in private, and before parents, group mates, and friends, shows their perception of some rules for selecting audience and setting for such emotional displays. Furthermore, considering the aforementioned contexts, it could be said that one motivation for these students to suppress their emotions was to manage the impressions they made on significant others.

Emotional reactions that maintained equilibrium in social interactions. The majority of the accounts of suppression of emotional reactions were situated within two collaborative contexts. First, within the group work context, in situations involving uneven participation. The following list illustrates the nuances in students' acts of suppressing their emotional reactions:

- <u>Chose not to react</u> to her group mates' accusations that she was slacking off during laboratory work, although she was hurt;
- <u>Exerted effort at controlling her emotion</u> so that it would not boil over and would reach the point where she would say hurtful things to her group mate's face;
- <u>Stopped herself from verbalising her thoughts and feelings</u> about her group mate's faults; and,
- <u>Did not confront her group mate</u> regarding her uneven participation, although she harboured mean thoughts about how useless her group mate was.

Second, within the context of student-research adviser interactions, in situations involving unfulfilled teacher role expectations. Some students kept their thoughts and feelings regarding their teachers' failings (e.g., one student was dumbfounded at her teacher's unwitting display of lack of knowledge) to themselves. Others controlled their feelings while in the teacher's presence and stopped themselves from displaying negative behaviours (e.g., talking back during consultations out of frustration at the teacher's inability to provide helpful guidance). One student's account of her emotional reaction to her adviser's unavailability for consultation (see Section 7.8.1 for additional details) suggests that asymmetrical power

relations could be one reason why students deployed this passive strategy during interactions with their teachers:

> [I was] depressed plus angry. […] I wanted to throw plates but I'd get scolded […] I wanted to shout at him but you are a mere student. ($034)

Public display of emotion that was dissonant with actual feelings. An elaborated version of this strategy, suppression of emotional reactions, consists of students' display of behaviours and expressions that were a mismatch to their emotional responses, which, in effect, concealed their true emotions.

Some students' effort to manage others' impression of them involved emotion work in the form of an outward display that was incongruent with their actual feelings:

> In the [elite] stream, there is so much pressure because our pacing is fast. It is stressful because teachers seem to expect that we can do the work. Well, we can do the work, but sometimes our feelings towards that activity, […] we hate it. But even if we hate it, we show to the teachers that we are willing to do this […]; because maybe one of the criteria that they judge us on is our willingness to do research. We are really willing; it's just sometimes we are already so stressed and tired inside, but we still need to act as if we are willing to do it, maybe for the grade. ($055)

Within the context of group work, another student described her effort to minimise interpersonal conflicts with her group mate who used to be her friend. Her group mate criticised the quality of her contribution to the group outputs and wanted her to modify them based on the group mate's specifications:

> I just kept quiet. […] I'm good at hiding what I feel inside, even though I'm angry. […] I am good at acting when it comes to this; because this situation has been happening frequently. I keep quiet, even though deep inside I'm angry, and, outwardly, I pretend to be jolly so that the problem will not worsen. Because if I get angry and he gets angry, we might not be able to finish any work. I just put on a mask of jolliness. Even if deep inside I am really not that happy. ($055)

The following table features further illustrative examples of the various renderings of this strategy.

Table 8.3 Illustrative examples of dissonance between outward display of emotion and actual feelings.

Display	Real Emotional Response	Situation
Smiling, happy	Angry	Group mates' uneven participation
	Embarrassed, dismayed	Experts laughed at their faulty research design
	Extremely tense	Undergoing questioning during grant application interview
Joking, laughing	Worried	Assigning tasks to group mates who were loafers
	Hurt, bristling	Grandfather scolded her in front of her teacher and group mates
Laughed, offered well-wishes	Hurt	Group mate informed her close to the deadline that he would be unavailable to help because of extracurricular commitments

Motivations for suppressing emotions. Four reasons for students' deployment of this strategy could be gleaned from students' narratives. First, in problematic situations involving teachers, the students seemed to abide by the social norm that students must not display hostile behaviours against their teachers (see above excerpt from narrative $034 illustrating asymmetrical power relations).

Second, some students did not want to infect others with their negative emotions or be infected by others' negative emotions. This suggests that students were aware of how they could influence each other's emotions and emotional reactions, a phenomenon called emotional contagion (Barsade, 2002). For instance, a student who received a low grade because of insufficient progress in their project explained why she stopped herself from breaking down:

> [In the past], whenever I get a low grade, I usually have an emotional breakdown. […] [But] if I become emotional [now], my group mates might become disheartened with our project. They rely on me when we are doing our work; so [having an emotional breakdown] might cause us to stagnate. I'd rather provide some way for us to make some progress instead. ($075)

Another student shared his group mates' feelings after a failed field work session, but kept these to himself, while his two group mates ranted:

> I tried to be positive, so that there was at least someone who was positive in our group; although, deep inside, I was frustrated. ($043)

A third reason for suppressing emotions was identified from the accounts of some of the 'doers' in situations involving uneven participation in group work. These students suppressed their emotions in order to avoid hurting the feelings of group mates who also happened to be their friends, and to avoid interpersonal conflicts (e.g., a fight, a quarrel) that could negatively affect their working relationships, their projects, and their achievements (e.g., grades).

A fourth reason, on the other hand, was identified from the accounts of some of the 'loafers' in situations involving uneven participation in group work. Their accounts seemed to indicate that they recognised that their emotions were unreasonable or inappropriate, considering the situation. One student, for instance, did not express her annoyance at her group mates who left her alone for a time to do the laboratory work by herself while they watched a movie on their phones; she feared that her group mates would retort that she had also done the same to them. Another student, who resented doing laboratory work late at night on her birthday, held off from showing her feelings to her group mates, because she accepted that they really needed to work at that particular time.

8.3.3 Students Moderated Their Emotional Reactions

The accounts of some students who were in situations involving uneven participation alluded to their attempts to moderate their emotional reactions towards their group mates. Some doers reported about their attempts to keep calm and to be patient:

> My group mate was mostly the cause of most of my frustrations. I was a person who always passes my requirements on time while he was the type of person who likes to wing it. I had to text him every single night to remind him what to do. It wasn't helping with my stress from school work, and I get sick a lot when I get stressed. The one thing that helped me was how I learned to stay calm and be patient. ($008)

There was also some evidence that loafers attempted to change their emotional reactions towards the doers. One student, who was positioned by his group mates as a 'loafer' and was excluded from group activities, described what he did in order to change his mood (see excerpt from narrative $021 in Section 7.7.2 for additional details):

> I became moody and cold whenever research came up. […] I became grumpy not only to my group mates but also to my friends and my classmates. […] Well, this was during our third year; when we were in our fourth year, I started to understand their decisions and

> my shortcomings. I would just simply go with the flow to avoid triggering my 'grumpy' mode. This carefree mode of me was a better self as I felt more confidence whenever I talked to my group mates. ($021)

This section featured the expression-related strategies that students deployed. The next section explicates the second family of students' emotion work strategies.

8.4 Perception- and Attitude-Directed Strategies

This section discusses in greater detail emotion work strategies that involve students' attempts to: (1) transform their perception of the situation, (2) bolster themselves against negative emotion experiences, and (3) understand the situation.

8.4.1 Students' Attempts to Transform Their Perception of the Situation

Previous research has shown that adopting benign or positive interpretations of an emotion-eliciting situation can influence its emotional impact and reduce distress (Aldao et al., 2010; Wolgast, Lundh, & Viborg, 2011). In this study, students' transformation of their perception of the situation was accomplished in three ways.

One, they attached a different interpretation to the situation. Some students saw in their current experiences some value for the future. They considered their experiences of low grades, rigorous questioning, and competing school demands, preparation for similar (or worse) experiences when they go on to university and beyond. Within the context of group work, two students entertained benevolent thoughts towards loafers by considering alternative explanations to their group mates' uneven participation. As one student put it:

> I want to believe that she is also doing her best, that perhaps it is really difficult to find the information [that we need]. ($052)

Two, students pointed out the upside of the situations they encountered— with implications on the quality of their project, their achievements, the academic stressors they encountered, and their personal growth. The following table features representative examples.

Table 8.4 Emotion work-engendering situations and their upsides.

Situation	The Upside
Repeated data gathering after some data were lost due to the students' oversight	(*Quality of the project*) An opportunity to improve their performance in the lab and to address the flaws in their previous data gathering.
Uneven participation by group mates	(*Achievement*) By taking sole responsibility for tasks, the doer ensured that the group's outputs were of "high quality" and was saved from having to redo the loafers' inferior work.
Transferred to the non-elite stream after getting a substandard grade	(*Academic stressors*) There would be less pressure because, in the non-elite stream, there was more teacher supervision and lower expectation on students' ability to work independently.
Uneven participation by group mates	(*Personal growth*) Being with her group mates "taught [the doer] to be more patient".

Three, students <u>put their experiences into perspective</u> by: (a) considering them within the larger context of undergoing the process of science inquiry; (b) discounting the severity of the situation compared to others; and (c) by dismissing the seriousness of the situation (see Garnefski & Kraaij, 2006, for a similar idea). The following table provides examples.

Table 8.5 Examples of "putting into perspective".

> Entries (a), (b), and (c) in the first column corresponds with items (a), (b) and (c) in the above paragraph.

Situation	Student's Perspective
(a) "Grilled" by the defence panel and "bombarded" with questions they could not answer	"We really got disappointed until we realised that it is just normal. […] <u>It is natural that the panel will get deeper into our study and criticise its limitation.</u>" ($026)
(b) Uneven participation by group mates	"Still I'm grateful that they are my group mates. <u>The other group that I could have ended up with had it worse.</u>" ($017)
(c) The equipment they were set to bring for field work was broken.	"<u>I could look at it as bad luck but it's not</u>. Because something like that happens every time we gather data in the field; sometimes it's even worse. <u>They are just easy and small problems</u>, and there are lots of things that can be done to solve them." ($096)

8.4.2 Students' Attempts to Bolster Themselves Against Negative Emotion Experiences

Students attempted to bolster themselves against the negative emotional impact of situations by (a) anticipating the emotion-eliciting aspects of expected situations; (b) encouraging themselves; and (c) declaring their resolutions about the situations.

Anticipation of emotion-eliciting aspects of situations. Students prepared themselves for emotion-eliciting situations by—

- Anticipating worst-case scenarios, such as a "grilling" during questioning at the proposal defence;
- Expecting problems, such as difficulties due to their perceived lack of competence and conflicts with group mates; and
- Entertaining the possibility of negative outcomes or failure in performance and achievements contexts, such as proposal defence, grant application, and competitions.

One student explained her deployment of this strategy, in the context of applying for a grant, in the following excerpt. In the last part of the excerpt, she alluded to the potential of this strategy to minimise the emotional impact of failure. Note that her explanation contained references to her self-evaluation of underperformance, to her fatalistic beliefs, and to her self-protective motivation (see underlined phrases).

> I really don't expect too much [to get the grant], because I know I was somewhat lazy, especially during our data gathering[25]. It was a month after we submitted [the application letter] that the shortlist for the interview [i.e., the next stage of the selection process] was announced. Each applicant had a letter. I was expecting that I wouldn't get shortlisted, since I felt that the application letter I wrote was rubbish. […] When I got the [result] letter, I immediately opened it, because I was willing to accept whatever outcome it contained. Right now, I'm nervous about the grant [N.B. she was shortlisted for the interview] […]. I don't quite know what to do. But, for me, I just don't expect too much. I'll accept whatever the result might be. If it's meant to be for me, then it would really come to me. I don't expect too much because, sometimes, you could end up in tears. ($084)

Self-encouragement. Students described in their accounts the self-talk, thoughts, or beliefs that they told themselves, to bolster their flagging emotions or to spur themselves to positive behaviour or action. The contents of students' self-encouragement can be described as:

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[25] She actually did not participate in three of four field work sessions.

- *Future-oriented.* These communicated optimism, belief in second chances, and hope for positive outcomes.
- *Self-affirmatory.* These reflected their beliefs in their competence, their investments (of time, effort and resources), and their achievements.
- *Self-compassionate.* These depicted a self-attitude that was considerate of their limitations and failings.
- *Value-laden.* These were indicative of what the students regarded as important or significant.
- *Metaphysical.* These reflected students' beliefs in external agency that influences or determines the outcomes in situations they encountered.

The following table provides examples for the abovementioned variety of students' self-encouragement, with relevant passages in italics.

Table 8.6 Examples of students' self-encouragement.

Content	Context	Illustrative Excerpts
Future-oriented	After an oversight caused a delay in obtaining data from an external laboratory, without which they were unable to enter their project in some competitions	Because of one mistake, the delays accumulated, which depressed me. *But I tell myself* not to be defeated by sadness or depression, *that there's always a tomorrow, a chance to change.* I just regret that we missed those research competitions. *But we are still expecting more opportunities.* That's why we still give our best and hope to complete our data soon. ($086)
Self-affirmatory	While waiting for the proposal defence to start	Before the defence, while we were outside, we were telling ourselves, *"We can do this!"* I told [my group mates] that we should relax because we can get past this; there isn't any aspect of our research that we had not studied. We said "we can do this" to calm ourselves, so that our minds would be prepared for what's going to take place inside. ($065)
Self-compassionate	Questioning during consultation meetings with the adviser	I had always been afraid of consultation. I felt like [I was] being interrogated and it was the time when I somehow felt that I did not do the right thing. *It was [only] later [that] I overcame my fear and learned to accept that there is nothing wrong with being wrong.* ($066)
Value-laden	A doer recounting her pep talk to her group mates, whom she identified as loafers	Do you want to finish this project? Then let's do it. We were able to accomplish other things by working together, why can't we do that always? [...] If we work together, all of us would have a chance to do better. *I'm sure of one thing, working as a group achieves higher goals than working alone.* ($044)
Metaphysical	Failing to win the grant	The feeling of disappointment and frustration is what I felt after the release of the [names of the] grant awardees. The feeling of jealousy that you don't belong

Content	Context	Illustrative Excerpts
		with them? […] It was a great failure for me. I don't know what to feel. To be happy for others or not. To overcome this, I just thought of the good things that happened during this time. *Maybe that award or grant is not for me.* Plus I had not done very well during that time that's why I don't deserve it. *Plus the fact that people couldn't have everything. Maybe it was the thing that I was meant to give up.* Maybe there is something that awaits me. ($143)

Resolutions. Students' statements of intentions could be considered their way of regaining a sense of control over emotion-eliciting situations. These resolutions reflect their decisions with respect to:

- *their work ethic* – e.g., "to do better", "to work harder", "to do my best"
- *their attitude* – e.g., "to never give up", "not to repeat mistakes", "try to love research", "to learn to live with [the teacher's unhelpful guidance]"
- *their achievement goals* – e.g., "to complete project", "to regain lost grades", "to finish data gathering"

These are examples of students' resolutions in various situations:

(Failed proposal defence because of flawed research design leading to a change in problem) We said to ourselves that it is just a challenge to us and we will do our best next time to defend our concept and we will also do more reading that will make us know our concept very well. ($083)

(Underperformance due to lack of motivation to work) I realised that, oh no, I have not really done my part. So, the only thing I can do is work harder and be a hundred times more motivated, have a much better attitude compared to before. […] I will do my best with the help of my two group mates to do well in research, so that we can finish the project. ($062)

(Group mates contributed very little to group work) I know that they know between themselves that they had contributed little. But still, they are my group mate and I have to work with them no matter what. I don't want to be like that senior who finished research alone even though she had other group mates. I can't give up on them and so I work on motivating them. […] Also, if there will be the last person to give up on them, it will be me. ($039)

8.4.3 Students' Attempts to Understand the Situation

Students' accounts of their attempts at understanding emotion-eliciting situations provided insights into the process and results of the self-reflection that they were undertaking. It has been suggested that "[g]aining understanding of a distressing event may reduce its negative impact by

promoting habituation, prompting efforts to manage demands associated with the event, or increasing a sense of mastery" (Tsai & Lau, 2013, p. 418).

It might be argued that the act of story-telling that students performed for this study was a form of self-reflection. Students' narratives, however, provided enough clues to show that the self-reflection that students recounted in relation to the emotion work that they performed took place outside the story-telling for this study (for an example, see the next illustrative excerpt below).

Self-reflection. Students' attempts at finding insights generally involved:

- finding the merits of undesirable situations,
- understanding their and others' culpability in the situation,
- exploring the motivations for certain actions or behaviours,
- understanding the cause underlying a situation, and
- reflecting on the (possible or actual) consequences of a situation.

For one student, self-reflection allowed her to psychologically leave behind the emotion-eliciting situation ("move on"). The student's (and her research partner's) oversight delayed the processing of their samples in an external laboratory; the delay resulted in reduction in their quarterly grades and missed opportunities to join competitions:

> Initially, I was saddened. Then, I sat down and thought over why it happened, what did I do wrong. I was sad and frustrated because we did not intend for it to happen. Perhaps, it was meant to happen. […] But that delay would not have been for long had we followed up the transaction diligently, so we shared the blame, too. I just needed to understand it, so that I could move on and my feelings would not worsen. ($086)

Another student explained that the cognitive act of self-reflection prevented her from dwelling on her feelings and allowed her to shift her focus from her emotional response to the act of thinking—in effect, making self-reflection a cognitive distraction strategy.

One student's account illustrated how self-reflection led to problem solving. The following excerpt is unique, because it is the only account of a doer who took the initiative to directly address a relationship issue with her group mates (i.e., the loafers):

> I attended a […] leadership training camp and came to the realization that I wasn't a good leader then. So, those who follow [me] wouldn't be good also. But if I were to change that and become a truly good leader, then I could solve both the research work problem and the relationships problem. I started by saying "I'm sorry" on our Facebook page and saying how a bad leader I am and promising to learn from the past and be an awesome leader. My two group mates read it and they just didn't comment, they each wrote a whole speech. So, I really

was inspired; all of us were inspired and we all tried doing our research work together again. ($023)

Some of the students' attempts to gain insights into the emotion-eliciting situations that they encountered took the form of repetitive thoughts about the distressing aspects of the situation (i.e., rumination). Although this cognitive act is emotion work that can intensify one's negative emotion experiences, for some students, fixating on the distressing aspects of a situation led to productive acts that modified the emotion-eliciting situations. Below is one's student description of the aftermath of a negative teacher evaluation of lack of progress, which included an account of help-seeking (underlined) that followed her rumination:

> Its effect on me was this: I was anxious again because my partner and I still had a lot to do. […] My subconscious was telling me that we must accomplish something and finish data gathering. […] I was so anxious that I could not concentrate on my physics quiz. Even in the middle of taking the quiz, I was still thinking about our dratted research [work] that needed to be finished. […] <u>After our class, I and my research partner went to see our adviser to talk about the tasks that we should accomplish that week. I told myself that it's okay now, because we at least had a plan, and I already had an idea about the status of our project.</u> ($051)

In many cases, students' self-reflections led to either acceptance of the situation, or attribution of agency (discussed below).

Acceptance. Acceptance, as a way of managing emotion, has been associated with psychological well-being (Wolgast et. al., 2011). Students' acceptance of the situation appears to be predicated on their beliefs: (1) that there was nothing that they could do in the situation (i.e., resignation); (2) that the situation would sort itself out (i.e., passivity); and, (3) that the situation was necessary, right, reasonable, or acceptable (i.e., rationalisation). Students deployed this strategy in various situations.

Some students were resigned that there was nothing they could do to change their teachers' actions (e.g., decision with respect to streaming, problematic behaviour), their past academic performance and outcomes (e.g., lack of effort, low grades), and their group mates' decision to slack off in group work. They also considered some constraints insurmountable (e.g., their lack of time, competence, and access to resources), some competing school demands inescapable, and some failures inevitable (e.g., failing to win a grant was "God's will").

For one student, however, resignation did not mean total passivity towards the situation. The student referred to "damage control" as her attempt at containing the impact of perceived underperformance by a group mate, and

limiting the negative effects of this group mate's performance on the group's achievement. Below is the student's account of her reaction when her group mate performed badly under questioning at their proposal defence, because of the group mate's tendency to give long-winded and tortuous answers:

> We can't intervene [while the questioning was going on]. That's the way he is, I can't do anything about it. I will just do damage control on my part, but I cannot undo the damage he caused. I stopped myself from saying anything to [my group mates]. After a while your anger fades, because slowly, you come to accept that that's the way [he is]. So if he has failings, I just do my part and do my best to contain the damage that he might have caused to our project or our grades. ($114)

The only two cases of passivity were in the context of students' uneven participation in group work. Two doers chose not to do something about their group mates' lack of participation and about the relationship conflict within the group, in the hope that the situation would sort itself out.

Some students accepted that the situation was necessary, right, reasonable, or acceptable. For example, students accepted that teachers' assessment of their underperformance, teachers' decision to transfer them to the non-elite stream, and experts' assessment of flaws in their research design were right. Two loafers conceded that the doers' negative reactions to their (i.e., the loafers') failings were reasonable. A doer, on the other hand, was considerate about her group mates' (i.e., the loafers') decision to prioritise a co-curricular activity over their project. Another student made explicit the connection between her acceptance of the necessity of tedious laboratory work and her emotion work in the following excerpt:

> We needed to finish doing it; because I think that if we didn't do that, we wouldn't be able to finish the project. That's what I kept in mind so that my feelings will lighten, because the work was extremely boring. ($071)

Attribution of agency. Students attributed setbacks, failures, and other problematic aspects of emotion-eliciting situations to themselves ("self-agency"), to other people ("other-agency"), and to external causes ("circumstance-agency")[26]. Attributions of agency have been found to "influence people's appraisals of their ability to deal with negative events and their consequences" (Ellsworth & Scherer, 2003, cited in Leary & Gohar, 2014, p. 383).

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[26] Terms within parentheses in quotation marks were adopted from Leary and Gohar (2014).

Students' "other- agency" attributions were focused on group mates and advisers. Some students blamed their group mates' uneven participation and the resulting relationship conflicts for various instances of underperformance (e.g., failed proposal defence, lack of progress). Some students attributed to their adviser's lack of support their failures during the proposal defence; while another student blamed her adviser's faulty guidance for the flaw in the research design that was identified by a scientist-judge in a competition.

In students' accounts that featured "circumstance-agency" attributions, external causes, such as the weather and resource constraints, were implicated in delays and setbacks. Competing school demands were blamed for some students' inability to meet deadlines. Some students identified the assessment criteria as a contributory factor in their low grades in the science research subject.

It is noteworthy, though, that when put together, other-agency and circumstance-agency attributions were far fewer than the number of instances of self-agency attributions found in students' narratives. Nevertheless, locating the source of failures and setbacks outside of themselves enabled some students to reduce the negative emotional impact of these situations.

The majority of students' attributions were self-agency attributions, which might be an indication of students' strong sense of ownership of their project. Evidence that students accepted blame (or partial blame) could be found in their accounts of emotion work across the various emotion work-engendering situations. Although self-agency attribution is associated with guilt, which is a negative emotion (Leary & Gohar, 2014), evidence from some students' narratives indicates that self-agency attributions were deployed by students in their attempts to lessen the negative emotional impact of their failings:

> *(She and her group mates worked in a university laboratory without consent, which earned them a reprimand from their adviser)* I realised that we were really at fault, we did not inform our adviser. […] I accepted the responsibility for that mistake, so that I would feel better. ($087)

Students' self-agency attributions can be described as related to: (1) trait, (2) performance, (3) competence, and (4) attitude. The table below provides illustrative cases for these.

Table 8.7 Examples of students' self-agency attributions.
Relevant passages are in italics.

Aspect	Situation	Illustrative excerpt
Trait	Decided not to apply for a grant, although she aspired for it once	I can't manage the added pressure [that comes with the grant]. *I don't like pressure.* ($053)
Performance	Low grade, which contradicted her self-expectation	Our quarterly grades were given out this week. My grade in research was 2.0. I never had that grade before, so I said, "Oh, my God!" *I know that we are partly to blame because we were not able to do data gathering,* which was the minimum requirement for the second quarter. ($075)
Competence	Competing school demands associated with participation in extracurricular activities	*It is so hard for me to manage myself. My self-management skill is too low;* that is why it is very challenging for me to manage my time, my effort, and all the things around me. ($048)
Attitude	Lack of progress	Sometimes *the fault is with us because we are not very responsible in doing our project and we do not love research wholeheartedly.* […] Sometimes we dawdle […] and right now my life is *not 100 percent focused on research and I am sometimes irresponsible,* that's why the pace of our project slows down even more. ($041)

8.4.4 Social Support in Perception- And Attitude-Directed Strategies

Some students employed teacher support, peer-oriented support, and parental support to shape their perceptions and attitudes.

Teacher support. The teacher support that the students appropriated and used to shape their perceptions and attitudes was in three modes: (1) teachers' explicit messages during talks with students; (2) messages that were contained in materials provided by teachers (e.g., letters, posters); and (3) teachers' actions that students interpreted in accordance with their own particular need. Examples of these could be found in the following discussion.

<u>Achievement-themed messages</u> from teachers provided some students with alternative viewpoints that helped in their emotion work:

> *(After failing to win in a competition, where one scientist-judge made them feel that they could have done a better project)* We kept in mind what out advisers told us—that it is okay not to win as long as you shared the knowledge you acquired [while doing the inquiry project]; that we should be happy, enjoy the event and make new friends.

> Because of that, we did not worry anymore that our project was worthless, since we knew that we did our best and shared what we know and it was fun. ($105)

> *(When they had to conceptualise a new investigation, after their previous one failed the proposal defence)* I kind of realised our situation, that we could end up not finishing our research. […] It was around this time when [our adviser] told us that […] the study that we can come up with [is secondary]; what is more important is to develop us into future researchers. I think this helped us. Somehow, it decreased the pressure. ($093)

Students also used as resource for emotion work the consolation that teachers offered when they experienced difficult situations. One student drew comfort from a letter that teachers sent to students who failed to qualify for a research grant:

> In the letter it says that if you failed to get the grant, it doesn't mean that you are not a competent researcher. So I was relieved by the thought that there are many other opportunities, aside from the grant, that can affirm that we did our best. ($077)

In another case, it seemed that the teacher's attitude, more than his words of consolation, made a stronger impression on one student, when he and his group mates dealt with feelings of inadequacy after a failed field work session due to their lack of diving skills (see excerpt from narrative $090 in Section 7.6.1 for additional details):

> Our adviser did not mind our negative thoughts. He appeared to be positive still. He explained to us that setbacks are a part of doing our research; because we are first-timers in field work. So it's nothing; it's just part of the process. After the field work, he talked to us and told us that these are things that would usually happen in the field and what we were feeling were usual feelings. I was able to overcome the negative thoughts; because it seemed to me that he was telling us that we can do it, that what we experienced was just a little problem. So after that talk, I realised that we could do it. Since what happened in the field was not a big deal to him, I was also okay. ($043, $090)

Some students needed direct and explicit teacher intervention to aid in self-reflection and self-encouragement. For instance, a "heart-to-heart talk" with their adviser helped one student and her group mates to understand "what [they] were feeling and why [they] were behaving that way" (i.e., lack of motivation to work on their project, which was the reason for their lack of progress). Their adviser also "pointed out what [they] were doing wrong and what [they] needed to change". Another student's account showed that teachers' direct inquiry can help foreground obscured issues and initiate group reflection. When a group of students were asked by their adviser why they had failed to find crucial information for such a long time, it led to an admission about the problem of uneven participation within the group, and

the realisation that they needed to take the initiative and should not wait to be told to work on their project (for additional details on this, see excerpt from narrative $027 in Section 8.6.2 within the subsection 'Support from advisers').

Some students used what seemed to be unwitting teacher support. For example, the posters with "words of wisdom" in her adviser's office helped to "enlighten" one student as she strived to overcome her lack of motivation. Another student, who texted her adviser an update about the status of their field work in inclement weather, found in her adviser's concerned response the "courage to continue even though it's hard".

Peer-oriented support. Students' accounts of employing peer-oriented support to influence their perception and attitude alluded to emotional contagion, experiential and emotional similarity, and social comparison. These are illustrated in the following excerpts:

- Emotional contagion

  (The search for a missing chemical) I started to believe that we will find it, because my two group mates were optimistic, and their optimism was infectious, which made it easier [for me to be optimistic, too]. ($074)

- Experiential and emotional similarity

  (Questioning during proposal defence) What probably lessened my nervousness and prevented me from wetting myself in front of the panel was the fact that there were three of us being grilled, I was not alone. If my group mates were not there, I think I would have passed out from nerves. ($042)

- Social comparison

  (Failed to win a grant but qualified to join two national competitions) I told myself that joining the two competitions is also a great privilege, so it evened things out. They are a great privilege because ours is the only project that qualified for the competitions; whereas, you would be just one of many research grantees. So our group is the only one who gets to have the title of qualifying into prestigious competitions. It's a nice feeling, because it relieves my sadness from the grant. ($077)

Parental support. Three accounts showed that students solicited parental support to bolster their motivation and emotions. After her quarterly grade in research decreased, one student set for herself the goals of finishing their project and joining national and international competitions. "To make this ambition possible, […] [she asked her] mother […] to support [her], pressure

[her], and push [her] to move on". Another student, after receiving a negative evaluation from a competition judge, "talked to [her] parents because [she] was so sad, and [she] wanted to gain from them some words of wisdom and positive outlook in life". A student's account of the encouragement she received from her mother, after undergoing a series of setbacks, was remarkable because of the added element of her mother's reference to experiential and emotional similarity (see vignette in Section 7.9 for additional background information regarding this student's experiences):

> When I felt really frustrated and lost, I asked for help from my mother who is also a researcher. […] [S]he told me that research is like this— it brings a lot of burdens—and I should learn to handle them and to persevere, because they will be resolved in the end. Then, research is rewarding. […] She said that she understood that setbacks could happen, that things could be difficult; because she had also experienced times when she found doing research difficult. ($072)

8.5 Disengagement-Focused Strategies

Students used various means in order to avoid, withdraw, escape or distance themselves from emotion work-engendering situations, or from their emotion experiences in these situations.

Many students were quite adept in using distraction techniques. Some students distracted themselves during tedious laboratory work by engaging in relatively more pleasant activities (e.g., watching movies). Others intentionally tried to forget or to avoid thinking about setbacks, failures, and other issues (related to their project, group mates, and advisers), and their unpleasant feelings in these situations: by sleeping them off, by surrounding themselves with people who could positively influence their emotions[27], or by thinking of more pleasant things.

One striking strategy that some students deployed was the performance of school work in other subjects as a distraction from feelings and thoughts related to the undertaking of their science inquiry projects. Students did school work on other subjects to alleviate boredom during tedious laboratory work, and to forget for a while a persistent setback or the anxiety-inducing proposal defence. This could be an indication that some students found the undertaking of science inquiry projects relatively more demanding than school work in other subjects.

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[27] Another reference to emotional contagion.

8.5.1 Disengagement-Focused Strategies That Could Potentially be Misunderstood in the School Setting

One key insight related to students' use of disengagement strategies is this: outwardly, students' actions and behaviours could potentially be (mis)interpreted as merely problematic actions and behaviours in school, rather than as attempts to deal with their emotions and the situations that engendered these emotions. The table below provides a summary of cases.

Table 8.8 Cases wherein the students' use of disengagement strategies for emotion work might be misinterpreted as problematic actions or behaviours in the school setting.

Student's Overt Action or Behaviour	Students' Specific Use of Disengagement Strategies for Emotion Work
Independent decision to change projects (i.e., a decision that was not teacher-initiated)	• Changing to a simple project as a way of escaping from a problematic project and dealing with feelings related to low self-esteem because during proposal defence, the student and his group mates "were bombarded by questions that [they were] barely able to keep up". • Changing to a simple project as a way of dealing with difficulties in finding specialist scientific information for a sophisticated project. • Changing to a new project, after a flaw in the original project that was discovered during proposal defence made them lose confidence in the merit of the project.
Exerted effort to avoid running into teachers, asked to be excused from supervision meetings, or did not attend supervision meetings	Avoided interaction with teachers as a way of – • Dealing with the frustration and annoyance they experienced with problematic teacher behaviours and teacher's inability to provide helpful guidance. • Dealing with the guilt of failing to accomplish a project-related task that the teacher asked them to do.
Passed up opportunities for achievements (i.e., competitions, grants)	• To avoid stress-related emotions due to the pressure of the extra effort required in preparation and of trying to meet deadlines, the students chose not to participate. • To avoid the "risk of more traumatic experiences" after a negative evaluation from a competition judge during the preliminary stage, the students pulled out of the competition.

Student's Overt Action or Behaviour	Students' Specific Use of Disengagement Strategies for Emotion Work
Not working on the research project for a significant amount of time	• A group consensus in order to give themselves time to recover from the emotional impact of a gruelling proposal defence. • Procrastinated with respect to the performance of a repetitive inquiry activity and in response to a sense of inadequacy during problem conceptualisation. • Shifted focus to doing school work in other subjects as a way of dealing with the pressures of competing school demands, or as a distraction from a setback in the research project. • Prioritised (easy and fun) extracurricular activities over the research project as a way of getting relief from the pressures of competing school demands. • Purposely did not do research work; since investment of effort was equated with emotional investment in the project. This was a way to minimise the emotional impact of anticipated failures. • Avoided research work for a time, since she was discouraged when she realised that she was the only one working in the group; this was also a way to compel her two group mates (whom she positioned as loafers) to do the work.
Uneven participation in group work	• Avoided answering "hard questions" and passed on the responsibility of responding to a group mate as a way of dealing with her panicky feelings due to her lack of knowledge during proposal defence. • Kept finding excuses not to participate in group work, and ignored group mates' entreaties to participate in the group work, as a way of dealing with being demoralised after a long period of stagnating in the preliminary stages of data gathering. • Passed on to his group mates work related to conceptualising a new research problem, a task which was aversive to him (because he did not want to start anew) but unavoidable, after the government banned the use of a chemical that they wanted to study.
Strained interpersonal relationships within the group	• Strived to be mentally absent during group interactions in order to control her negative emotions towards the loafer. • Confined interactions to research-related matters (i.e., withdrew from friendly interactions)—as a way for the doer to deal with anger towards the loafers, as a way for the loafer to minimise the possibility of being subjected to more hurtful words from doers, and as a way of avoiding an altercation because the two factions in the group accused each other of failings. • Withdrew from <u>any</u> interaction with loafers, in order to deal with her disappointment due to the loafers' failure to do assigned tasks[28], to give herself time to get over her anger over her group mates' uncooperativeness, and to "avoid quarrels" and prevent

[28] One student sought to mitigate her guilt at snubbing the loafer by interacting with her some of the time, in the interest of salvaging their friendship. In these instances, she confined her interactions with the loafer, who was her best friend, to "fun and happy" things, and avoided talking about their science inquiry project.

Student's Overt Action or Behaviour	Students' Specific Use of Disengagement Strategies for Emotion Work
	"the bad feelings [they] had for each other [from] affect[ing] the research that [they] were doing".
	• Disregarded group mate during group discussions as a passive way of retaliating for her group mate's lack of participation in the group work.
	• Withdrew from group discussions about their project in order to avoid starting a quarrel with the loafers.

The cases presented in the above table underscore the need to unpack the indicators of students' disengagement in school in order to accommodate the possibility that they are actually students' deployment of emotion work strategies.

8.5.2 Instrumental Deployment of Disengagement-Focused Strategies

Some students physically, cognitively, or emotionally withdrew from certain situations to achieve particular aims (in addition to managing their emotions).

Evidence from the narratives shows that some students deployed disengagement-focused strategies to manage their cognitive resources and to facilitate the deployment of other emotion work strategies. One student avoided thinking about her anger towards her group mate, whose negligence caused a setback, in order to avoid mental stress and to think of more important things. Another student set aside her emotional response to a delay caused by a resource constraint so that she could focus on solving the problem caused by the constraint. In another case, after failing to win a research grant, one student detached herself from her feelings because, according to her, allowing herself to feel would "tempt [her] to be inert and stop [her] from proceeding to the next steps". Emotional detachment enabled her to cope with the "extreme disappointment" that she felt, to reflect on her culpability in the failure (i.e., reflection), and to figure out what she should do next (i.e., strategising).

The instrumental use of disengagement strategies was not without its hazards, though. For instance, one student avoided further interactions with her adviser, whom she implicated for lack of support, after a particularly frustrating encounter during one consultation meeting. In a strategic move, in order to get the optimum results from these student-teacher interactions, she and her two group mates decided to delegate the task of consulting with their adviser to the group member who was deemed to be the teacher's

favourite. This plan backfired, however, when the student and her other group mate received a summons, after the teacher assessed them as underperforming and mistakenly attributed the group output solely to the group liaison (who was, allegedly, contributing less than the other two members to the group work).

8.6 Situation-Directed Strategies

Strategies that are aimed at changing a situation (that engendered emotion work) and managing its consequences do not directly influence emotions; they, however, have "beneficial effects on emotions by modifying or eliminating" the elements in the situation that triggered the emotion experience (Aldao et al., 2010, p. 218). Four kinds of situation-directed strategies were identified in students' narratives (elaborated in Section 8.6.1). In addition, students' accounts featured numerous mentions of the social support they solicited or received within the context of their use of these strategies (discussed in Section 8.6.2).

8.6.1 Four Kinds of Situation-Directed Strategies

Situation-directed strategies were double-edged. They helped students address practical problems or issues related to their science inquiry projects; at the same time, they engendered changes in the emotion-eliciting situations that students encountered—which might explain why there were many references to these strategies in students' narratives. By strategising or problem solving, students regained a sense of control over the situation, as well as benefitted from the emotion-moderating effects of a changed problematic situation. The situation-directed emotion work strategies that students deployed were directed towards four kinds of issues related to their (a) science inquiry projects, (b) sense of self, (c) peers, and (d) teachers.

Science inquiry project-directed strategies. Students experienced the emotional benefits that resulted from solving (or preventing the (re)occurrence of) practical problems related to their projects. One student reported that, after her group missed an important deadline, she and her group mates established a shared online calendar and a social media group for reminding each other of tasks that they needed to complete at a particular time. These time management tools helped them in their attempts to avoid the panic and stress of working at the last minute and/or missing deadlines.

The irony of problem solving strategies, however, is that, because they influenced students' emotion experiences indirectly, these strategies placed additional demands on students. That is, students were working to solve problems while dealing with negative emotion experiences at the same time. One student performed painstaking troubleshooting to determine why she and her group mates were getting anomalous data during two runs of a laboratory test, a situation she described as "heartbreaking". It was only after she achieved success in the troubleshooting that she was able to reap the emotional benefit of solving a problem:

> The readings that we had been getting were very random. There was not a pattern that you could get from them. [...] We continued until the third-hour interval, hoping that maybe things would turn out okay and that the data would finally make sense. Unfortunately, they never did. So I started to worry. I started reviewing our methods in my mind. I could not think of a reason for this because I was pretty sure that we followed every procedure. It had to be in the spectrophotometer part. We stopped testing our samples. We tried filling every cuvette with [a buffer solution]. We tested them one by one; they had different readings when they should have the same, because they were practically the same. It was [then that] [...] we finally [figured] out that the one causing the randomness of the reading was the cuvette. The cuvettes were not clear and they varied from one another. Some even had scratches. We approached [the laboratory technician] and she suggested that we use the glass instead of the plastic ones. We tested the glass cuvettes and they gave us the same reading. I had momentarily sunk to the bottom of the earth. That's how I felt when our readings, hour after hour, went from a positive value, to a negative and positive again. It was very heartbreaking. However, after learning that it was only the cuvette, my spirit was significantly raised up. ($118)

Strategies related to students' sense of self. Students implemented strategies aimed at changing a situation in order to maintain or enhance their sense of self. For example, one student was demotivated after failing to qualify for the elite stream and his grade in research suffered a steady decline. In view of this, his increased effort in order to improve his grade could be considered an act of self-affirmation:

> When classes started again, I did the best I could to have near-perfect, if not perfect scores. Whenever I receive perfect or near-perfect scores, the painful feeling goes away. So I resolved to keep on doing this until I regain the grade that I lost. ($088)

Some students used problem solving strategies to overcome the sense of inadequacy that adversely affected their engagement in project-related activities. One group of students used multiple solutions to the problem of their lack of diving skills, which resulted in an unsatisfactory first field work session at a marine reserve (see excerpt from narrative $090 in Section

7.6.1 for additional details). They lined up three problem solving strategies in order to "gain confidence to return to the field". Two solutions were aimed at avoiding the need to dive: One, they used tidal height information to schedule their subsequent field work to start at low tide, and, two, they searched scientific literature for an alternative method to obtain the underwater data that they required. For the third solution, they took private swimming lessons and practiced their diving skills, in case the two aforementioned solutions would be insufficient and they needed to dive again.

Peer-directed strategies. In situations involving uneven participation in group work, the doers' most common default solution was to compensate for loafers' deficient participation—by doing all of the work or most of the work, or by working alone at certain tasks. According to some doers, they did this to avoid interpersonal conflicts in the group and the consequent risks to the completion of their projects and other achievement goals (e.g., grades):

> I did the work that I can do. I was very careful not to offend either of them or risk our research [project]. ($008)

Another student who never reported about uneven participation, inadvertently positioned himself as doer in the following excerpt. He seemed to imply that his proactive strategy of taking on the "major jobs" (in the group work) seemed to avert the negative impact of uneven participation, which he alluded to with his reference to his group mates' unsatisfactory outputs [Note that the student also deployed other emotion work strategies, namely, suppression (i.e., "I don't say it out loud") and reappraisal (i.e., "I also believe that…").]:

> I actually question myself sometimes if it is selfish of me, or if it's an indication of my lack of trust in my group mates, that's why I'm taking the major jobs. […] But there is something in me that is sometimes not satisfied with the results [of their work], and I wanted to redo them. […] I don't say it out loud; but I think at the back of my mind, I don't fully trust them, that's why I take on the major work. But I also believe that, in our group, we each has our own unique contribution. [One group mate] is good at providing [logistical support] while [another] is good at liaising during transactions. I feel that writing a research paper is what I'm good at, so that's why I take that job. ($104)

Some self-identified loafers tried to mitigate the emotional impact of their uneven participation by apologising to the doers. One loafer apologised to the doers and made a resolution to increase her effort. She considered her actions as expiatory moves to make up for her failings. These were aimed at restoring her working relationship with her group mates. The account of one doer, however, called into question the efficacy of this strategy. The

excerpt below shows that without tangible contributions from loafers, their apologies might not be able to reverse the impact of uneven participation on interpersonal relationships:

> What sucks the most was that they knew that they were not of much help, but they didn't do anything about it. They kept on saying sorry. What shall I do with that sorry? Sorry doesn't make the grades. Sorry doesn't get the work done. ($017)

It could be argued, then, that for the students who considered themselves doers, the (default) task-focused problem solving strategy could also be an avoidance strategy, aimed at minimising the emotional impact of interpersonal conflicts and threats to academic achievement. This might explain why most of students' problem solving strategies for uneven participation might be termed as stratagems; because they were indirect approaches to address the participation-related problems of uneven participation while evading the relationship issues.

A comprehensive list of specific (situation-directed) strategies is provided in the table below to show that students adopted various aims and strategies in dealing with the problem of uneven participation, with mixed results (noted in the examples if the information was available in students' accounts). In some cases, the strategies were in diametrical contrast to each other (e.g., see first pair of strategies in the first and second rows, in italics).

Table 8.9 Situation-directed strategies that were deployed by students in situations involving uneven participation in group work.

Aims	Specific Strategies
Forestalling potential problems	• *Choosing to use her (doer's) research idea for the project, to lessen the burden because the student knew she would be the de facto leader of the group*
	• *Choosing to use the loafer's idea for the project, in the hope that the loafer would be more engaged in the project (unsuccessful)*
	• Selecting group mates based on academic performance and perceived work ethic, in the hope that her burden would be lessened (unsuccessful)
	• Selecting group mates based on their perceived work ethic, predicted impact on the group dynamic, and the match between their research interests (very successful)
	• Adjusting achievement aspirations (i.e., completing the project instead of participating in competitions), so as not to subject themselves to more pressure, which could exacerbate the existing interpersonal conflicts within the group.

Aims	Specific Strategies
Managing loafers' contribution	• *Deliberately asked loafers to take their turns, or assigned each member of the group to be responsible for a certain aspect of the project, to even out the work and knowledge distribution, and to develop in each one "a sense of responsibility"* • *Tried to do tasks "as a group" instead of dividing the tasks among them (on the adviser's suggestion), to deal with the issue of each of them thinking that the others had done unsatisfactory work (unsuccessful)* • Asked the loafers to specify the tasks that they wanted to do • Assigned the less cognitively demanding tasks to loafers • Sending a text message to the loafer "every night to remind him what to do"
Motivating loafers' to contribute to the work	• Offered to change the project to something that the loafers would be interested in, after she perceived that the loafers "had lost interest" in their project (the loafers declined) • Gave a "good [peer] rating" to the loafer, in the hope that he would realise that the doers "cared for him" and he would "do his best" to deserve the rating (unsuccessful)

Teacher-directed strategies. Students never confronted head-on teacher-related problems with regards to problematic behaviour, lack of knowledge, and faulty guidance. Instead, students implemented solutions that either left the teacher out (e.g., finding their own expert-consultants), or employed workarounds (e.g., sending a group mate who was the teacher favourite as liaison). One student took over the adviser's responsibility and convened a proposal defence panel on her own, after her adviser's failure to do so resulted in a previously scheduled proposal defence to be cancelled just before it was about to start. This student's independent move was aimed to avert the possibility and her anticipation anxiety that the teacher might fail them again. Another student, along with her group mates, used a workaround to deal with their adviser's lack of knowledge and the consequent fear that their adviser might give them the wrong advice: they tried beforehand to understand as best as they could the scientific information that they wanted to discuss with their adviser, and then simplified it when they shared it with their adviser during consultation meetings (see excerpt from narrative $064 in Section 7.8.2 for additional details). Other strategies directed at teacher-related issues are described in the following subsection.

8.6.2 Social Support in Performing Situation-Directed Strategies

In addition to accounts of students trying to solve problems on their own, their narratives also provided insights into students' help-seeking behaviours, in relation to their attempts to change an emotion work-

engendering situation and its consequences. Students used the support offered by others as part of their emotion work. Students sought and appropriated social support from four groups of people: (1) their advisers, (2) parents and family members, (3) experts, and, (4) peers.

Support from advisers. The most commonly mentioned help that students sought from their adviser was guidance and advice for dealings with project constraints, setbacks, and threats to aspirations. Some advisers also provided students with referral to experts with specialist information and with hands-on support during field work.

The value for emotion work of help-seeking from advisers depended on how definitive the students perceived the advisers' help, guidance, and advice to be. One student (and her research partner) sought help from their adviser after a competition judge gave a negative evaluation of their project (see excerpt from narrative $098 in Section 7.6.1 under 'Underperformance' for more details):

> The tension was great, […] we felt that our work was really wrong. […] We asked our adviser [if we needed to change our project] but she said that we should just pursue what we had already started, that it was the comment of just one judge, it's not a comment of all [the judges]. <u>What she said was inspirational and it relaxed our minds</u>. ($098)

However, some students reported mixed results from their help-seeking from their advisers. When the advisers lacked knowledge or gave questionable guidance, students' help-seeking engendered further emotion work instead of emotional benefits. One student, for instance, struggled with feelings of uncertainty about her teacher's contribution to knowledge building:

> One time, our adviser happened to chance upon me and talked to me about our research. He asked a question, which I answered. Then during our consultation meeting, he referred to our conversation, and I realised that he misunderstood what I told him. So from then on, I hesitated to talk to him. But if I really didn't know and we really needed the information, we consulted our adviser, who then asked other research teachers. So, that is one of our adviser's forte—if he does not know, he admits it or he suggests that we ask other research teachers. Or he himself asks them and he relays the information to us. Or if we don't understand a certain part of our research, he conducts his own information search and he discusses what he learns with us. […] In a way, what he does helps. But sometimes, when he tells us about the information that he gathered from his search or from other teachers, we are fearful that he might have misunderstood some things. ($064)

Another student (who avoided further interaction with her adviser) explained in the following excerpt the unsuccessful help-seeking that preceded the

deployment of an avoidance strategy (i.e., the use of a group liaison that was reported in Section 8.5.2). The excerpt below tells of their help-seeking after the defence panel disapproved their proposal due to a scientifically unsound problem, and they needed to conceptualise a new one:

> We proposed a new problem; but our adviser had reservations about [one element in the proposed problem]. We explained to him why it was needed, to no avail. […] We were not able to do any work on our project for two weeks because we did not know what to do. […] We're way behind other [students]. […] We made a new concept paper, even if it was not required, in order to convince [our adviser]. […] We wasted a lot of time on it; and it turned out that he did not even read the title. For a week, we had been regularly going to him to consult about our concept paper. And he always said [to see him] later or tomorrow. Isn't that part of his responsibility as our research adviser? It seems that he does not care that our work is not progressing and our grades are low. ($034)

Some students combined help-seeking from their advisers with strategies to address the problem of teacher failings. One student, for example, described how she and her group mates coped with their teacher's lack of competence to give helpful guidance (see additional details in the illustrative excerpt from narrative $036 in Section 7.8.2):

> When we learned that [our adviser] is like that [i.e., gives unhelpful guidance], we agreed beforehand that after we handed in draft number one to him, we would start editing a second draft right away based on the mistakes that we could see on our own. Because when we go to him, usually, he would say that he had already read it and it is okay. […] During consultations, this is how our group works: we do not wait for him to ask us questions and to give us advice; we determine [ahead of the meeting] what we don't know and what we think is wrong, and we present them to him straightaway so that he could give us his advice on these. ($036)

It is noteworthy, though, that majority of students' help-seeking from their advisers were for dealing with task- and achievement-related problems. Of the 44 student-participants, only one told of soliciting the teacher's help for relationship issues associated with group mates' uneven participation (unsuccessfully). Additional accounts from three students told of being recipients of teacher intervention with regards to their relationship with 'loafers', help which they utilised in their emotion work but did not intentionally seek. Below is the account of one of these three students describing how the teacher intervention happened:

> The [academic] year was almost over, we were almost done with our research proposal. We talked to [our adviser] because our [proposal] paper was really faulty. Our adviser figured out that our paper was affected because we were not cooperating, that I was virtually the only one who shared what I know, that my group mates were not

> contributing to the discussion. They were, in fact, honest to admit to our adviser that sometimes I was the only one who did the work, and that they hardly knew anything about our project. […] After that talk with our adviser, we cried together because we realised [our faults]. […] After that, our relationship with each other became okay. ($027)

Some students intentionally concealed from their research advisers their problems with their group mates. Two students did not seem to expect positive outcomes from seeking help from their adviser for dealing with interpersonal problems in the group:

> We do not want [our adviser] to know about this because it might worsen the situation, and create more awkwardness between us [i.e., group members]. So we are trying to hide this. ($038)

> We couldn't tell our adviser about this [i.e., problem with a third group mate] because [our adviser] might just scold us and tell us that we are to blame for the problem. ($050)

Support from parents and family members. Students' accounts of help-seeking from parents and family members were predominantly within the context of dealing with delays and setbacks. In these situations, the help that students received were in following forms:

- *Access to parents' resources and social network.* Parents facilitated students' access to materials for their projects and to research sites. They also connected students to family members and other people (e.g., scientists, science professionals, local contacts for field work) who provided specialist knowledge, technical expertise (for laboratory and field work), and material resources.
- *Benefit of parents' science expertise and/or research experience.* Some students whose parents were science professionals or academics involved them in conceptualising their projects.
- *Assistance in performing inquiry tasks.* Parents and family members served as research assistants to students who worked alone on their projects (either by choice or because of group mates' uneven participation).

One student gained access to her mother's social network when she asked help after stagnating in the preliminary stage of trialling out their data gathering procedures (see vignette in Section 7.9 for background):

> When I felt really frustrated and lost, I asked for help from my mother who is also a researcher. She would give me the names of scientists [with whom I could consult]. ($072)

On the other hand, some students concealed from their parents their experiences of setbacks and failures. One student, for instance, received

support from her group mate's parents, but intentionally avoided seeking help from her own parents, when their laboratory work failed several times:

> Luckily, we were able to get help from my research group mate's parents. I felt so relieved and thankful at least someone's parents were alarmed and actually cared. I felt dependent on them [group mate's parents], and independent at the same time, because my parents had totally no idea about what was going on in my research, especially since my grades (aside from research) were all good. I did not let them know because I did not want to worry them. I simply hoped I could survive research without them knowing the details [of] how I did, and I did! If they had asked about it, I would've shared and asked for help, but they did not. So the only help they were able to give was financial. ($015)

Support from experts. Students sought help from two groups of experts: (1) experts in school (i.e., school laboratory technicians and specialist science teachers who were not their advisers), and (2) experts outside of school (i.e., scientists and laboratory technicians in universities and research centres). These experts provided students with specialist information for knowledge building, technical expertise for laboratory and field work, and access to materials resources and to their network of experts.

Students sought help from the experts in school when they needed help that was beyond the area of expertise of their advisers. Access to these experts was either facilitated by their advisers or independently sought by students (i.e., independent of their advisers, as a response to perceived lack of teacher support). One student told of her group's help-seeking from another teacher for a chemistry-related problem, which was outside their adviser's expertise. This was part of their independent problem solving to find an alternative to a missing chemical after their long search failed to find a supplier for the chemical (to be used in a laboratory test), which placed the completion of their project at high risk (see excerpt from narrative $099 in Section 7.4.4 for additional details):

> After calling all possible suppliers and learning that the [chemical was not available], we went back to our related literature, as a last recourse, to see if there were other alternatives. One article showed [the reaction between the chemical and the test samples], and the drawing of the structure. We learned that what we needed from the chemical was its chromium ions to break the hydrogen bonds in our [test samples]. We checked what chromium solution was available in the [school's chemistry laboratory]. Then, we checked the molecular structure of the available solution; we found that it was similar to that of the original chemical, except for the spectator ion. <u>To make sure, we went to see a chemistry teacher, who confirmed that the alternative chromium solution would function similarly to the original one in the test</u>. Thankfully, it worked! ($107)

Another student, who struggled with her adviser's problematic behaviour and lack of support, described the emotional benefits of seeking help from other teachers:

> We already have plans to consult with [two other research teachers]. Because every time we come to see our adviser for consultation, he had not read the paper that we submitted to him two weeks before. I was really hurt because of his lack of support. So, the thought of consulting these teachers helped in dealing with these feelings; because we do not know everything, and the expertise of these teachers is really a perfect fit for our study. We just want to get something helpful every time we consult; no longer to be told that we should move our meeting to the following day because our adviser had not yet read our paper. If we rely only on our adviser, we cannot obtain any help. But now that we have [these two teachers], we have the feeling that our research is heading somewhere, because they can really help us. We are feeling good and relieved that at last we can get some help. ($068)

When the expertise that students needed could not be found in their advisers and experts in school, they sought help from experts outside of school. These experts (outside of school) provided students with access to knowledge, skills, and material resources in the scientific community. One student, whose group was allowed to work at the laboratory of a research centre, described her positive experience of help-seeking from professional researchers:

> It's so cool to be with professionals. Whenever we didn't know something, they quickly came to our aid, to teach us how to do things step-by-step. Then they would help us find information in books. Super cool! ($109)

Aside from the technical help these experts provided so that the students could complete their laboratory work, for one student, an added benefit was the consolation she derived from this experience. She referred to the experience of working with professional researchers as a consolation after all the setbacks she encountered, which resulted in a grade so low that she gave up on her dream to graduate with highest honours (see vignette in Section 7.9 for additional details):

> Despite the [setbacks], we're happy, because one silver lining in our project was the friends we made among the staff in [the research centre]. […] They talked to us and trusted us with their lab. […] We were part of the true scientific community. We were no longer playing but were doing serious work, because they allowed us to use their super high tech [equipment] on our own. […] I really enjoyed the chance to do research in that lab. ($116)

Some students' help-seeking from experts outside of school was unsuccessful, however. One student, for instance, wrote of emailing "almost

50 different people and institutions" to seek information about the marine organism that they wanted to study. She did not receive any helpful response.

Support from peers. Students' help-seeking from peers was mainly predicated on closeness or similarity of experiences. Aside from their group mates, students sought help from friends, classmates, and school mates. One student, who worked on her concept paper at the last minute, requested her classmates who had already completed their concept papers to critique her work. Another student asked previous students, who had completed their projects in recent years, for information regarding suppliers for chemicals. In another case, when her group mates failed to help her, one student turned to friends for assistance in doing project-related tasks.

8.7 Chapter Summary

This chapter presented the findings on the emotion work strategies that students deployed within the contexts of the various emotion work-engendering situations that were presented in Chapter 7. Evidence from students' narratives showed that they deployed various emotion work strategies, which could be grouped into the following four families: (a) expression-related, (b) perception- and attitude-directed, (c) disengagement-focused, and (d) situation-directed. Furthermore, students' deployment of these strategies was not only aimed at feeling good or attaining psychological well-being but was also aimed to support the students' pursuit of achievement goals. The findings in this chapter highlighted the significance of social resources in students' emotion work.

The next two chapters deal with the procedures and results of the analysis regarding the links between achievement discourses and students' emotion work.

Chapter 9
Overview of the Analysis for Achievement Discourses
(Research Question 2)

This chapter presents the procedures that were undertaken in analysing school artefacts and students' emotion work narratives for achievement discourses and how these discourses were linked to students' emotion work.

9.1 Overview of the Analysis, Assumptions and Caveats

With respect to the second research question, a two-stage data analysis was performed, namely, (1) the analysis of school artefacts for achievement discourses (Section 9.2) and (2) the analysis of students' emotion work narratives for achievement discourses, and the links between these discourses and students' emotion work (Section 9.3). The analysis employed the principles of discourse, textual and thematic analysis.

Principles, assumptions, and caveats. The principles and assumptions that underpinned the data analysis are set forth below. In addition, some caveats are included to draw the boundaries of the analysis.

(a) The analysis drew on frameworks of Foucauldian discourse analysis (Arribas-Ayllon & Walkerdine, 2008; Willig, 2013). According to Foucault (2002), discourses are "the set of conditions in accordance with which a practice is exercised, in accordance with which that practice gives rise to partially or totally new statements, and in accordance with which it can be modified" (p. 230). Foucault considers artefacts as "carriers of discourse"; and in the school context, artefacts could manifest the school leadership's perspective of a certain topic (Maguire et al., 2011, pp. 598, 599), such as student achievement. Thus, in this study, it is assumed (1) that the school artefacts under consideration conveyed the discourses of achievement that were disseminated by the school's leadership (and its agents) to the students in that particular school at the time of the study, and (2) that in their emotion work narratives, students provided evidence of their interpretations and negotiation of these knowledges about achievement.

(b) The collection of artefacts was limited to what was gathered during field work and what was published on the school website and other online sources. They are not claimed to be a comprehensive set of evidence on the school discourses on achievement. Rather, the school artefacts are taken to be a representation of the school discourses on achievement.

(c) It is not assumed that students' knowledges of achievement were derived solely from how achievement was portrayed in these school artefacts. They may have formed ideas of achievement from other sources, such as their primary schooling and home environment. However, since the students were exposed to the school artefacts that were considered in this study, these artefacts could have made significant contributions to their knowledges of achievement.

(d) This is an interpretive analysis that is aimed at drawing out school discourses on achievement from the artefacts. It is not the aim of this analysis to critique the artefacts or evaluate the school achievement discourses.

 (e) This analysis is mediated by the researcher's familiarity of the context and the artefacts as an insider researcher. Thus, it is acknowledged that the researcher's past relationship with the research setting, as a student and as a teacher, informed this analysis, since "it is not possible to escape a knowledge that is inextricably bounded and situated" (Santos, 2012, p. 246).

9.2 Analysis of School Artefacts for Achievement Discourses

9.2.1 The School Artefacts

The artefacts, enumerated in the table below, were used as source materials for analysis of school discourses on achievement. They may be classified into three levels, based on the producer or publisher of the artefacts—to wit, (i) system-level, those artefacts that were produced at the school system level and were common to all the schools in the system; (ii) school-level, the artefacts that were produced by order of the school management; and, (iii) unit-level, the artefacts that the teachers in the science research unit of the school either produced or exhibited.

Table 9.1 The different school artefacts that were analysed.

Artefact	Level	Mode of access	Explanatory details
Student code of conduct	System	Website	Every year a copy is given to students to keep for the academic year for their own reference. Designated members of the staff go over the contents with them at the start of each academic year and on occasions (e.g., before going on a field trip) when it was deemed that a briefing was needed.
Student pledge	System	Online blog post	Students were required to memorise this, and they recited it at the start of every school week during the flag raising ceremony.
Mission statement	System	Website and field work photo	This was displayed as a poster at the main entrance of the school building.
Vision statement	System	Website and field work photo	This was displayed as a poster at the main entrance of the school building.
School hymn	System	Wikipedia	Students were required to memorise this, and they sang it at the start of every school week during the flag raising ceremony.
School mandate	System	Website	This was on the webpage with other information about the school system.
*News features**	System	Website	These were webpages that featured either an article or announcement of student achievements, usually in national and international competitions. They also included images of students holding their prizes, and of the students' teacher-advisers or school directors.
*Banners**	School	Field work notes	These were big banners displayed high up on the perimeter walls of the school compound, announcing the students' accomplishments in various regional, national and international events and competitions (including science inquiry project-related achievements).
*Research awardee essay**	Unit	Field work photo	This was posted on one of the notice boards maintained by the science research unit. Graduating students who were shortlisted for this academic award for science research were required to submit an essay about their research experience. This was the essay of the previous year's awardee. Some ideas from this artefact were observed to crop up in the narratives of some participants.
Performance tracker	Unit	Field work notes	This was posted on one of the notice boards maintained by the science research unit. It identified every student undertaking a science inquiry project and provided information about the project-related milestones reached by <u>all</u> the students.

Artefact	Level	Mode of access	Explanatory details
Research event programmes *	Unit	Field work photos	These were programmes for the two annual events where the students presented their research findings. One is a school-level competition where students presented their findings and answered questions from scientists and professional researchers who were invited to judge the students' projects. The other is a community science fair that the school held in partnership with a local government unit that allowed some of the students to conduct their projects in its marine reserve. Students presented their research findings to the community and engaged with students of secondary and primary schools in the area.
Research awards winners *	Unit	Field work photos	This was an announcement posted on a notice board regarding winners of research grants and best paper awards. Some of these winners were participants in this study.
Values posters	Unit	Field work photos	These were posters with pithy sayings about attitude and character. These were put up by the unit head in the science research faculty room that research students frequent. Some participants mentioned these in their narratives.

Note: The artefacts marked with asterisks above (see first column) contained names of individuals and information about their achievements. Personal information about these individuals (i.e., names and photos) was not part of the data, and therefore, was excluded in the analysis.

9.2.2 Analytical Approach for Examining School Artefacts

School texts that were relatively permanent (i.e., their contents had remained the same at least over the students' period of residency in the school) were the starting point of the textual analysis. These are the student code of conduct, student pledge, mission statement, vision statement, school hymn, and school mandate. These texts were initially interpreted based on the literary theory that textual meaning derives from the text alone and its authorial intent (Yanow, 2000).

Note: To protect the identity of the school, the url addresses of online materials are not provided and extensive direct quotes from the artefacts are avoided.

9.2.3 Textual Analysis

In order to identify the school achievement discourses, the analysis employed two sensitising concepts. First, at the start of the analysis, the dictionary definitions of achievement were used as a guide in order to identify portions of the text that contained ideas on achievement. In various

online dictionaries, achievement was depicted both as an act or a process, and as a result or a product. The Merriam-Webster Dictionary gave "accomplishment", "attainment" and "success" as its synonym and provided the various nuances in these definitions: (i) "something that has been done or achieved through effort", (ii) "a result of hard work", (iii) "the act of achieving something", and (iv) "the state or condition of having achieved or accomplished something" ("Achievement", 2015).

In addition to the abovementioned "effort" and "hard work", other dictionaries included "perseverance" (Achievement, 2011, American Heritage Dictionary), "skill" and "courage" (Achievement, 2015, Oxford Dictionary) as actions or abilities that bring about achievement. The definition from Cambridge Dictionary emphasised the quality of what is achieved: "something very good and difficult that you have succeeded in doing" (Achievement, 2015).

In the first round of the analysis, parts of the school texts that addressed the various dictionary renderings of achievement were highlighted.

After this step, a second round of textual analysis of the same set of texts were done. This time, van Leeuwen's (2005) idea (which builds upon Foucalt's (2002) idea of discourse)—that discourses are knowledges about a particular social practice—was used as a sensitising concept, with 'achieving in school' as the social practice under consideration. According to van Leeuwen (2005):

> The discourses we use in representing social practices […] are versions of those practices plus the ideas and attitudes that attach to them in the contexts in which we use them. (p. 104)

Hence, discourses about a social practice can include the following elements (i.e., the abovementioned "ideas and attitudes"): evaluations, purposes, legitimations, actions, manner, actors, presentation, resources, times and spaces (van Leeuwen, 2005, pp.104-110).

With these ideas about discourses in mind, the school texts were again read. Parts that were relevant to the abovementioned conceptualisation of discourses were highlighted. The highlighted parts of the text from the two rounds of analysis were then excerpted. To minimise traceability, however, samples from these extracts are not provided here[29].

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[29] As part of the validation process, these excerpts and the texts from which they were extracted were shown to the researcher's two supervisors while the analysis was ongoing.

The next step involved the examination of these excerpts, which was guided by the following questions:

    a. What key themes on achievement are articulated within these artefacts?

    b. How does the school frame achievement through these artefacts?

This step yielded three strands of school discourses on achievement: (1) the rationale for the expectation of student achievement, (2) the actions of achievement, and (3) the standards of achievement.

Once the analysis of these texts had been made, the rest of the school artefacts (e.g., banners, posters, etc.) were analysed as "text-analogues" (i.e., acts or objects that are treated as texts) (Yanow, 2000), and the results were integrated into the findings from the main texts.

The results of this analysis are explicated in Chapter 10.

9.3 Analysis of Students' Emotion Work Narratives for Achievement Discourses and Their Links to Emotion Work

This part of the analysis involved two key steps: (1) an examination of students' narratives of emotion work to identify references to achievement, and (2) the analysis of students' references to achievement in order to identify student achievement discourses and their links to emotion work.

9.3.1 Identifying References to Achievement in Students' Narratives

The findings on school discourses of achievement within the abovementioned three strands were used as basis for examining students' narratives for references to achievement. Hence, as students' narratives were read, they were constantly interrogated to identify references to (1) rationale, (2) actions, and (3) standards of achievement. Underlying this process, therefore, were the dictionary definitions of achievement and van Leeuwen's (2005) ideas on discourses as sensitising concepts; but, this time, the social practice was narrowed down to 'achieving in school within the context of undertaking science inquiry projects'. This step yielded three sets of excerpts from the narratives corresponding to each of the three strands of school discourses.

The following table shows examples of these excerpts.

Table 9.2 Sample achievement-related excerpts from students' narratives associated with the three strands of school achievement discourses.

Strands	Achievement-Related Excerpts
Rationale	I started with grades because I'm a bit of a grade-conscious person. If I do my best in something, I expect that good karma or good things will come back. ($005)
Actions	What I disliked the most in our research was that it was time-consuming. Just the finalization of the research proposal took us several months to finish and we had changed our methodology at least three times. ($003)
Standards	And with [my adviser's] guidance, I was able to come up with a concept paper, which was then accepted by the research committee. This was one of my greatest achievements at the time because of the repeated revisions. I was one of the first few who got their concept papers accepted. ($006)

9.3.2 Identifying Students' Achievement Discourses and Their Links to Emotion Work

This part of the analysis was predicated on the idea that "[d]iscourses make available certain ways-of-seeing the world and certain ways-of-being in the world" and "construct social [and] psychological realities" (Willig, 2013, p. 117). By locating themselves with respect to the identified school discourses on achievement, students subjected themselves to the possibilities afforded within these discourses with respect to what can be "said", "done", "felt", "thought" and "experienced" (Willig, 2013, p. 117). These ideas underpin the analytical agenda of identifying students' knowledges about achievement in the narratives, comparing the students' discourses of achievement to the school discourses of achievement, and examining how these knowledges of achievement shaped students' emotion work. The details of the analytical procedure are explicated below.

Identifying students' achievement discourses. Each set of excerpts from students' narratives, corresponding to the three strands, were analysed one after the other. The determination of students' achievement discourses proceeded in two steps. First, each set of excerpts associated with the particular strand of school achievement discourses were examined in order to identify specific references related to achievement. These specific references were then examined; and clusters were formed based on thematic similarities (e.g., for 'actions of achievement', see first column, Table 9.3 below).

Table 9.3 Illustration for the analysis of achievement discourses in students' emotion work narratives.

The references featured in the first column were based on excerpts related to 'the actions of achievement' strand.

Students' Achievement-Related References	Students' Achievement Discourses
1. fitting in fieldwork within limited time in school ($008) 2. completing research proposal in four months to meet a predetermined data gathering schedule ($015) 3. lab work over several weeks without breaks ($020)	Achievement entails an investment of student resources.
4. giving up leisure hours to work on project ($005) 5. doing lab work over holidays ($014) 6. prioritising research over other subjects ($011)	Achievement entails making sacrifices.
7. three failed data gathering episodes before finally succeeding ($020) 8. changing methods several times before research proposal could be finalised ($003) 9. continued working on a difficult research problem instead of changing to an easier one, despite perceived lack of knowledge ($012)	Achievement entails overcoming challenges.

The second step involved the identification of students' knowledges about achievement from these clusters of references. The question posed at this particular stage was: "What knowledges about achievement are reflected when students in this particular setting talk about ['fitting in field work within limited time in school', for example]?" Students' ideas were summarised and key ideas on achievement were then identified; these are the students' achievement discourses (see second column, Table 9.3). For instance, from one cluster, such students' ideas on the actions of achievement as 'persevering through challenges', 'overcoming external constraints', and 'overcoming personal constraints' were grouped together to form the 'achievement entails overcoming challenges' discourse.

It is conceded that this step of the analysis is subjective, and, therefore, there is no one right answer to the above analytical question. To manage this subjectivity, each set of excerpt was divided into two, with one half-set comprising excerpts from 61 narratives, and the other half-set from the remaining 64 narratives. Clusters for one half-set were subjected to the aforementioned analytical step. Once students' achievement discourses were identified from the first half-set, these discourses and the specific students' ideas that formed them were tested for consistency on the second half-set.

Comparing school and students' achievement discourses. This step of the analysis involved locating students' achievement discourses within the school achievement discourses, and examining the ways students' achievement discourses reflected how students interpreted and negotiated the school achievement discourses. To do this, the source narratives for the excerpts which provided evidence for a particular student achievement discourse were read holistically (in their entirety) in order to draw ideas about how students' achievement discourses compared with the school achievement discourses.

For example, consider Table 9.3, which depicts the organisation of the data during the analysis for students' achievement discourses. Narratives $008, $015, and $020 (see first column of Table 9.3) were part of the source narratives that provided evidence for the 'Achievement entails an investment of student resources' discourse (see second column of Table 9.3). These three narratives, along with the rest of the source narratives for this particular students' achievement discourse, were read in their entirety. During the holistic reading of these narratives, the alignments and differences between the school achievement discourses and the particular students' achievement discourse (as depicted in these narratives) were noted.

Identifying links between students' achievement discourses and emotion work. Determining the links between achievement discourses and emotion work entailed a recursive process of reading the three set of achievement-related excerpts from students' narratives and referring to literature to identify the educational issues of concern (a) that are implied in students' discourses of achievement, and (b) that, at the same time, provide conceptual perspectives for exploring the link between students' achievement discourses and emotion work. This is, admittedly, a highly inferential process, which relied heavily on the researchers' familiarity with the data and the research setting. However, this interpretive leap was necessitated by the limitation imposed on the analysis by the fact that the research agenda pertaining to achievement discourses was not part of the original conceptualisation of the study and was not addressed explicitly during data collection, but was set only in the early stage of data analysis when achievement-related ideas were found to be prevalent in students' narratives. Thus, no empirical data was collected to directly address the aim of identifying links between students' achievement discourses and emotion work. Instead, the identified issues of concern served as conceptual lenses

for exploring these links. The procedure for selecting the issues of concern is described next.

This part of the analysis involved cycling through the following steps: examining the narrative excerpts, considering the relevant students' achievement discourses, and studying the literature to identify the potential and final issues of concern. For instance, with regards to the three students' achievement discourses relevant to the strand "actions of achievement", the list of potential issues of concern included (a) student commitment, (b) student engagement, and (c) motivational resilience. A survey of literature did not yield references that linked student commitment and emotion experiences in school; hence, it was dropped from the list. This left student engagement and motivational resilience for consideration, both of which were depicted in literature as associated with students' emotion experiences in school. The decision to adopt motivational resilience rather than student engagement, however, was based on the assessment that motivational resilience is more robust in terms of its explanatory value by virtue of the availability of a model of motivational resilience that describes the interaction among emotion, engagement (or disaffection), and coping (which involves the regulation of emotion) when students encounter problematic situations (Skinner, Pitzer, & Brule, 2014).

Once the issues of concern were identified, they were used as conceptual lenses for exploring the links between students' achievement discourses and emotion work.

The findings of this analysis are presented in Chapter 10.

9.4 Chapter Summary

This chapter presents the analytical procedures that were used to identify school achievement discourses, student achievement discourses, and the links between students' achievement discourses and emotion work. The general analytical approach drew on frameworks of Foucauldian discourse analysis. Textual analysis and thematic analysis were employed to examine school artefacts and students' narratives for achievement discourses, respectively.

Chapter 10
School and Students' Achievement Discourses, and Their Links to Students' Emotion Work

This chapter presents the findings on school achievement discourses, students' achievement discourses, and how these discourses were linked to students' emotion work.

10.1 Overview of the Chapter

The chapter is organised into three parts, according to the three strands of school achievement discourses that were identified from school artefacts. The three strands of school achievement discourses are as follows: (1) the rationale for the expectation of student achievement, (2) the actions of achievement, and (3) the standards of achievement.

Within each strand, the discussion of the findings is organised in three sections: (a) the school achievement discourses, (b) the students' achievement discourses, and (c) how these discourses were linked to students' emotion work.

The table below gives a summary of the main findings related to the school achievement discourses and the students' interpretations of achievement discourses.

Table 10.1 Summary of school and students' achievement discourses.
The section where each strand is discussed in this chapter is noted in the first column.

Strands	School Achievement Discourses	Students' Achievement Discourses (*Achievement-Related Concerns Linked to Emotion Work*)
Rationale (Section 10.2)	There is an expectation of achievement that is predicated on students' science-based identities.	• Achievement is an obligation (*Student motivation*) • Achievement is a consequence of personal investment (*Student motivation, Locus of control*) • Achievement is a choice (*Locus of control*) • Achievement is subject to constraints (*Locus of control*)
Actions (Section 10.3)	The doings of achievement are presented as students' development and demonstration of knowledge and character traits.	• Achievement entails overcoming challenges (*Motivational resilience*) • Achievement entails an investment of student resources (*Motivational resilience*) • Achievement entails making sacrifices (*Motivational resilience*)
Standards (Section 10.4)	Achievement is characterised by "excellence in all undertakings".	• Achievement is attaining success in high-stakes opportunities (*Social validation/Demandingness*) • Achievement is reaching school milestones and standards (*Social validation/Demandingness*) • Achievement is satisfying self- and peer-imposed standards (*Demandingness*)

The summary section at the end of the chapter contains the key findings pertaining to the research question on achievement discourses.

[N.B. When referencing the school artefacts in the following discussion, words quoted from them are enclosed in quotation marks. However, in order to minimise traceability, the source materials are not cited.]

Caveats: The achievement discourses are not mutually exclusive; and in the narratives, an episode might contain allusions to several discourses. Therefore, in the discussion that follows, some excerpts or references to the same story may appear in several sections.

10.2 The Rationale for the Expectation of Student Achievement

The following two subsections discuss the school achievement discourses (Section 10.2.1) and the students' achievement discourses (Section 10.2.2) that were related to the rationale for the expectation of student achievement.

The third subsection explicates how these discourses were linked to students' emotion work.

10.2.1 School Discourses: There is an expectation of achievement that is predicated on students' science-based identities.

The students are described as scholars in a science specialist school (their present identity), as high-achievers possessing high aptitude in science and mathematics (their past identity that qualified them for a place in the school), and as future scientists and "professionals and leaders in science and technology" (their future identity).

The students are referred to as scholars all throughout the student code of conduct. This designation invests a certain status and responsibility to the students. It does not only indicate that they are recipients of a scholarship in a selective school (as opposed to students who are recipients of free secondary education in public schools, or students who pay to have a private school education). But it also underscores the idea that they "owe" their high quality education to "the Filipino people", which makes it incumbent on them to "dedicate" the fruits of this education (i.e., "acquired expertise in science and technology") to the "service" and "uplift" of the Filipino people. These are ideas that the students reiterate every time they recite their pledge.

Their future identity as science professionals is predicated on their past identity as having achieved high attainments in science and mathematics and as top students in their primary schools. This identity is also mediated by the kind of secondary curriculum that they are undertaking, one that "emphasizes science and mathematics", and is partly imposed by the contract that they and their parents sign, stipulating that they will pursue "any mandated [i.e., by the school system] Science and Technology" undergraduate degrees.

Therefore, the expectation of student achievement is embedded in the social identities that are attributed to the students by their membership in this particular school.

10.2.2 Students' discourses related to the expectation of achievement were a plurality of ideas linked to their motivation and perception of control.

Students' discourses on achievement, which are associated with the schools' expectation of student achievement, are represented by four key

ideas (see second column in the table below). These four ideas are discussed below, while their links to emotion work (see third column in the table below) are explicated in Section 10.2.3.

Table 10.2 Students' achievement discourses related to the schools' rationale for expectation of student achievement.

Representative Excerpts from Students' Narratives	Student Achievement Discourses	Achievement-Related Concerns Linked to Emotion Work
It is really a great responsibility to become a scholar. Even if I wanted to be lazy, I should not because the government is paying me to study like this. ($043)	Achievement is an obligation	Student motivation
My mother encouraged me to apply for [a grant]. I told her that I could not do it. That would be added pressure. I told her I don't like pressure. [...] She said that I could do what I wanted. What I wanted was that I would not be subjected to additional pressure. ($053)	Achievement is a choice	Locus of control
[There's a difference] between what [I] want [to do] and what [I] can do as a researcher. [I can't always reach what I wanted to achieve because] I have my [personal] limitations. ($110)	Achievement is subject to constraints	Locus of control
Prizes and awards will come if we do our best and love our [research project]. ($044)	Achievement is a consequence of personal investment	Student motivation Locus of control

Achievement is an obligation. The 'achievement is an obligation' discourse indicates that some students had interpreted the schools' expectation of achievement as a social duty[30]. This discourse represents an alignment between this particular school achievement discourse and the students' interpretation of it.   Furthermore, in the narratives, students' allusion to the 'achievement as obligation' discourse was predicated on their being a "student" or a "scholar" <u>of</u> this school, which suggests their acceptance of their social identities as defined by their membership in this

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[30] Additionally, two students oriented this obligation to their parents and one student to his group mate. These students associated their desire to achieve to making these significant others "proud".

particular school and of the expectations that were attached to these identities (see excerpts below).

> I wanted to show through our research [project] that a [name of the school] scholar could do this, that's why [I aspire to win a grant]. ($040)

> What I'm saying is, we are from this school and so much is expected of us. Everyone is saying that if you are from this school, you are intelligent. It is painful because so much is expected of you and you are able to come up with only this much. ($108)

In contrast, the 'achievement is a choice' and 'achievement is subject to constraints' discourses could be interpreted as students' passive way of contesting the school's expectation of achievement—passive, because they did not explicitly reject the idea of achievement as a duty and the social identities that underpinned this expectation.

Achievement is a choice. In the narratives, intimations of the 'achievement is a choice' discourse suggest that students were asserting their right to choose whether or not to pursue the achievement opportunities offered in the school (see the excerpt from narrative $053 in the table above), and their right to alternative self-definitions and conceptualisations of achievement. For instance, in the following excerpt, the student's description of himself as a happy-go-lucky student presents a contrasting image from that of a high-achieving student and scholar, as stated in the school discourses. This alternative self-definition, then, seemed to serve as warrant for his inconsistent achievement behaviour of being hardworking in group work while being negligent in individual work.

> I am a happy-go-lucky student. I have initiative to work only on occasions when my classmates choose me to be the leader. It is only then that I become hardworking. But if the [school] work is only for myself, sometimes I forget and neglect it. Because I feel that during group work, it is not only me that is affected, so I feel pressured [to work hard]. But if I'm [working] alone, I sometimes think that's it's okay [to be negligent] because the only one affected is me. ($001)

Achievement is subject to constraints. The 'achievement is subject to constraints' discourse could be construed as the students' dissent about the reasonableness of the school's expectation of achievement. In their narratives, many students asserted that it was not the lack of desire to achieve that limited their ability to achieve. Rather, their accounts showed that they were dealing with various personal (e.g., lack of knowledge), school (e.g., competing school demands), and real-world (e.g., inclement weather) constraints that they either failed to overcome, or accepted as unsurmountable (see Section 7.4 for illustrative accounts). For instance,

after a long search for a missing chemical caused delays that jeopardised the completion of their data collection in time for a competition, one student alluded to the 'achievement is subject to constraints' discourse to explain an anticipated failure:

> We had lots of hope of winning—best in developmental [research], best researcher. We wanted to win at least one. Then we realised that, "No! It cannot happen to me." [...] It finally sank in to me that it was impossible [...] and I was able to accept that we could do nothing to change the situation, because we were not the only [client in the queue] who required the services [of the external laboratory which had the only equipment in the whole country for that particular test]. [...] So I was resigned to the idea that we wouldn't be able to join [the competition]. ($107)

Achievement is a consequence of personal investment. The 'achievement is a consequence of personal investment' discourse, on the other hand, is a parallel rationale for the expectation of achievement. It does not appear to have connections to the school's expectation of achievement as underpinned by the students' science-based/social identities; thus, it could be considered an alternative discourse. The narratives revealed two ways that students drew on this discourse. First, in some students' accounts, this alternative discourse seemed to be a variant of the popular notion that 'hard work equals success'[31] (see also Spohrer, 2016), which revealed students' naïve notion of a cause-and-effect relationship between personal investment and achievement:

> During the third quarter, we gave 150% effort [to collect data], sacrificed our Christmas break and worked nights. For all that, we only got this [very low] grade? ($116)

Second, in other students' accounts, the 'achievement is a consequence of personal investment' discourse was conflated with the 'achievement is subject to constraints' discourse. This conflation indicates students' subscription to the idea that while personal investment is key to achievement, it is not the only determinant. The excerpt below is a continuation of the 'missing chemical' excerpt in the 'achievement is subject to constraints' discourse above. In the same narrative, after referring to the real-world constraint related to access to an external laboratory in the previous excerpt, the student segued to their investment of resources and effort in the excerpt below:

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[31] A Google search using the key words 'hard work equals success' yielded 646,000 results.

> We had done so much work and this is what happened to us […] I cried because there would be no return on the resources and efforts that we invested. There is no reward for all the work we had done; we were the most hardworking; whenever there was a problem, we would always find solutions. ($107)

One of the students' discourses on the actions of achievement, discussed later in Section 10.3.2, echoes this personal investment theme.

10.2.3 Links to Emotion Work: Student Motivation and Locus of Control

The two concerns that are related to the discourses on the expectation of student achievement are achievement motivation and locus of control (see third column in Table 10.2).

Student motivation. Students' narratives that alluded to these two discourses—'achievement is an obligation' and 'achievement is a consequence of personal investment'—showed how students' motivations influenced their performance of emotion work. The term 'student motivation' is used here in its intuitive sense: what drives students to engage in the undertaking of their science inquiry projects[32].

The 'achievement is a consequence of personal investment' discourse implies a belief on the causal relationship between personal investment (the cause) and achievement (effect). Within this discourse, students' investment of time, talent, and energy (Maehr, 1984) was expected to result in the attainment of achievement goals. Students who alluded to this discourse in their narratives performed emotion work to optimise their capacity to make this investment. For instance, they suppressed emotional expressions in order to focus their personal resources to task performance and problem solving (see Section 8.5.2 for examples). This discourse could also be the reason why much of students' emotion work was task-focused (rather than, say, relationship-focused)—because students were allocating their personal resources strategically where they would best contribute to the attainment of their achievement goals. As one student, who struggled with his group

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[32] Although it is recognised that the related concept 'achievement motivation' has an extensive conceptual foundation in motivation research (e.g., Weiner, 1985; Wigfield & Eccles, 2000), it was decided not to use the concept in this part of the analysis, because it would require an epistemological commitment that was not considered during the conceptualisation of the research design and, thus, could not be sufficiently supported by the data.

mates' uneven participation, put it, "I could do something about our work, but I'm helpless when it comes to relationships" ($023).

Moreover, the belief that achievement follows sufficient investment of time, talent, and energy could also account for students' persistence in performing emotion work within long-lasting problematic or challenging situations and for their continued investment of time, energy and talent over long periods when dealing with these situations, as shown in this student's story of dealing with failure:

> What I found challenging during this two-year research course? It's striving hard to regain my research grade. […] I got 2.75 for the first quarter. It was during our weakest moment. It was when we were really down […], when we're not making any progress since we couldn't find one simple equation. […] After being frustrated [with] not making any progress in our study and getting sad [about the] grade of 2.75, we were about to give up and just change our study. After a month, it […] sank in to me that we got a substandard grade and we're no longer [in elite stream[33]]. We got a 2.75 and we couldn't do anything about it. […] Well, that didn't stop me from striving so hard to regain my lost grades. We couldn't change it; but we could improve it next quarter. I worked hard to finish outputs in time and also submit them on time. Fortunately, we're able to find the needed equation and finish our methods [chapter]. After sacrificing leisure time for research, it was like a success after we got a grade of 2.00/ 2.25 in the second quarter. I was so proud of myself since my grades increased; but I still had regrets since I didn't do well in the first quarter. After getting a grade of 2.0/ 2.25 in the second quarter, my [next] goal was to get a grade of 1.75 or higher for the next quarter. [A]nother goal was to finish our paper [in time for an international competition]. ($013)

The 'personal investment' discourse depicts a simple linear relationship between personal investment and achievement. The 'obligation' discourse, on the other hand, is more complex.

The 'achievement is an obligation' discourse, because it is predicated on social identities, implies the view of achievement as a way to maintain these social identities. Students' narratives showed that, within this discourse, the investment of time, energy, and talent could be considered as means, achievement as an intermediate goal, and maintenance of social identities as an end-goal. This discourse is comparable to the aforementioned 'personal investment' discourse in that it also asserts the importance of personal investment. In contrast, however, this 'obligation' discourse attaches a higher-value goal to academic achievement—the maintenance of

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[33] The students' failure to satisfy the grade requirement for the elite stream meant that they were transferred to the non-elite stream.

students' social identities. One effect of this discourse was to add an identity-oriented imperative to students' pursuit of achievement goals, which, as their narratives showed, increased the emotiveness of the situations that students encountered (e.g., due to increased pressure). The students' emotion work in these situations could be said to be motivated by the desire to maintain their social identities. In the following excerpt, for instance, the student who defined herself as a 'scholar' whom the government paid to study in her earlier story (see excerpt from narrative $043 in Table 10.2) alluded to the 'obligation' discourse in her aspiration to be a role model. Though not stated explicitly in the following excerpt, her emotion work related to the pressure of teacher expectations could be motivated by this identity-oriented aspiration:

> We feel that the <u>teachers' expectations</u> for us [i.e., her and her research partner] are quite high. At times <u>we feel pressured</u>. But we try to apply teamwork and cooperation in order to finish our research. Our goal is to finish and share our research, and <u>be a role model to other people</u>. ($086)

Another impact of the 'obligation' discourse on students' emotion work was to heighten their experiences of self-conscious emotions, which served as negative sanctions for failing to maintain their social identities. For example, students experienced guilt, embarrassment, and shame when their academic performance or outcomes seemed to contradict these social identities, and pride when their academic performance or outcomes seemed to affirm them[34]. It could be argued, therefore, that when students invested time, talent and energy to re-establish their social identities, involved in that effort was emotion work to mitigate the feelings of guilt, embarrassment, and shame. In the excerpt below, for example, the effort by one student and her group mates to find the correct answer could be considered part of their emotion work to manage shame and embarrassment, and to reclaim their social identities, which were called into question by a scientist:

> [The scientist] gave us a problem to solve [...]. It took us some time [..] So she said, "You are from [name of the school], yet you don't know how to solve a simple chemistry [problem]. [...] We were really ashamed that [...] we were not able to solve it. We are [name of the school] students, yet we were an embarrassment. [...] [W]e solved it again [...] until we finally got it right. ($109)

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[34] The view of academic achievement as a social obligation has been associated with feelings of guilt and shame, which may motivate hard work and persistence in the face of failures (Tao & Hong, 2014).

From the perspective of student motivation, the 'personal achievement' and 'obligation' discourses directed students' emotion work toward a particular goal—to optimise their capacity to invest time, energy and talent in order to achieve and in order to maintain their social identities.

Locus of control. The issue of locus of control is associated with three student achievement discourses, namely, (1) 'achievement is a consequence of personal investment', (2) 'achievement is a choice', and (3) 'achievement is subject to constraints'. When taken together, these three discourses imply that students do not have absolute control over their achievement. This is significant because students' perception of control over achievement-oriented actions and outcomes is related to their emotion experiences in school (Pekrun, 2006). The locus of control could be conceived of as a continuum with the belief that life's outcomes are within one's own control at one end (i.e., internal), and the belief that attribute outcomes to forces beyond one's control at the other end (i.e., external); individuals could be located at various points within this continuum (Findley & Cooper, 1983). Evidence from students' narratives shows that students can assume both orientations at the same time or can shift their positions from one to the other.

These two achievement discourses—'achievement is a consequence of personal investment' and 'achievement is subject to constraints'—contained ideas of the differential perception of control that students held. Within the 'personal investment' discourse, students' deployment of certain emotion work strategies indicated a sense of control over their own achievement, and a belief in their own abilities to achieve their goals and to contain the threats to the achievement of these goals. On the other hand, the 'constraints' discourse is associated with students' deployment of emotion work strategies which reflected their beliefs that outcomes could be affected by circumstances outside their control. These divergent approaches to students' emotion work are illustrated in the two-column comparison below:

Internal Locus of Control	External Locus of Control
• Problem solving and help-seeking to eliminate or manage constraints; anticipating problems and preparing for them	• Acceptance that that some constraints are insurmountable (e.g., inclement weather)
• Self-agency attribution such as when they self-blame regarding their negative actions and outcomes; Self-reflection to understand their own culpability in their failings	• Other-agency and circumstance-agency attributions, such as teachers' lack of support for failures, or the school's assessment system for their low grades
• Making resolutions to do something or to stop doing something, as a way of bolstering their optimism	• Self-encouragement that referenced fatalistic beliefs (e.g., "The award was not meant for me")

On the other hand, students' use of the 'achievement is a choice' discourse reflected their attempt to assert control over their pursuit of achievement goals <u>and</u> provided them with a way to justify their self-protective emotion work. For instance, some students chose not to take up some achievement opportunities (which is a disengagement strategy) as a way of dealing with a sense of inadequacy due to perceived lack of ability or underperformance compared to peers.

A broader view of the narratives from which allusions to the 'achievement is a choice' discourse were identified seemed to support the argument that students' choice to pass up on an achievement opportunity did not necessarily equate with lack of desire for that particular achievement. One student, for example, referred to a long-held aspiration for the same achievement that she forewent (i.e., a research grant), when she said that she witnessed upper-year students receive the grant, and the sense of pride and honour attached to the grant inspired her to aspire for it. When it was their cohort's turn to apply for the grant, she gave up the aspiration when she appreciated the expenditure of effort that was required to attain it. Within the context of disengagement strategies and a sense of inadequacy, these moves, then, could be construed as self-handicapping in order to "protect ones' image of competence" (Nosenko et al., 2014, p. 158) by eliminating the possibility of failure. With respect to emotion work, framing the non-achievement as a personal choice was a proactive way of dealing with the fear of failure.

When viewed using locus of control as a lens, the 'personal investment', 'constraints' and 'choice' discourses seemed to shape students' stance towards the challenging situations they encountered, which is manifested in their strategic deployment of emotion work strategies.

10.3 The Actions of Achievement

This section discusses the school and student discourses on the actions of achievement, and how these discourses were related to students' emotion work.

10.3.1 School Discourses: The doings of achievement are presented as students' development and demonstration of knowledge and character traits.

This aspect of the school achievement discourses recognises not only that the students are still in the process of "becoming" but also that they are doing so within the evaluative context of school. Hence, while the students "develop", "pursue", and "strive", they must also "demonstrate", "show", and "meet [the school requirements]". The two domains for these actions are knowledge and character.

Generally, knowledge is encompassed within one of the school's core values: the "pursuit of truth". Within this core value, the students are expected to seek "true knowledge and wisdom", to develop the "critical and creative thinking" of a scientific mind, and to acquire scientific expertise. Admittedly, though, scientific knowledge is the major focus of this "pursuit", although the students of this science specialist school are also expected to learn knowledge within the humanities domain.

Character, on the other hand, is a significant part of the "holistic formation" of the students[35]. It is materialised as the students develop "positive scholar behaviour", "behave in a manner befitting [a scholar]", and adhere to "high standards of behaviour". Specifically, the students are expected to:

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[35] The quarterly assessment for students includes an assessment for character, where teachers with whom the students have classes rate the students on a list of character traits (e.g., integrity, industry, responsibility, and respect for others). A summary then appears on the students' report card. Low final rating at the end of the academic year in any of these traits could mean forfeiture of opportunity to win some honours or awards at the time of graduation. The student code of conduct describes sanctions for misbehaviour, the highest of which is expulsion from the school system.

- Value honesty
- Demonstrate academic integrity
- Show respect for rules, authority, other people, and the environment
- Be committed to serve their country and countrymen
- Value excellence and industry
- Be accountable for their behaviour and actions
- <u>Manage their emotions</u>
- Show responsibility by "taking the initiative to do what needs to be done with less prodding"

In the light of the focus of this research, it is significant to note that one of the abovementioned actions that are expected of the students, with respect to character, is the management of their emotions. The importance of character development and the expectation of good behaviour in students are underscored by the quarterly character assessment that is reflected in their report cards and by the negative sanctions that are given for bad behaviour (e.g., by disqualifying students from some achievement opportunities).

The school recognises a "shared responsibility" for student achievement. However, it also emphasises that the attainment of goals with respect to knowledge and character depends largely on the students.

10.3.2 Students' discourses on the actions of achievements were framed as 'feats'.

Three discourses on the actions of achievement were drawn from students' narratives. These are presented in the table below.

Table 10.3 Students' discourses related to the actions of achievement.

Representative Excerpts from Students' Narratives	Student Achievement Discourses	Achievement-Related Concerns Linked to Emotion Work
[A]fter several attempts, we weren't successful [in producing the desired chemical solution]. […] [W]e had only a few weeks left before [the] deadline of data gathering. […] The final time we attempted to make the [solution], I accidentally spilled the solution after my research group mate and I carefully observed for two hours. I seriously broke down, and felt like giving up […] But, no; giving up wasn't an option. […] [W]e did not have a choice, we needed [the solution]. […] [W]e kept going till the end. I was able to […] fight and finish research with [my group mates]. ($018)	Achievement entails overcoming challenges.	Motivational resilience
My concept paper, I spent countless sleepless nights [working on it]. I did a lot of thinking, trying to figure out and understand things. […] [My adviser] told some students that my concept paper was good. […] In a way, it was a compliment. ($056)	Achievement entails substantial investment of student resources.	Motivational resilience
[Y]ou really need to work hard and learn to sacrifice just to get a good grade in research. After all the hard work, come the prize and satisfaction. ($013)	Achievement entails making sacrifices.	Motivational resilience

As reflected in the three discourses (see second column in the table above), the students, instead of simply narrating their actions related to the pursuit of knowledge and development of character, framed the actions related to the undertaking of their science inquiry projects in their narratives as 'feats'. For instance, instead of just saying that she searched for information relevant to their proposed investigation, one student told it as spending "sleepless nights…in front of the monitor… searching and searching and searching for the best articles that will support our study". The details that the students provided in their narratives served to highlight the extraordinariness of their actions, within the context of young people (15 to 17 years old) undertaking two-year open science inquiry projects as a curricular requirement.

Achievement entails overcoming challenges. In their accounts that reflected the 'achievement entails overcoming challenges' discourse, students focused on the following actions:

- *Solving real-world problems persistently and creatively* - e.g., see excerpts from narratives $118 in Section 8.6.1 under 'Science inquiry project-directed strategies' and $107 in Section 8.6.2 under 'Support from experts';
- *Persevering through (or, not giving up despite) threats, challenges and constraints, until desired outcomes were achieved* - e.g., see excerpt from narrative $018 in Table 10.3 above; and,
- *Completing tasks or reaching goals despite lack of support from group mates or teachers* - e.g., one student gathered data in three of four field work sessions without the help of her group mates; another student prepared for two competitions alone with deficient teacher support.

Achievement entails substantial investment of student resources. The 'achievement entails substantial investment of student resources' discourse was abstracted from stories where students told of their commitment of inordinate amount of time, talent and energy, and of their use of social resources. Consider how the framing of the students' actions in the following excerpts underscored their noteworthiness:

- have school on weekdays…go to the laboratory for data gathering on weekends ($009).

- went to the [coastal area] Friday afternoon…stayed overnight…started our data gathering early in the morning…went out on a boat at 3am…waited at sea until the tide started to recede around 5am…then I went into the water to set up our transects…we could not stay underwater for very long…so the whole morning we were taught [by local divers] how to dive ($043).

- go up from ground floor to rooftop, climb up the four-metre scaffolding, five times a day for 30 days, to gather data ($012).

- a long work because our study needed information…from the kingdom up to the genus for each taxonomic group ($023).

- many nights of preparation and revision…for our defence…studied things that we should know about our study ($059).

- I really wanted to join [national and international research competitions]. To make this ambition possible, we contacted people that could help us. ($005).

Achievement entails making sacrifices. The narratives that featured the 'achievement entails making sacrifices' discourse emphasised the primacy of project-related aims and students' willingness (grudgingly, in some cases) to suffer loss to achieve them. In their accounts, the students specified that they sacrificed the following:

- *Fun and leisure;*

  "We did our second data gathering during [sport] week until the semestral break. This is my last year in school and I wanted to experience everything. I wanted to play with my [peers]. Well, we all have to [make] sacrifices. While the school body was having fun, we were in the lab." ($005)

- *Time with family;*

  [Because of] research, our [group] had to spend Christmas in school. […] Christmas was supposed to be a time for family gatherings and enjoyment, [but] we were stuck in the chemistry lab. ($014)

- *Well-being; and,*

  I have sacrificed a lot because of research. Sometimes I even skip lunch or dinner because I don't have any spare time. And not only that, my five-hour sleeping time is reduced to four, three, two hours because of assignments in other subjects plus the requirements of research. […] Every time I go to the dorm, my body seeks for rest; but my mind cannot, because I'm still thinking [about] and [brain]storming for the probable solutions [to] my [research-related] problems. ($048)

- *Academic performance in other subjects.*

  [During] our first data gathering, [w]e had to be absent in some of our classes, since it conflicted with our schedule. It was a bit hard [because] we would be missing lessons and some tests. ($061)

The narratives that alluded to these three student discourses did provide evidence that students' actions were consistent with the school's focus on knowledge and character traits (as evident in the illustrative excerpts above). However, the focus of students' accounts was not on highlighting these actions as pursuit of knowledge or development of character traits. Rather, the students focused on foregrounding the exceptional quality of these actions. The students' framing of the actions of achievement as 'feats' hinted at two things.

First, the student discourses reflected the strong influence of the evaluative context of school and the students' personal history as high-achieving in the way that they interpreted the school's discourses on the actions of achievement. This seemed to suggest that for the students, what counts as achievement is accomplished through acts that are more than the usual, the expected, or the ordinary. This, actually, reflects the school's discourse on excellence as the standard of achievement (discussed below in Section 10.4).

Second, this way of framing the actions of achievement served a purpose in mitigating students' failings and the failures that they experienced. By highlighting the extraordinariness of (some of) their actions, students could

be asserting their adequacy irrespective of achievement outcomes. For instance, one student told of her delay in conceptualising a research problem, because of her decision to procrastinate, and of her lack of knowledge and experience (see excerpt from narrative $058 in Section 7.4.1 for additional details). However, as she continued with her story (in the following excerpt), she provided additional details about the time when she underwent seven cycles of concept paper revision. These additional details could be aimed at mitigating the perception of underperformance that her reference to procrastination and inadequacy might have engendered.

> <u>Every break time, I worked on my concept paper</u>. For example, <u>I took shorter lunch breaks</u> so that I could go to the library and work until it's time for the next class. […] So <u>whenever I had free time, I went to the library to work</u>. […] Doing a second revision was still okay, because, of course, it was just normal to have errors. But when it came to the third, fourth, fifth, sixth. Oh no, what's happening, why do I need to do this much revision when <u>I was doing all that I can do</u>. So, I was feeling more and more awful, until I couldn't take it anymore, <u>I just kept on doing the work.</u> ($058)

By highlighting her sacrifices and her tenacity throughout the seven cycles of revision, she might have been attempting to counterbalance her failings and present herself as a 'trier', not a failure.

It was noted above that the students' accounts related to the actions of achievement were consistent with the school's focus on knowledge and character traits. There were, however, a few accounts that pointed to students' experiences of tensions between the knowledge and character domains. Some students reported of inadvertent actions related to the completion of tasks for their inquiry projects that reflected on their character badly, such as when they contravened school rules (e.g., breaking into a closed laboratory or cutting classes in order to work on their projects). These actions had a negative impact on students' assessment outcomes related to character, which in turn affected other achievement outcomes. This is the account of one student about the fallout after she and her group mates played truant when they worked on their project at a university laboratory without consent from the school:

> During the semestral break, we went [to a university laboratory] to work on our project. But the problem is, we forgot to inform our adviser. […] Then, classes resumed; but our data gathering was nearly complete so we went back to the university to finish it. […] Our adviser texted to ask about our whereabouts. We replied about where we were and informed him that we were not able to ask permission [to miss classes and to work outside of school]. […] We realised that that incident had an adverse effect on our grant application. Not one of us qualified. […] It was only a one-time transgression but it had a

far-reaching effect; because it was the cause why the [screening panel for the grant] did not have confidence in us. [They might have thought] that if we did not know how to properly ask for permission, how could they trust us to work correctly, or follow processes and protocols. ($087)

The above excerpt illustrates the pressure the knowledge-related goals exerted on the character-related goals of students.

By framing achievement as the overcoming of challenges, the substantial investment of student resources and making sacrifices, students highlighted not only the outcomes that they achieved but also the extraordinary acts that they performed while undertaking their science inquiry projects.

10.3.3 Link to Emotion Work: Motivational Resilience

The three student discourses on the actions of achievement are linked to the concept of motivational resilience. Motivational resilience refers to:

> [T]he constructive energy focused on the hard work of learning: effort, enthusiasm, interest, and commitment, sustained on a daily basis and robust even in the face of obstacles and setbacks. [It] includes the quality and intensity of students' ongoing engagement as well as what happens to their engagement when they run into trouble: how they react and cope, and how they maintain or recover their forward momentum so they can re-engage with challenging academic tasks. (Skinner, et al., 2014, p. 331).

Consider the situations that engendered emotion work (discussed in Chapter 7) where students dealt with:

- Constraints (process, personal, and resource);
- Setbacks and failures, and their aftermath;
- Balancing the science inquiry project and competing school demands; and,
- Problematic situations related to peer participation in group work and teacher support.

It could be argued that these situations exert pressure on students' ongoing engagement. Evidence from students' narratives shows that, within these situations, some students--

- Lost: interest, focus, motivation, drive, excitement, energy, hope
- Felt: overwhelmed, lost, lazy, discouraged, uninspired, hate
- Reacted by: procrastinating, avoiding, neglecting, ignoring, reducing effort/not exerting effort (on project-related work)

Furthermore, these students attempted to change their emotion experiences and responses within these situations. One student told of working on her and her research partner's new research proposal, after the previous proposal was assessed by their adviser as unfeasible due to time

constraints. The new proposal was on a different field, so the student needed to build new knowledge in order to conceptualise a new investigation. Furthermore, she was also dealing with her research partner's lack of participation in the group work. Hence, in her story, she said that she was "doing everything [her]self" several hours before the deadline. In the excerpt below, she provided details on the challenging situation (1), her emotional response (2), her emotion work (3), her emotional recovery (4), and her re-engagement with the task (5):

(1) It was past three that morning and I was seriously freaking out. I had classes later in the day and I hadn't slept a wink. Even though I was extremely tired, I knew I couldn't sleep knowing [that later that day], we needed to [submit] our research proposal. […]

(2) That morning was one of the worst moments I ever had concerning research. I felt frustrated and disappointed [with] myself. I stared blankly at the screen. I didn't know how to feel. Should I motivate myself that everything's gonna be fine? The next thing I knew, tears were falling. I was curled up like a ball, feeling helpless. I knew I was losing hope. […]

(3) [To give] myself a break from the heavy feeling, I searched for motivational quotes. I tried to find the perfect words that could lift me up. From hundreds of them, one great saying stood out. It wasn't that rare or unique; but I felt like it held everything I needed at the moment. "Never give up." Reading these words, I felt whole again.

(4) I was broken, [I] fell apart; but I stood up with these three simple words and did everything I could to overcome this challenge. I slept [after] 4am that morning and woke up at around 6.30am.

(5) Of course, it was still extremely hard; but I did my best and we're able to submit our proposal on time. ($052)

The underlined passages in the above excerpt reflect the 'overcoming challenges' discourse and provide evidence of the students' emotional recovery. According to Skinner et al. (2014), emotional recovery after a distressing encounter with challenging situations is a necessary part of the process of re-engagement. It could be argued, therefore, based on evidence in students' narratives, that emotion work can facilitate emotional recovery, which leads to "the maintenance or intensification of one's efforts and determination" (Skinner et al., 2014, p. 337).

Not all emotion work results in emotional recovery or re-engagement, however. In the following illustrative excerpt, the student's emotion work did not successfully result in re-engagement, after he experienced a setback due to his failure to qualify for the elite stream. His account alluded to the 'substantial investment of personal resources' discourse, when he spoke about the diligence that enabled him to previously perform academically at the top of his cohort in the research subject (see excerpt from narrative $054 in Section 7.6.2 for additional details). His reference to wanting to be diligent

again reflects his awareness of a target behaviour for his emotion work. However, despite his long-term efforts at emotion work (i.e., by deploying various strategies, namely, resignation, self-compassion, reflection, comfort-seeking from peer/friends in the same situation, emotional detachment, motivated forgetting, self-affirmation), he was not able to return to that level of effort and determination after over one year.

> [T]he results came out and I was in the [non-elite stream]. It's like, I was downgraded [embarrassed laugh]. […] I was really depressed and, then, in the succeeding quarters my grades went lower and lower. That's it, it's just sad. Because I wanted to be in [the elite stream] but ended up in [the non-elite stream]. […] I accepted it because you can no longer change it. <u>But my diligence in the first quarter did not really come back. That's why I said that I really wanted to get back my diligence. […] But I don't think I would ever excel in research again; I no longer have the motivation.</u> […] Actually, my first quarter grade [for the research subject in third year] was 1.25, the highest in the batch. Then it became 1.5 in the second quarter, 1.75 in the third and fourth quarters. And now for the first quarter of fourth year, it was 2.0[36]. […] I really became lazy in research, because I did not get what I wanted. At that time, I felt that I really needed it so that I could continue with that good performance. ($054)

From the perspective of motivational resilience, then, emotion work can be viewed as students' attempts to deal with their emotional responses to challenging situations that presented threats to and pressure on their motivation to engage in their science inquiry projects, so that they can continue, or return to, performing the actions of achievement (i.e., investing resources, making sacrifices, and overcoming challenges). In essence, students' discourses on the actions of achievement defined a behavioural profile of (re)engaged students—that is, (re)engaged students make substantial investment of personal resources, make sacrifices, and overcome challenges. This behavioural profile, then, functioned as a shared target for students' emotion work.

10.4 The Standards of Achievement

This section features the school and student discourses on the standards of achievement, and how they were linked to students' emotion work.

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[36] In a later story, the student told that, in the next quarter, his grade went down further to 2.25.

10.4.1 School Discourses: Achievement is characterised by "excellence in all undertakings".

The students are expected to demonstrate a "passion for excellence", by "continuously and tenaciously" striving for it in all that they do. It is implied that mediocrity is not acceptable, when it is explicitly stated that students ought to distinguish themselves by "doing [their] best at every opportunity", going "beyond what is expected", "surpassing [the] usual" and "achieving outstanding [or "the highest possible quality of"] performance".

This ideal is perpetuated by school rituals that define what excellence is. For instance, special ceremonies are held regularly for the giving of recognition and prizes to students who achieve high marks in academic subjects. Students' outstanding performance in school, national, and international competitions are celebrated with posters on school notice boards, with news features on the school website and in mainstream media, and with large banners along by the school perimeter that feature the achieving students' names and photos. Previous students who distinguish themselves in their post-secondary science education and in their science-related professions are invited back to the school to inspire the current students.

The science inquiry projects, in particular, are held up as students' works of great merit. The importance of these projects has been underscored through the years by school-sanctioned activities. There are regular events that give students the opportunity to present their science inquiry projects to school communities, to local communities, to science professionals, and to national and international audiences. The students are also encouraged and supported to join national and international research competitions as representatives of the school. Moreover, annual research grants from a corporate sponsor are awarded to selected students in an elaborate special ceremony after a rigorous, competitive application process. Sponsored prizes for best researchers and best science inquiry projects are given during research events in school and the students' graduation ceremony. At the class-level, the research advisers/teachers post progress markers for all the research students on the school notice boards, thereby giving the school community and its visitors a visual representation of the project milestones the students achieve, and how they compare with their peers.

10.4.2 Students' discourses reflect an alignment with the school's standards of achievement.

Three student discourses on the standards of achievement were drawn from the narratives. These are presented in the table below (see second column).

Table 10.4 Student discourses on the standards of achievement.

Representative Excerpts from Students' Narratives	Student Achievement Discourses	Achievement-Related Concerns Linked to Emotion Work
Last January 28, we had [the school research competition]. […] It was such a great accomplishment, standing there in front of everyone and presenting our study. […] It was not only possessing that knowledge that only you know, but being able to share it with everyone was just amazing. It was different. It wasn't like the joy of winning a quiz bee or acing a test. It was something else beyond. ($090)	Achievement is attaining success in high-stakes opportunities	Social validation Demandingness
We successfully passed our [defence] and got our proposal accepted! […] [The] proposal is just one of the first steps. But it feels really satisfying and heavenly to have your proposal accepted. ($039)	Achievement is reaching school milestones and standards	Social validation Demandingness
[Our group leader] is the type who wants every task to be completed and it should be perfect. She is not bossy, it's just the way she is. […] So when she told me and another group mate that she would be away and that we should take responsibility for preparing for a [competition], I had mixed feelings. I was happy that I would be able to show how good I am; but sad because of the additional work. But I was more nervous that I would make a mistake, […], we would not qualify, and our [group leader] would be mad at us. […] I felt responsible. […] Because there were only two of us, […] we rehearsed several times […]. It was hard work and time-consuming but fun, especially when we were becoming good at it. […] When we presented to the research advisers, I was a bit nervous; but for me, we were able to perform what we had rehearsed. ($001)	Achievement is satisfying self- and peer-imposed standards	Demandingness

In Section 10.4.1, it was shown that the school discourses on the standards of achievement had two components: (1) the qualitative description of 'passion for excellence', and (2) the school rituals that specified the

'excellence' that the school recognised and the markers for this excellence. When these are compared with the student discourses, it is evident that the first two student discourses—'achievement is attaining success in high-stakes opportunities' and 'achievement is reaching school milestones and standards'—reflect students' acceptance of the school's markers for excellence. The third, on the other hand, (i.e., 'achievement is satisfying self- and peer-imposed standards') represents an alignment with the qualitative description of 'passion for excellence'.

Achievement is attaining success in high-stakes opportunities. The high-stakes opportunities referred to in students' narratives were the recurring events (i.e., school rituals) wherein students presented their projects to local and international audiences, and win honours, grants, awards and prizes for them. These were opportunities which the school had purposely designed or sought out for the students and their inquiry projects. Since these opportunities were selective, by availing of them, students were subjecting themselves and their projects to more rigorous than usual standards. One student, for instance, wrote of the additional responsibility:

> I've also got a research grant to hold on to—meaning, I have to be a model researcher to other scholars—requiring me to show proper behaviour and enthusiasm in conducting research. ($010)

Their value in influencing the quality of students' efforts and outcomes was reflected in students' high regard for these opportunities, as indicated by the way students referred to them in their narratives: "a big deal", "a dream", "an ambition", "a cherished desire", "an inspiration".

Many students considered these high-stakes opportunities the pinnacle of achievement with respect to their science inquiry projects. According to the students, these opportunities were –

- An indicator of a successful project, of their competence, of other people's perception of them as researchers and of the value of their projects, and of how they compared with their peers.
- A "payoff for all pain, sweat and tears", and a recognition of, or recompense for, their hard work and the challenges they overcame.
- A source of prestige, pride and satisfaction.

Moreover, because these opportunities were given only to selected students and had been going on for many years, their prestige also derived from the sense of belonging and tradition that they imparted to the students. For instance, regarding the research grant, one student was "grateful to be part

of <u>batch 10</u>[37]"; while another who failed to win a grant reported a "feeling of jealousy that you don't belong [with] them". A third student pointed out one way the school cultivated this sense of belonging and tradition:

> In a way, it's a source of pride. Because if you are student, it's a big deal if you are a grantee. [*Pointing to the photos of previous recipients of the grant*] There they are, you will be one of them, and your photo will be up there. ($053)

Achievement is reaching school milestones and standards. As depicted in students' narratives, school milestones referred to the key stages or activities in the science inquiry process that marked the students' progress in the undertaking of their science inquiry projects (e.g., conceptualisation, pilot testing, data gathering). School standards, on the other hand, were prescriptions on what the students should be as researchers (e.g., independent, responsible), what their projects should be (e.g., has a sound scientific basis), and what their outcomes should be (e.g., pass proposal defence).

Students' attainment to these milestones and standards were directly monitored by the research teachers/advisers, who, then, reflected their assessment of students' performance via different forms of external evaluation: oral and written feedback, streaming, grades, and recommendations to high-stakes opportunities. The following excerpts illustrate the power teachers had over the students and their projects by virtue of their roles as evaluators and enforcers of standards:

- *On students' engagement with their projects*.

  Well, we can do the work, but sometimes our feelings towards that activity, […] we hate it. But even if we hate it, we show to the teachers that we are willing to do this […]; because maybe one of the criteria that they judge us on is our willingness to do research. We are really willing; it's just sometimes we are already so stressed and tired inside, but we still need to act as if we are willing to do it, maybe for the grade. ($055).

- *On the conceptualisation of students' inquiry project*.

  We were not able to defend the concept of our research proposal. So, the panel [of research teachers] decided that we will change something [in] it. ($083)

- *On students' access to high-stakes opportunities*.

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[37] This particular research grant has been awarded to selected students annually for the past nine years. The current group of students comprised the tenth cohort of recipients.

> [My research] is complicated and […] that complexity has attracted the attention of the research committee [composed of research teachers]. They decided to enter me and my study in research events, namely, [a national] research competition and the [international] search for young scientists. ($016)

Three kinds of students' perspectives towards school milestones and standards can be identified from their narratives:

1) *Mandatory*, by regarding them as school requirements which demand compliance.

> We have lost interest in research. We are just complying, because it is a requirement. We need to submit a research [project] in order to graduate. ($038)

2) *Indexical*, by viewing them as indicators of their competence, and of their standing with respect to peer achievement.

> When we were in third year, I found research easy. […] I was proud to be among the first to have their concept paper approved. ($033)

3) *Instrumental*, by considering them as means to the abovementioned high-stakes opportunities.

> [A]nother goal was to finish our paper for the [international] search for young scientists […] [Here's] what I did to accomplish my goals. First, my group mate and I finished our proposal, so that we could […] start with our data gathering. […] After finishing our data gathering, […] I needed to go back to school during Christmas break just to meet with my group mate, so that we could process our data. […] My group mate and I finished our paper and we were able to present in the [school research competition], the community science fair, and the [international event]. […] It felt like a success, being able to present to the world and meet new friends from other countries. ($013)

These three kinds of students' perspectives towards school milestones and standards seem to reflect the varying levels of internalisation that students attained (e.g., treating them as a school requirement that should be complied with versus considering them as instrumental to attaining their achievement goals). Internalisation is the process "whereby behaviours and values that are initially external and other-determined (i.e., by a teacher…) transformed into internal beliefs and values, and self-determined behaviours" (Davis, 2003, p. 215). Thus, some students in this study seemed to choose to reach these standards and milestones, not because they were externally compelled, but because they "perceive[d] them as personally relevant or important" (Davis, 2003, p. 215).

Achievement is satisfying self- and peer-imposed standards. Evidence from the narratives shows that, in addition to school milestones and standards, and the standards related to high-stakes opportunities, students were also influenced by self- and peer-imposed standards. These personal

standards could be inferred from students' accounts that featured the following:

- *The conscientiousness they demanded from themselves and their group mates, in the pursuit of best outcomes.*

  [Our group mate] texted us that we must understand the whole study; we should not just submit [outputs] for compliance. So, my other group mate was hurt, because he seemed to imply that we are not doing anything right, we are just passing outputs for the score, without understanding them. ($038)

- *Their (overly) critical evaluations of their, or their group mates', behaviours and outputs*[38].

  I feel that our research [project] lacks worth, because it seemed that we really did not exert much effort; we only inputted [data into a computer]. I feel that our project does not satisfy the standards of the [elite stream][39]. ($028)

- *The high goals they set for themselves and their group*[40].

  We are not on good terms. [I and a second group mate] are rather carefree […]; but our other group mate, he is so grade-conscious. He was aiming to get a 1.0[41] in research, but we could not do it […]; because the basis of our grade was the progress [we made]. At that time, we had no progress; because we could not understand [our methodology]. So we have not been talking in our group, even until now. ($028)

On the whole, the three students' discourses on the standards of achievement—attaining success in high stakes opportunities, reaching school milestones and standards, and satisfying self- and peer-imposed standards—functioned as students' way of managing the perceived expectations associated with the school's standards for achievement. Based on the accounts of some students, these discourses were not static views; rather, students shifted from one discourse to another, adjusting the

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[38] This idea was suggested by the discussion on perfectionism in Dunkley, Blankstein, Masheb, & Grilo (2006).

[39] This statement reflects the student's self-evaluation as a result of comparing the amount of work their project required to those of their peers within the elite stream, many of whom performed field work or laboratory work. This was not a teacher evaluation. This excerpt was from an earlier account. In her later stories, the student reported that this project won prizes in school and national research competitions.

[40] This idea was suggested by the discussion on perfectionism in Dunkley et al. (2006).

[41] This was the highest possible grade.

standards they adopted to the changing circumstance. Two students, for instance, lowered their achievement expectations because of perceived constraints:

> I wanted to apply for the research grant, because it's a privilege and an honour. But we couldn't make the deadline, so I'll just accept that I can't. […] I just think that even without the grant, we will do our research anyway, we will just complete [the project]. ($046)

> I want to join competitions; because if ever we would qualify, there's a chance to go [abroad]. It's like 'wow'. And from the start, that's what I and my group mate have been aspiring. But because of difficulties [with the uneven participation of a third group mate], we set that aside in the meantime. Our priority at the moment is to complete the research. ($055)

By shifting from one discourse to another—as in the case of the above excerpts, from the 'achievement is attaining success in high-stakes opportunities' discourse (i.e., research grant, competitions) to the 'achievement is reaching school milestones and standards' discourse (i.e., completing the project)—the students could be positioning themselves, so that, even with their inability to reach some achievement goals, they could still be perceived by themselves and by others to be satisfying the school's standards of achievement. (This idea is discussed further in Section 11.4.4 under 'Students' achievement discourses as emotion work resource'.)

10.4.3 Links to Emotion Work: Social Validation and Demandingness

The two concerns that are related to the discourses on the standards of achievement are social validation and demandingness (see third column in Table 10.4).

Social validation. Social validation, as referred herein, pertains to positive feedback from the school (and its agents) and significant others (e.g., scientists and experts who acted as consultants or competition judges) about how students performed as researchers[42], within the context of the undertaking of two-year open science inquiry projects. As novice researchers, students used the judgement of significant others as a gauge.

In reference to this study, it is argued that succeeding in high-stakes opportunities and reaching school milestones and standards were forms of social validation, which provided affirmation to students that their actions and

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[42] This particular definition was suggested by the idea of social validation, in relation to the socialisation of newcomers in their new workplace, in Smith, Amiot, Smith, Callan, and Terry (2013).

outcomes while undertaking their science inquiry projects were aligned with their perception of the school's standards of achievement. Therefore, when considered from the perspective of social validation, the two discourses on the standards of achievement –'achievement is attaining success in high-stakes opportunities' and 'achievement is reaching school milestones and standards'—provided students with a shared way of determining failure and success. In essence, these two discourses served to define (1) failure-related situations that could potentially be emotion work-engendering to students, and (2) success-related situations that students could use as resources for emotion work.

When students failed.   In students' accounts of instances of failure to reach the perceived standards, one response to failure that underscored students' need for social validation was their attempt to get over the negative experience of failure, and to focus on reversing that failure or on succeeding in the next achievement opportunity. In the following two excerpts, for example, the students set their sights on succeeding in other achievement opportunities in the process of dealing with failure to qualify for the elite stream (first excerpt) and to participate in a competition (second excerpt):

> The results came out and I was surprised that I only got into the [non-elite stream], even though I applied for the [elite stream]. In that moment, everything fell on me; it's like my research life had come to an end. […] I poured everything into my research and then I only got to be in the [non-elite stream]; that was so unfair in so many ways. […] After that, my classmates started teasing me about being bitter about my stream. […] I can only say that the [research teachers] are sometimes wrong in choosing who is rightful for the [elite stream]. […] If I couldn't be [in the elite stream], I would prove to them [i.e., the teachers who comprised the selection panel] that they were wrong in putting me [in the non-elite stream]. My research group mates [and I] tried to be equal with [students in] the [elite stream]; we joined the [school research competition that was judged by science research professionals], [a national science research event], and even won prizes for our research project. […] Our classmates were telling us that we deserved to be [in the elite stream] because of what we had achieved! ($025)

> I can say I moved on. […] Because of that experience [i.e., a competition judge's negative evaluation of their project], I learned how to handle my feelings so that [my performance in] other subjects would not be affected. I felt tremendous sadness; but I learned to consider it a good thing. […] <u>I moved on, because I know there are still many other opportunities. I told my [research] partner that we should try other opportunities.</u> When we decided to give up the competition [after a negative evaluation from a judge during the preliminary round], we told ourselves that perhaps it was not for us. We just accepted the fact and then moved on […], just have a positive outlook when it comes to research. ($098)

There are two ways of looking at students' attempt to move on to the next achievement opportunity when they failed in attaining an achievement goal. One, as depicted in the first excerpt above, students' pursuit of success in the next achievement goal can be aimed either as an affirmation of their sense of self (see Cohen & Sherman, 2014, for a similar idea), or as a means of discounting the validity of negative external evaluation (see Lesko & Corpus, 2006, for a similar idea), which arguably could be strategies for students' emotion work.

Two, students' pursuit of the next achievement goal is a result of their emotion work related to their attempts to 'move on' from failure, as shown in the second excerpt above. In a later story, the student reported that she and her research partner were successful in their application for a research grant a few months after their withdrawal from the abovementioned competition. The emotion work in this case is, in many respects, similar to emotion work related to emotional recovery and motivational resilience needed to re-engage (see Section 10.3.3); only that, in this case, the emotion work is more specifically related to the attainment of socially shared indicators of success (which could also be part of students' aims for re-engagement).

When students succeeded. When students obtained good outcomes with respect to high-stakes achievement opportunities, school milestones and standards, this success became a resource for emotion work in two ways: (1) as recompense or consolation that they used to put into perspective their experiences of challenges and failures, and (2) as a source of motivation in pursuing the next achievement goal.   In the following excerpt, for example, the student, whose first proposal failed to get approval, used her success in her second proposal defence as a consolation for the hard work that she invested and as a source of optimism for facing a future milestone (i.e., the completion of the project):

> We passed out second defence, but it was not without undergoing a lot of hardships. […] It was very tiring; but after passing the defence, it was all worth it. […] After the defence, I felt really elated. I can't really explain how happy I had felt—after all those hours I spent in front of my laptop, the nights I stayed up late, the eye bags, and the tears that I had shed. I feel like finally after a very long time, things are starting to make sense again. I don't feel lost anymore. I can really feel that I can do this. I can go all the way to finish research. I feel like the sun is shining on me (this is how I really feel). I couldn't help smiling after we got out of the [venue] after the defence because I knew that we finally did it (we got our proposal approved!!). ($118)

One compelling reason for students' emotion work, as related to the pursuit of social validation, could be the desire to maintain their self-definitions and

social identities. High-stakes achievement opportunities, as well as school milestones and standards, (1) challenged students' self-definitions, and (2) attached social labels to students, thereby assigning them into groups. Thus, when students failed to reach these standards, the impact on their need to maintain their self-definition and to belong to what they perceived to be the desirable social group activated regulatory strategies, such as emotion work. For example, the following excerpt shows the shifts in the student's self-definition ("independent") and social identity ("member of the elite stream"), after getting a sub-standard grade. Her emotion work is implied in her attempts to console herself by asserting her expenditure of effort to stay in the elite stream and by highlighting the upside of being in the non-elite stream ("less pressure"):

> I belonged to the [elite] stream—that was until my research partner and I got a grade of 2.25[43]. I don't know whether I'd be sad or happy. Perhaps I'm sad because it was nice to think that in the [elite stream] you are one of a select group; and I know we had exerted effort to stay in the [elite stream]. At the same time, I'm happy because there would be less pressure when it comes to requirements. If you're in the [elite stream], there is not much teacher input. You are expected to be independent. I guess we're not. ($032)

Demandingness. Demandingness refers to the quality of a learning environment that is characterised by "high standards for performance and behaviour", "by enforcement of rules to meet those standards", and by the expectations that students would "work hard and challenge themselves academically" (Pellerin, 2005, p. 1166). The combination of the three student discourses on the standards of achievement—(1) 'achievement is attaining success in high-stakes opportunities', (2) 'achievement is reaching school milestones and standards', and (3) 'achievement is satisfying self- and peer-imposed standards'—underscored the demandingness of undertaking science inquiry projects. When these three discourses on the standards of achievement are considered, achievement was not merely about good behaviour and good grades, the traditional notion of achievement in school. Instead, achievement, for these students, became the pursuit of so many other achievement goals (e.g., winning an award), milestones (e.g., passing the proposal defence), and standards (e.g., conceptualise an ethical research project). For some students, the multiplicity of achievement goals, in addition to their tendency as high-

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[43] Students must maintain a quarterly grade of at least 2.0 to stay in the elite stream. If not, they were transferred to the non-elite stream in the next quarter.

achieving students to have overloaded agendas (Ideacast, 2011), translated into heavy demands on them, which heightened the emotiveness of undertaking science inquiry projects.

Students' narratives provide clues to students' emotion experiences within this demanding learning environment and the conditions (in italics, below) within this environment that engendered the heightened emotiveness:

- *The effort required to obtain satisfactory outcomes was onerous, especially when compared to other subjects.*

  The word research is usually associated with the word hell, because it sucks the life out of the students doing it. It felt like a 40-unit subject[44]; [getting a passing grade in] the subject requires the sacrifice of blood, sweat, and tears. ($002)

- *It required a certain level of maturity[45], in terms of managing one's self/actions.*

  Research taught me <u>the importance of time management, orderliness, focus, responsibilities, dedication, cooperation, team work</u>, and, most especially, <u>love for the work I'm doing</u>.[…] In my one-year experience of research, I faced a lot of trials, [and] solved a lot of problems. But within this short period of time, <u>I realised that if you will not [make] a move and pass requirements in every task our teacher gives us, you will have a hard time coping and […] catching up to [peers] who pass on time; and [your] grades will suffer</u>. Research also taught me the true meaning of taking risks. In pursuing our study, <u>we really had to take courage [in the beginning] to stand up for it</u> [during the proposal] defence; [also] in consultations and in other occasions when we need to give supporting articles and [write] very good paragraphs, [in order to satisfy] what our research adviser wanted from us. […] In research, <u>we need to know what we are going to sacrifice and what we are going to choose</u>. […] Research is full of choices, from thinking about your proposed problem for the concept paper, to choosing your research [group] mates; there was decision making in every turning point that we encountered in all this time. […] <u>It is so stressful</u>, but if you [overcome] all the challenges, [it brings] a feeling of fulfilment. ($026)

- *It involved the management of requirements for and performance of different activities.*

  I believe that the research experience has made me more serious and stressed. It aged me a lot and I smile less. I get wrinkles and eye bags because, sometimes, I'm sleep deprived. It is very fun to learn scientific concepts; but research in [this school] is very […] meticulous. The pressure of DEMANDS [*emphasis hers*]—time limits, deadlines, repeating of data gathering, methods, research paper (this especially),

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[44] Science research was a one-unit course.

[45] Maturity demands are one aspect of demandingness (Pellerin, 2005).

logic concepts, and especially the grammatical errors and rephrasing in the research paper—is frustrating and annoying. ($022)

- *It introduced cognitive demands that were different to what students were used to in their other school subjects.*

    When we were asked to write an essay about a life-changing experience, I told about research. I think that it is the only [school work] where you can't copy or cram. ($028)

- *Teachers strictly enforced the rules on standards.*

    Our adviser told us that the panel [of research teachers] would not agree to the new study we were proposing, because it did not fit with our being in the [elite stream]. In other words, our new proposal was too easy for the [elite stream]. He also said that [the panel's decision] was in line with our training as science students [and] scholars […] At that time, [my research partner and I] felt terrible; that moment where we had to choose whether to continue with our old study or to give it up and pursue the easier one (which unfortunately did not pass the standards of the [elite stream]). ($012)

Evidence from students' narratives suggests that the student lore in this school might have influenced the way students apprehended the standards-related achievement discourses of the school, particularly in the way students perceived the demandingness conveyed by these discourses. For example, some students experienced negative emotions related to the undertaking of the science inquiry projects a year or more before they became research students, because of student lore which highlighted the demandingness of undertaking science inquiry projects. Students handed down stories from one cohort to another, which elicited anticipation anxiety in younger students:

    I was really nervous […] when the students [in older cohorts] told us what doing research is like. Terror teachers, goodbye to social life, and hello failing grades—these were just some of the things that made me fear for my third- and fourth-year high school life. ($024)

Thus, some students were performing emotion work even before they actually undertook a science inquiry project:

    [R]esearch started on our third year. I always dreaded entering my third year. For my [first] two years in [this school], I managed to forget about it. It was quite a surprise when I finished the first quarter in research and I did not feel the "big stress" that everyone had been talking about. ($031)

The lens of demandingness foregrounded the teacher-student interaction related to teacher authority in the enforcement of standards, a situation that could engender emotion work. The power relations with respect to the teacher role as enforcer of school standards is highlighted in the following excerpts. In the first excerpt, the student depicted compliance as an

emotion work strategy. The second excerpt, on the other hand, shows how emotion work could be engendered in the process of negotiating the uneven power relations:

> Our classmates, who were also late in submitting an output, told us that [our output] would not be accepted because [the teacher] was very strict. The root cause why we were not able to meet the deadline was our faulty time management, and because the teachers were strict. To cope with their strictness, we had to be much stricter on ourselves when it comes to completing and submitting our work on time. Because we did not want to go through the panic and the stress again; it was not a good feeling to experience. ($045)

> There were times when [my adviser] could be demanding, that I had to fight for what I wanted for our research. When I won, I felt good. But [when] he won, I felt awful. Over time, I learned to deal with this and I pretty much felt better. ($002)

With respect to the concept of demandingness, what underlay students' emotion work was their awareness that virtually every situation related to the undertaking of the science inquiry project was an evaluative and performance context. Their emotion work could be depicted relative to the following three aims.

First, they performed emotion work that would maintain the impression of high-level engagement in their projects and elicit a positive evaluation from significant others (i.e., usually the teacher). Students were strategic about their emotion displays, such as the student who displayed to the teacher engaged behaviours "for the grade", despite her dislike of the activity (see excerpt from narrative $055 in Section 8.3.2 under 'Public display of emotion…'). They also anticipated worst case scenarios in performance situations (e.g., defence proposal) and moderated their emotional impact by preparing for them (e.g., mock defence with group mates). Furthermore, students engaged in persistent problem solving to overcome constraints and setbacks, and increased their efforts as response to failures. They also performed task-directed emotion work to aid in the attainment of achievement goals despite deficient peer and teacher support (e.g., a doer taking over the loafer's work to ensure a high quality group output).

Second, they performed emotion work that would support their demonstration of good behaviour. Students, for instance, suppressed the display of what they considered inappropriate emotions in the classroom, and during problematic interactions with peers and teachers (e.g., one student vented in private to prevent herself from making a rude response when talking to her teacher). They also did not show overt resistance against teachers' actions related to the enforcement of school rules and

code of conduct. Instead, they deployed passive strategies to deal with their emotion experience and the situation (e.g., acceptance of teachers' decision regarding streaming and deadlines).

Third, they performed emotion work that was self-protective in order to deal with stress that is inherent in a demanding learning environment. For example, they performed situation selection by avoiding achievement goals that would engender too much stress for them (e.g., a student deliberately chose to be in the non-elite stream). They also adopted alternative perspectives about their failures and the negative evaluation that they received in order to reduce the distress these failures and negative evaluation evoked, and counteracted their negative impact on their sense of self by performing acts of self-affirmation.

On the whole, the three student discourses on the standards of achievement reflected the students' acceptance of the demandingness inherent in the learning environment that the school provided.   Because of the substantial emotional demands on students, emotion work was necessary for effective student functioning within such learning environment.

10.5 Chapter Summary

This chapter presents the school and student discourses on achievement, as drawn from school artefacts and students' narratives, respectively. Three strands of discourses were discussed: (1) the rationale for achievement, (2) the actions of achievement, and (3) the standards of achievement. Student discourses, for the most part, showed agreement with the school discourses. These discourses endorsed the image of high achievement that the school promoted and the students supported. Furthermore, students' narratives showed that these discourses could be linked to students' emotion work, in terms of these educational concerns: student motivation, locus of control, motivational resilience, social validation and demandingness.

Chapter 11
Discussion

This chapter presents a discussion of the research findings, and their implications for research and practice, as well as reflections on the methodology and suggestions for future research.

11.1 Chapter Overview

The chapter begins with a presentation of the key contributions of the study (Section 11.2). Then, the next two sections elaborate on these key contributions. Section 11.3 expounds on the proposal that students' emotion work is a significant component of school work. The following section (Section 11.4) discusses the social-cultural context for students' emotion work (i.e., social resources, teacher involvement, peer involvement, and achievement discourses). The subsequent sections feature the implications for practice and research (Section 11.5), limitations of the study (Section 11.6), reflections on the methodology (Section 11.7), and concluding remarks (Section 11.8).

11.2 Key Contributions of the Study

Students' emotion experiences in school and the important role they play in student engagement and achievement have been the focus of a surge of research interest in the affective dimension in recent years. However, while some of the studies have foregrounded students' emotion experiences in school (e.g., Bellochi & Ritchie, 2015) and have shown that students do employ strategies to manage their emotion experiences (e.g., Buric et al., 2016), naturalistic studies that provide insights into the contextual factors that engender these emotion experiences, and that show that emotion experiences are not merely reactions, but that students do manage their emotion experiences to aid in the achievement of their academic goals, have been sparse. The present study has attempted to address this gap by looking into students' emotion experiences, which they articulated in their narratives, through the lens of emotion work. In the personal accounts of 44 students, the 'work' that students do in managing their emotion experiences in school has become more apparent; thereby showing that, for these students, emotion experiences in school were not merely an underlying condition for student engagement and achievement (Wang & Degol, 2013), but an aspect of school work that could be as important as studying, doing

homework, participating in classroom activities, and taking exams. One key idea that is claimed by this study is this: for the students in this study, emotion work was a significant component of school work.

The findings of this study reinforce what emotion regulation and academic coping researchers have already established—that is, students do have a repertoire of strategies for managing emotion. The families of emotion work strategies that were reported in Chapter 8 could be mapped onto the models and categorisations that have been conceptualised by researchers in emotion regulation (e.g., Gross, 1998) and academic coping (e.g., Skinner et al., 2013). Some of the specific strategies that the participants in this research deployed are even found to be analogous to some situation-specific emotion regulation strategies that student-participants reported in a previous study (Buric et al., 2016, see p. 146). However, previous studies either elicited students' emotion regulation strategies with minimal contextual details (e.g., Buric et al., 2016), or asked students to respond to questions with predetermined emotion regulation strategies (e.g., Nett et al., 2010). In contrast to these, the present study's use of students' narratives as data source afforded a deeper insight into the contextual elements of one particular learning environment that engendered students' emotion work, and the emotion work strategies that students deployed within these situations, instead of focusing attention merely on the strategies. Moreover, the use of narratives made the voice of the students more salient with respect to their emotion experiences in school. Therefore, one contribution of this study is to provide insights into the social-cultural context for students' emotion work related to the undertaking of extended/open school science inquiry projects, a particular school science learning environment that has not been explored with respect to students' attempts at managing their emotion.

This study provides empirical evidence for the hypothesised association between achievement-related messages from the students' social and cultural environments and their emotion experiences in school (Pekrun, 2006), and broadened it by not only focusing on the arousal of emotions in academic settings, but also on students' attempts to change their emotion experiences. By examining how achievement discourses shaped students' emotion work, the present study contributed a distinct focus to research that has been done on teacher classroom discourse (e.g. Turner et al., 2003) and discourse within teacher-student interactions (e.g., "pedagogical

messages" in Tainio & Laine, 2015); hence, the focus on school and students' achievement discourses is a novel contribution made by this study.

On the whole, the use of students' narratives and of emotion work as a conceptual lens brought the social and cultural context of students' emotion experiences in school into salience. The findings of the present study, therefore, might have potential value to educators and researchers whose fields of practice and research share common elements with the multifaceted context of this particular research setting: school science inquiry, open-ended investigation, collaborative work (with peers, and between teacher and student), independent work, extended project work, continuously assessed student work, group work, high-achieving secondary students, and selective science specialist school (see Tracy, 2010, on 'resonance').

The sections that follow elaborate on the abovementioned key research contributions. The discussion below is not organised based on the research questions. Instead, the key research contributions are explicated by drawing from and integrating the results reported for each research question (in Chapters 7, 8, and 10).

11.3 Students' Emotion Work as a Significant Component of School Work

While previous studies have focused on various school contexts and students' emotion experiences within them (e.g., science lessons in Bellocchi and Ritchie (2015); group work in mathematics in Linnenbrink-Garcia et al. (2011)), this study attempted to go beyond the focus on student emotions and on school situations that elicit emotions by directing attention to situations that engender students' emotion work.

Evidence from this study suggests that there are learning environments where the performance of students' emotion work is integral to the attainment of academic goals. Insights gained from students' emotion work narratives within the context of undertaking extended/open school science inquiry projects allow the abstraction of (1) the characteristics of such learning environments, and (2) emotion work that is integral to academic goals within these learning environments.

11.3.1 Characteristics of Emotion Work-Associated Learning Environments

Learning environments characterised by high ambiguity and high risk of failure can require students' emotion work that is directed towards the

attainment of academic goals. When students engage in learning activities with many unknowns and uncertain outcomes, they encounter highly ambiguous situations. High risk of failure by students within learning environments, on the other hand, may be attributed to high demandingness, and high interdependencies among people and processes. These are elaborated below.

Ambiguity in the learning environment. High levels of ambiguity can be attributed to open-ended tasks, boundary crossing to (learning) environments outside the school, and collaborating with others, as evidence from this study shows. Open-ended activities can present students with indefinite possible outcomes; thus, outcomes are difficult to anticipate and control. In the student-participants' experience of open science inquiry, for example, knowledge building as a novice, conceptualising an investigation starting with undefined or ill-defined problems, decision-making from many alternatives, and data gathering in real-world settings were some of the science inquiry activities in which a random variable could result in unexpected outcomes. Moreover, when students' learning activities take them outside of school, their entry into and their participation in the activities of people in settings that are culturally different from school can place them in unfamiliar situations with many unknowns. Collaboration with peers, teachers, and other people inside and outside of school can also introduce uncertainty into the learning environment (see also Jordan & McDaniel, 2014). Within collaborative contexts, roles, expectations, and participation can either be undefined or shifting; thus, other people's impact on the attainment of collective and individual goals can be unpredictable.

Risk of failure in the learning environment. "Demandingness" in a learning environment signifies high standards for performance and behaviour, and enforcement of rules to meet these standards, as well as expectations that students will work hard and challenge themselves academically (Pellerin, 2005). These standards, rules, and expectations are part of school structures and thus, external to the students. Hence, these are aspects of the learning environment over which students have very little control. Moreover, meeting these standards and expectations requires a certain level of maturity (Pellerin, 2005), which some young people in school are not developmentally able to fulfil.

Evidence from this study shows that the particular school, which served as the setting for this study, could be characterised as highly demanding, and was generally effective in conveying to students achievement-related

messages regarding what the students were expected to do and the standards they needed to reach (see Chapter 10). The expectations for students to achieve were explicitly connected to the social identities that they acquired by being members of this selective school; thus, failure in academic endeavours for the majority of the students in this study was considered a personal failing that threatened their sense of self (explicated further in Section 11.4.4).

Open school science inquiry, especially in the form undertaken by the students in this study, is an example of a learning activity that can have high interdependencies. Broadly, science inquiry might be viewed as a system involving processes and people (see also Windschitl, Thompson, & Braaten, 2008, for a similar idea). In open school science inquiry, processes and people can either be sequentially or reciprocally interdependent, in the sense that, the output of one is the input of another; and this dependence can be cyclical (Saavedra, Earley, & Van Dyne, 1993; van der Schee & Rijborz, 2003). Consequently, according to network theory, the failure of one of these interdependent parts can lead to a cascade of failures and the breakdown of the system (Buldyrev, Parshani, Paul, Stanley & Havlin, 2010). In the students' narratives, this was evident in how an early failure (e.g., a disapproved research proposal, social loafing of group mates) led to other failures (e.g., low grades, missing out on grants and competitions, exclusion from the elite stream, intragroup conflicts).

11.3.2 Students' Emotion Work That Facilitates the Attainment of Academic Goals

The attainment of academic goals in the aforementioned learning environments might require prolonged student engagement. In highly ambiguous and demanding learning environments, students might need to engage in repetitive tasks, cyclical processes, or extended activities for the following three reasons. First, some open-ended activities naturally result in incremental gains, and can require several iterations and the exploration of several alternatives before a desired outcome is achieved (e.g., conceptualising an investigation starting with an undefined problem). Second, the stringent enforcement of standards means that some student outputs require cycles of student effort and teacher (or expert) feedback before they are deemed to meet the standards. Third, interdependencies between tasks and between people make failure likely in intermediate processes; thus, persistent student effort is needed to overcome these intermediate failures and achieve the desired final outcomes.

In highly ambiguous and demanding learning environments, the requirement of prolonged engagement might have adverse effects on students' progress towards their academic goals. Consequently, students might have to deal with negative emotion experiences, such as those related to feelings of being lost, of stagnancy, and of inadequacy, as students' narratives have shown. Evidence from previous research shows that in highly ambiguous situations, students are liable to experience emotions related to challenges and threats (Folkman & Lazarus, 1985). Furthermore, experiences of failure can elicit shame, anxiety and hostility (Krohne, Pieper, Knoll, & Breimer, 2002). The findings of this study suggest that students' competence to manage emotion experiences related to uncertainty and failure might be important in the attainment of academic goals.

Students' accounts of their emotion work while undertaking extended/open school science inquiry projects align with the theorised associations between discrepancy reduction expectancies, goal-directed effort, emotion experiences, and disengagement (Carver & Scheier, 1990). Carver and Scheier (1990) theorise that when people pursue a goal, they monitor their present actions and compare them to some current salient standards, and make contingent adjustments to minimise the discrepancy. Furthermore, they propose that positive or negative emotions can be experienced depending on the appraisals of progress towards a goal vis-à-vis these standards. Thus, when one's progress towards the goal is perceived to be slower than the standard, one might experience negative emotions; on the other hand, the perception of being faster than the standard might evoke positive emotion experiences. When individuals perceive that they are unable to reduce the abovementioned discrepancy due to external or internal constraints, and to attain a desired rate of progress, the desire to disengage from goal-directed actions can be engendered.

The scenario described above was evident in students' negative emotion experiences when they perceived themselves to be not making as much progress in their inquiry projects as their peers, or based on their teachers' or their own expectations. They spoke of the fear of losing, or of the actual loss of, enthusiasm, interest, drive, or motivation in inquiry tasks and even their projects, as part of these experiences. Their accounts showed that experiences of uncertainty and failure, and the perception of their inability to meet some relevant achievement standards due to various constraints, evoked negative emotion experiences and triggered in some students the desire to disengage from some tasks, or from the project (see Section 7.4).

Some students did disengage for a time. It is, however, significant that despite the experiences of uncertainty and failure that students had encountered, none of the student-participants failed to complete their inquiry projects. This indicates students' motivational resilience (Skinner et al., 2014) and suggests that emotion work can be part of students' efforts to maintain engagement or achieve re-engagement in the pursuit of their academic goals (see Section 10.3.3 for an elaboration of students' motivational resilience).

Students' narratives showed that they employed a variety of strategies in order to deal with their emotion experiences so that they could complete their projects and achieve project-related aspirations (e.g., winning a research grant). Students' emotion work involved addressing constraints in order to achieve progress by help-seeking (e.g., consulting experts during knowledge building) and problem solving (e.g., looking for missing chemicals), by managing group functioning and mitigating the impact of group mates' uneven participation on attaining achievement goals, by containing the impact of teachers' misbehaviours, and by strategising to obtain teacher support (discussed further in Section 11.4 below). Students also performed emotion work to maintain engagement or to achieve re-engagement in situations involving setbacks and failures. They encouraged themselves by changing their perception of these situations, by seeking emotional support from others, by managing their and their group mates' emotional responses (e.g., to maintain optimism), by making the effort to 'move on' psychologically from setbacks and failures, and by performing acts of self-affirmation (e.g., increased effort, adopting alternative achievement goals).

The desire to maintain engagement or to achieve re-engagement depends on the value students ascribe to their goals. According to Carver and Scheier (1990), disengagement can be difficult from higher-order goals that have such a high value that one cannot disengage from them without effecting substantial changes to one's value system. In the case of the students in this study, the higher-order goals of maintaining their social identities as high-achieving and of graduating from the school (and not be excluded if they failed to complete their projects) assumed such high value. Hence, while they might want to disengage from efforts to attain some lower-order goals (e.g., by being off-task during one episode of laboratory work), the primacy of the higher-order goals would prompt them to re-engage to complete their science inquiry projects. In this sense, the performance of

emotion work is important in students' striving for high-order goals, and, specifically, in maintaining engagement or achieving re-engagement when encountering difficulties and challenges in school.

Previous studies reported some anecdotal accounts of students' emotion experiences with respect to open science inquiry as a challenging learning context (e.g., Grindstaff & Richmond, 2008; Polman, 2000; Ryder et al., 1996). Evidence from this study, however, extends the knowledge about students' experiences of open science inquiry by showing that the features of open science inquiry that were linked to students' emotion experiences acquire even more significance because they could engender students' emotion work.

11.4 The Social-Cultural Context for Students' Emotion Work

In this section, four elements of the social and cultural context of the emotion work of students in this study are elaborated: social resources, teacher involvement, peer involvement and achievement discourses.

11.4.1 Social Resources for Students' Emotion Work

Students' emotion work narratives revealed the emotion work-relevant resources and positions that were available to students in school and within the context of undertaking extended/open school science inquiry projects. One prevalent theme in students' accounts is their use of social resources for emotion work. These social resources were afforded by the people with whom the students were differentially related and by the broader social networks to which they had access via these relationships. Students looked to parents, relatives, friends, peers, and teachers for social support. Students' use of social resources for emotion work was related to the degree of familiarity students had with these people and the support that was afforded by these people. The kind of support that students sought from other people was dependent on their perception of familiarity with them, which could be based on kinship, fostered by immediacy behaviours, and engendered by experiential or emotional similarity.

Kinship. Close relationships bring with them the expectations of support. Social norms dictate that people share resources, provide help, and extend support to family and friends (Plickert, Cote, & Wellman, 2007). Generally, for the students in this study, family and friends were sources of familiar, predictable, and reliable support. They solicited support from parents and friends as they performed emotion work, specifically in relation to comfort-

seeking, help-seeking, problem-solving, venting, and social sharing. Their accounts show that parents (and parental figures) and friends were more frequently involved in students' comfort-seeking, help-seeking, and problem-solving than other people. Furthermore, students' experiences reflected that soliciting support from parents and friends was more spontaneous and less problematic than soliciting support from relationally distant people.

Likewise, the notion of familiarity was a significant condition in students' use of expression-related emotion work strategies. As previously noted in Chapter 8, students' deployment of venting and social sharing was done with parents and friends, but not with teachers. Because venting and social sharing involved negative emotional expressions and displays, students needed the security afforded by close kinship for these emotion work strategies. The prominence of the teacher's role as evaluator, on the other hand, might have inhibited students from involving their teachers in venting and social sharing due to concerns for self-presentation or impression management. Students' concerns for self-presentation or impression management might also explain why suppression of negative emotional expressions and displays was prevalent when students were in the presence of relationally distant persons.

While students could usually elicit sufficient emotional support from family and friends via social sharing, comfort seeking and venting, the perceived social support available from family and friends did not, in some cases, match students' needs related to help-seeking and problem solving. For example, some students in this study did not seek science inquiry-related help from their parents who were not science professionals. Instead, students solicited social support from relationally distant persons who had the required expertise.

Immediacy behaviours. Students' help-seeking from relationally distant persons (e.g. teachers, scientists) was influenced by the perception of closeness that was generated during their interactions. This perception of closeness is the student's subjective judgment of the sense of familiarity that exists between him- or herself and another person, and of the other person's responsiveness to the student's needs and goals[46]. Students' perception of closeness with such people can be fostered by these people's immediacy

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[46] This definition is partly based on the idea of "perceived partner responsiveness" in Reis, Clark and Holmes (2004, p. 203) and on students' depiction of perceived closeness in their narratives.

behaviours. Immediacy behaviours (e.g., listening, verbal expressions of empathy, smiling, name-calling, eye contact) are verbal and non-verbal communication behaviours that "convey warmth", engender positive feelings during interactions, and indicate accessibility and approachability (Andersen & Andersen, 2008; Jones & Guerrero, 2001). Thus, these behaviours could impart a perception of closeness. Evidence from previous research has shown that students are encouraged to seek teachers' help when teachers demonstrate their concern for "students' social-emotional needs" (Ryan, Gheen, & Midgley, 1998, p. 533). In this study, students sought help from teachers who were perceived to be warm and avoided teachers whose behaviours caused offence (discussed further in Section 11.4.2). Generally, behaviours that disrupted students' perception of closeness with teachers and peers curtailed their help-seeking, according to students' accounts in this study (discussed further in the next sections). Similarly, parents, friends and peers were normally the other party to students' venting and social sharing; but when these people failed to reciprocate with behaviours that maintained the perception of closeness (such as for example, by showing lack of empathy when students vented), students' emotion work via venting or social sharing broke down and students deployed other emotion work strategies.

Help-seeking is generally viewed as an indirect way to manage emotions because its immediate value is in modifying the situation that engenders emotion work. However, evidence from this study suggests that immediacy behaviours from providers of social support can increase the efficacy of help-seeking as an emotion work strategy by directly influencing the emotion experience. In this study, for instance, some students cited beneficial emotion experiences from their help-seeking from junior researchers in a research centre who were more accessible because of their readiness to help (see excerpts from narratives $109 and $116 in Section 8.6.2 under 'Support from experts') than from the senior scientist who scared them with her high expectations and negative evaluations (see excerpts from narrative $109 in Section 7.5.1 under 'Questioning' and in Section 10.2.3 under 'Student motivation'). This corroborates the findings of a previous study that the immediacy behaviours displayed by people who are regarded as sources of emotional support can influence the recipients' perception of the quality of support (Jones & Guerrero, 2001).

Experiential and emotional similarity. Students in this study showed a preference for social sharing with and help-seeking from people with whom

they perceived to have shared experiences or emotions, which can also foster a perception of closeness. In addition, outside of social sharing and help-seeking, the perception of experiential and emotional similarity has inherent value as a resource for emotion work. Students drew comfort and encouragement from the mere thought that they were not alone in what they were experiencing and feeling. This is also one reason that students gave for their decision to work with group mates on their projects, rather than to work alone. Research evidence supports these students' view—interacting with people who are experiencing the same emotions has been shown to have stress-buffering benefits (Townsend, Kim, & Mesquita, 2014).

Peers who experienced the same failures and problematic situations while undertaking inquiry projects, and parents who had research experiences (albeit fewer than peers), were significant sources of emotional support for students in this study. Students' accounts reflected their assumption that experiential and emotional similarity generates a perception of greater closeness, understanding, and empathy—affective outcomes that were also reported in previous studies (e.g., Suitor & Pillemer, 2000; Townsend et al., 2014). Students were able to identify people with whom they shared experiences and emotions by observing peers, by accessing student lore about peers and members of older cohorts that was transmitted from student to student, and by attending to other people's personal disclosures of their experiences.

Students solicited emotional support not only from research group mates and researcher-parents. Students' perception of similarity of experiences within the context of undertaking science inquiry projects extended to other people whose research experience, knowledge and skills overlapped with the students' inchoate research experience, knowledge and skills. Thus, students in this study turned to students from older cohorts and to peers whose science inquiry projects had similarities with their own, and to scientists and other teachers (i.e., aside from their research advisers) whose expertise intersected with the students' needs, for help-seeking (e.g.., in building declarative and procedural knowledge) and problem solving.

Access to broader social networks. One social resource that had been valuable to students was the access to social networks afforded by their family relationships, friendships, connections to teachers and group mates, and their school affiliation. Figure 11.1 below shows a summary of the social resources that students had access to via these social networks. Apart from these social networks, students also connected to virtual social

networks via the internet. Even without the benefit of interpersonal connection, students communicated with scientists, researchers, and business people online.
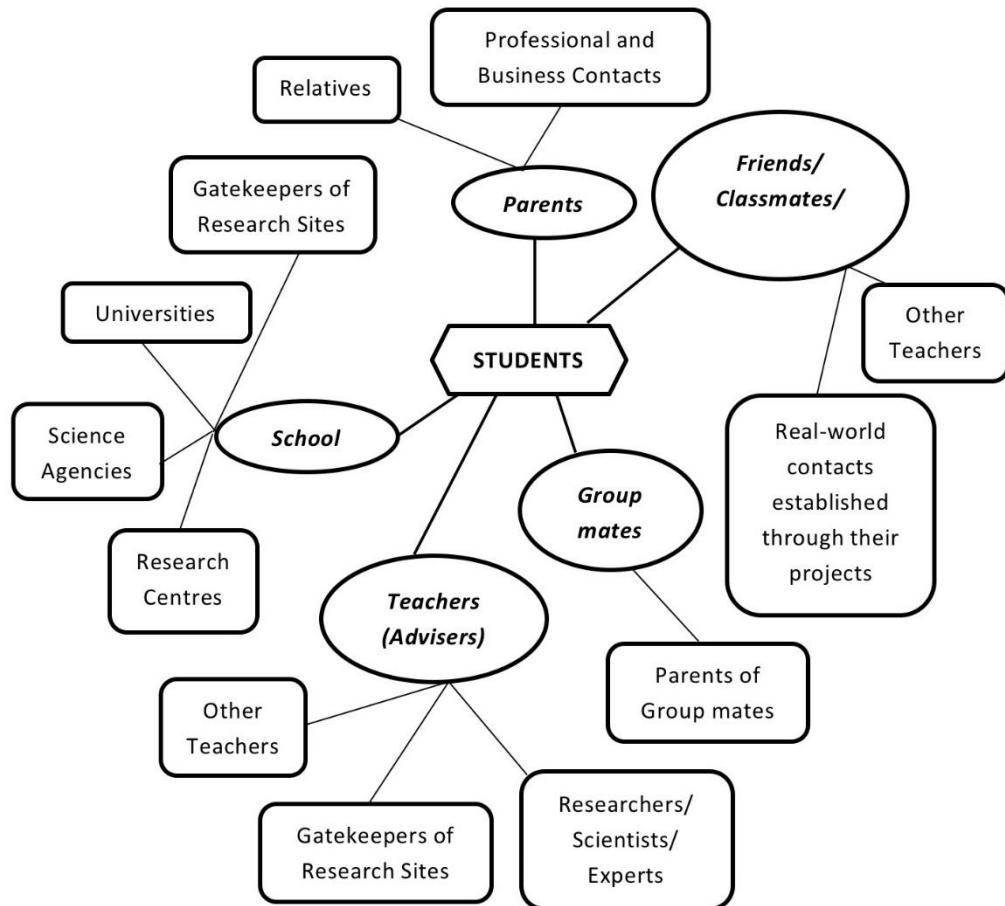
Figure 11.1 Social networks accessed by students during the undertaking of science inquiry projects.

People in these broader networks were relatively relationally distant; therefore, students did not solicit emotional support from them. Rather, the resources afforded by these social networks—in terms of knowledge, skills, and materials—were usually accessed contingently during students' help-seeking and problem solving. Since access to the members of these networks was through proxies (e.g., parent, friend, teacher), social sharing (or, other forms of personal disclosure) by students to these proxies about their support needs was the first step to making connections with members of the social networks. Furthermore, the nature of support that is being offered within this network is generally voluntary and is dependent on the tie

strength (i.e., the sense of mutual supportiveness; for example, "strong ties", see Plickert et al., 2007) that exists between the network member and the proxy through which the students channel the solicitation for support. Thus, the support that students derived from social networks were less predictable and reliable than support from relationally close persons. Therefore, their value for students' emotion work lies in their potential to change the emotion work-engendering situations. Furthermore, gaining access to the resources afforded by these social networks gave students stress-buffering benefits, especially when these resources matched the students' needs within the emotion work-engendering situations (see Cohen & Wills, 1985, for a similar idea).

Students' knowledge of the kind of support they can solicit from the various people in their social networks determines to a certain extent their engagement with emotion work-engendering situations. It was observed that the students who took on challenges related to their projects and achievement aims, persisted in problem solving, and showed resilience in the face of failures and setbacks—instead of avoiding challenges and problematic situations, or giving up—were also the students whose accounts showed that they had access to a wide range of emotional support and other social resources (e.g., the student who searched for the missing chemical in Sections 7.4.4, 8.3.1, and 8.6.2; and the student featured in the vignette in Section 7.9). Students' use of social resources for emotion work in this study provides empirical evidence to von Scheve's (2012) contentions: (a) that people's capacities to select and change emotion-eliciting situations are dependent on their social resources (as well as economic and cultural resources), and (b) that the distribution of these resources in social groups can be one explanation for the observable patterns in how people manage their emotions.

11.4.2 Teacher Involvement in Students' Emotion Work

Although the form of school science inquiry that the students undertook was less teacher-centred and more student-directed, students' narratives showed that teachers (i.e., their research advisers) can have various forms of involvement in students' emotion work.

Emotion-eliciting teacher acts. Teachers may find themselves involved in students' emotion work while pursuing the normal course of being a teacher, because many teacher acts in school can evoke negative emotion experiences in students. As reported in earlier chapters (i.e., Chapters 7,8,

and 10), the following teacher acts had been implicated in students' accounts of emotion work:

- critiquing student work/output,
- giving negative feedback and low marks/ratings,
- assigning challenging or difficult tasks,
- disciplining students for infraction of school rules,
- enforcing deadlines and standards,
- questioning to determine what students know and do not know, and
- labelling or categorising students based on school structures and standards.

Although students generally conceded that these pedagogical, regulatory, and evaluative acts were legitimate teacher acts, they sometimes evoked negative emotion experiences; and students had associated these acts with their experiences of self-conscious emotions, stress, demotivation, and threats to self-definitions.

Perception of unreliable teacher support. In some school contexts that require students to undertake extended independent work (such as long-term open school science inquiry), teacher roles can be varied, teachers can have multiple learning aims for students, and student-teacher interactions can have unstable dynamics. Evidence from the narratives, for example, showed that teachers could provide students with information in their role as co-constructor of knowledge as students develop their understanding of a science topic in one instance, and then, require students to find another information independently to develop their skills in information search and processing in another instance. Teachers could be solicitous and understanding when intervening in students' interpersonal conflicts, but could seem harsh and distant when enforcing deadlines. When this perceived fluctuation happens over time, students might find teacher actions or behaviours to be unpredictable, and teacher support to be unreliable. Students in this study expected teachers to display supportive behaviours and actions, which they used as a resource for emotion work. Therefore, when teachers were perceived to withhold support or display less benign behaviours towards them, students became anxious and distressed.

Teacher misbehaviours. Teacher misbehaviours can either engender students' emotion work or aggravate students' negative emotion experiences in other challenging situations.

Students' depictions of teacher misbehaviours in the context of this study align with the three dimensions of teacher misbehaviours that have been

established in previous research: incompetence, indolence, and offensiveness (Kearney et al., 1991, cited in Banfield, Richmond, & McCroskey, 2006). Incompetence that engendered students' emotion work, in the context of the school science inquiry undertaken by the students in this study, could refer to teachers' lack of relevant declarative and procedural knowledge related to students' inquiry topics, and their inability to provide helpful guidance in undertaking the various science inquiry processes. Indolence, based on students' accounts, was exemplified in teachers' negligence such as missing or postponing supervision meetings, inattention when students solicited support, forgetting to perform duties (e.g., convening a panel for students' proposal defence), and slipshod appraisal of students' output. Offensiveness, on the other hand, could be considered as teacher behaviours or actions during interactions that disrupted students' perception of closeness with them—for example, differential treatment of students (i.e., teacher's favourite), misidentifying students, forgetting key details of the students' projects, unreasonableness, and nonempathetic behaviours (e.g., laughing when students failed their proposal defence, sermonising about students' failings).

According to previous research, one important teacher support for students derives from the positive affect that can result from interactions with teachers (e.g., students' good feelings about themselves, motivations, and confidence) (Frymier & Houser, 2000). Thus, when the abovementioned misbehaviours evoked negative emotion experiences in students during teacher-student interactions and reoccurred over a period of time, it engendered in students the perception of nonsupportive teachers. In turn, because students had a taken-for-granted expectation of teacher support, the perception of unreliable support or nonsupport from teachers further evoked negative emotions, thereby creating a sustained cycle of teacher-oriented negative emotion experiences that engendered emotion work. Moreover, students' accounts showed that teacher misbehaviours could aggravate students' negative emotion experiences in other challenging situations (e.g., delays, setbacks), especially when teacher support (e.g., feedback regarding an output, guidance in task planning) was crucial in overcoming these challenges. This adds to existing research evidence that students' perception of nonsupportive relationships with teachers can lead to students' distress and negative affect for school (Davis, 2003).

Students' emotion work in teacher-centred situations. Students' emotion work in teacher-centred situations has two aspects: (a) emotion

work directed towards the teacher, and (b) emotion work related to the aim of mitigating the impact of these situations on student achievement.

Students' teacher-directed emotion work reflects the asymmetrical power relations between students and teachers. It could be argued that students' taken-for-granted expectation of reliable, appropriate, and sufficient teacher support, and their acceptance of the legitimacy of the aforementioned emotion-eliciting teacher acts (see the start of this section), are both predicated on teachers' dominant position over students. Students' awareness of their subordinate position with respect to teachers is reflected in their passive emotion work stances towards teachers. Generally, students dealt with their emotion experiences by deploying non-confrontational (i.e., with respect to the teacher) emotion work strategies (e.g. acceptance, resignation, self-affirmation, strategising, avoidance). Furthermore, they suppressed displays of negative emotion (e.g., anger, frustration) during interactions with teachers. For instance, there were accounts of 'surface acting', when students experienced a dissonance between their actual feelings towards their teachers (e.g., dislike) and their outward display of emotion (e.g., not letting the dislike show during interactions, not verbalising blame for teacher contribution to failures).

Students' emotion work in this respect reflects the implicit feeling and display rules that govern interactions and relationships with teachers, and students' awareness of negative sanctions for certain inappropriate (emotional) responses to teachers (as stated in the student code of conduct). Students seemed to follow this rule: They must not exhibit emotional responses that would elicit ill feeling from their teachers (towards the students) and engender teachers' negative impressions of them, which could, in turn, negatively impact their long-term relationship with their teachers and their teachers' assessment of them. Thus, they did not show negative emotions (e.g., frustration, anger), or any rude reactions (e.g., talking back), even when their teachers misbehaved. Moreover, even if they deployed disengagement-oriented strategies (e.g., avoiding their teachers) and engaged in autonomous acts (e.g., solving problems without soliciting teacher support), students did not (or, could not) fully disengage from their teachers; because, at the very least, their teachers were still responsible for assigning their grades. Therefore, teachers' impression that students are disengaged might have negative implications for evaluation, as the students who used a group liaison to communicate with their teacher found out (see Section 8.5.2 for details). These findings echo the result from a previous

study on power relations in teacher-student relationships and students' conflict handling modes: there was relatively high incidence of avoidance behaviours in secondary (and higher education) students when conflicts with their teachers arose (Jamieson & Thomas, 1974).

Despite the asymmetrical power relations evident in students' passive emotion work stances towards teachers, much of students' emotion work related to the aim of mitigating the impact of teacher acts and misbehaviours on student achievement can be considered agentic acts, which seem to counterbalance the aforementioned asymmetry. Students used proactive strategies to head off anticipated teacher-related problems—such as, when they positioned their inquiry projects outside of the field of expertise of teachers/advisers with reputation for misbehaving in order to minimise their chances of being supervised by these teachers. They also made use of their social resources (e.g., scientists, other teachers) to provide the expertise and support that their teachers failed to provide. The appropriation of social resources for independent problem solving and help seeking, in particular, demonstrated high levels of student agency. Without the help of their teachers, students identified problems and needs, lined up and tried out potential solutions, and accessed specific people inside and outside of school who had the particular expertise or resource that matched their needs. Furthermore, by using parents as advocates or favoured peers as liaisons in negotiating for teacher support, students were able to bypass the social impediments caused by their nonsupportive relationships with teachers.

Positive teacher involvement in students' emotion work. Although teachers were not the default source of solicited emotional support for the students in this study, their accounts showed that there were teacher acts that supported students' emotion work. Aside from the obvious emotional support that students obtained from teachers' offers of practical help (e.g., in goal setting, or task planning), there were particular teacher acts that might not be apparent to teachers as resource for students' emotion work; these are explicated below. Although the following teacher acts are framed as suggestions, they are actually drawn from ideas in students' narratives (see Sections 8.4.4 and 8.6.2).

Teachers can aid students' emotion work by providing timely intervention when students encounter emotion-eliciting situations. There was a conspicuous absence of accounts of students making spontaneous personal disclosures about their emotion experiences to teachers; however, they

found it helpful when teachers initiated their social sharing or gave them the opportunity to vent[47]. Teachers can also engage in purposeful interactions with students to facilitate students' self-reflection and to proffer alternative perspectives regarding emotive situations. Moreover, teachers can be more deliberate in exhibiting immediacy behaviours (i.e., verbal and nonverbal responses that convey warmth and empathy) towards students, especially when students are dealing with negative emotive experiences.

Students used subtler forms of teacher support as resource for emotion work. The process of emotional contagion, for instance, is invoked when students' observed and emulated teachers' positive attitude and emotional responses to certain emotion-eliciting situations (e.g., failure or setbacks). Students regarded teachers' affective stances towards these situations as valid responses and imitated them, thereby appropriating them as resources for their emotion work. The planned provision of emotional support in students' physical environment can be another approach for teachers. In their narratives, students mentioned how they used as a resource for self-encouragement the positive messages found on materials that teachers posted in faculty rooms and on notice boards.

Students' perception of the presence or absence of teacher support and of supportive teacher-student relationships appears to be a determinant of their teacher-related emotion work. Peers, however, were the central character in the majority of students' person-centred emotion work narratives.

11.4.3 Peer Involvement in Students' Emotion Work

The predominant context for peer-related emotion work in students' narratives was group work, and the perception of uneven participation was the key element in these peer-centred situations (see Section 7.7). Although the students in this study had a choice to work on their projects alone, a great majority chose to work in student-constituted groups. This is indicative of the prevalence of students' belief that working with peers has advantages for the attainment of their achievement goals. Students' emotion work narratives, however, provide evidence that working with peers can be

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[47] This was especially effective as a resource for emotion work with teachers with whom they had perceived closeness but who had no assessment responsibility over them. However, students' concern for possible negative teacher evaluation during social sharing or venting with teachers (although teacher-initiated) was indicated by their apparent attempts in impression management, such as, for instance, by tempering the words they used when describing to the teacher their group mate's uneven participation.

emotionally exacting and academically disadvantageous. The following discussion is situated within the group work context and focuses on students' uneven participation (except for the last subsection on resources).

Uneven participation by peers in group work. The emotional impact of uneven participation can be understood by looking into students' expectations from their peers and the students' multiple goals within the context of group work.

Evidence from this study suggests that uneven participation in group work can engender negative emotion experiences (see also Zschocke et al., 2016) because it represents a mismatch between peer expectations and behaviours. Within the group context, students' expectations from their peers can depend on how they position themselves relative to their peers. In students' emotion work narratives, the three ways of peer positioning were based on (a) power relations (e.g., dominant-subordinate, leader-follower, equals), (b) ability (e.g., better at writing, not as skilled in using microscopes), and (c) kinship (e.g., friends, classmates, enemies). These positions were not mutually exclusive; students could occupy multiple positions at one time (e.g., leader and friend), could shift between various positions over time (e.g., enemy then lab partner), and could identify with the positions with varying strengths (e.g., self-appointed leader versus reluctant leader). Overlaying the concept of reciprocity on these various positions unpacks the different aspects of students' expectations from peers. The following discussion shows how students' positioning with respect to peers determined the varying impact of uneven participation.

Students in dominant positions naturally assumed that they would have more responsibilities and could tolerate a certain degree of unevenness in participation. However, they also expected their peers in subordinate positions to dutifully comply with their instructions and standards. Sometimes, dominant positions were not taken up willingly; they could be imposed on some students by their group mates who positioned themselves as subordinate. Students who took on subordinate positions expected to play supporting roles to students in dominant positions. They looked up to those in dominant positions to manage and direct the activities of the group. They usually acknowledged that their contribution was inherently inferior, and tried to compensate in other ways (e.g., by being intentionally subservient).

Uneven participation, from the perspective of power positions, is reflected in the negligence by students in subordinate positions, and can be engendered

by the actions of those in dominant positions (e.g., excluding group mates from decision making, disregarding their task contribution) that led to the marginalisation of their group mates (even those who did not intentionally position themselves as subordinates). Marginalised students told of negative emotion experiences that were related to feelings of worthlessness and superfluousness. On the other hand, students in dominant positions saw those in subordinate positions as benefiting from their alliance. Thus, the inequitable participation of subordinate students evoked negative emotions in dominant students; because it was considered an unjust reciprocation for their benevolence.

Positioning based on ability supports the view that group members bring different capabilities and resources to the groups, and that the quality and amount of their contribution can vary at different times and with different tasks. Thus, some unevenness in participation is expected and tolerated. Students in various ability positions are expected to contribute their best to the collective effort whenever their abilities and resources matched the needs.

From the viewpoint of this positioning, uneven participation took place when peers withheld their contributions or did not give their best, especially when nothing prevented them from doing so. Some students in this study rationalised their uneven participation by referencing their belief that their contribution was not crucial to the achievement of collective goals—this perceived dispensability of individual effort as a reason for social loafing has been observed also in previous research (Kerr & Bruun, 1983). Students who were doers found this disappointing and frustrating. On the other hand, students who were legitimately constrained from making an equitable contribution to the work of the group, experienced negative emotions related to a sense of inadequacy and the fear of being labelled socially as a loafer.

With respect to kinship, the most significant of the positions is friendship. Friendship usually signifies an egalitarian position, and because there is a greater degree of interpersonal closeness, there is also greater expectation of caring, helping, sharing, and cooperation (Wentzel, 2005). Students expect their friends to pursue shared goals, to be involved in shared activities, to demonstrate shared values, and to be emotionally supportive. Thus, from the point of view of kinship, uneven participation can be the failure to fulfil any of these expectations. Because close personal relationships entail heightened emotional vulnerability, the negative

emotional impact of uneven participation seems to be more intense when it involved friends, as the students' narratives suggest.

One of the striking findings that emerged from students' accounts of emotion work is predicated on the fact that, in school, students can adopt goals within two domains of functioning: peer relationships and academic achievement (Wentzel, 2005). Students want to develop positive relationships with their peers and to attain their achievement goals. Within the group work context, the difficulties students might have in coordinating their own goals within these two domains, as well as with the social and achievement goals of other members of the group, are foregrounded in situations involving uneven participation. Uneven participation can be considered a reflection of the mismatch between individual members' goals, or the dissonance between the values they assign to goals related to peer relationships and academic achievement. Some students in this study would rather enjoy the company of their group mates than engage in group tasks in pursuit of academic goals. Other students had other achievement goals (e.g., in other subjects) that competed with achievement goals related to the group work. Thus, if the time, effort, and resources students invested in the group work were perceived to be less than what they devoted to their other achievement goals, or less than the contributions of the other group members, they could be perceived to be less engaged in the group work.

The negative emotion experiences that are evoked in situations involving uneven participation can be differentially influenced by the value students attribute to these goals. For students who value social goals highly, uneven participation can be emotive because it can result in interpersonal conflicts and the loss of peer acceptance and approval. Students' accounts included their emotion experiences due to negative sanctions resulting from uneven participation, such as rejection and retribution from peers. On the other hand, students who value achievement goals highly see uneven participation as loss of peer support, which jeopardises the attainment of their achievement goals—thus, it is emotive because it is a threat situation. Moreover, uneven participation provides a valid ground for social comparison with respect to peer achievement. Therefore, it can engender negative emotion experiences related to the perception of underperformance, or the injustice of free-rider effects (with respect to assessment) (see also Zschocke et al., 2016).

Students' emotion work in peer-centred situations. Students' emotion work in situations involving uneven participation can be characterised as

generally non-confrontational, task-directed, and achievement goal-oriented. But for a few exceptions, students generally deployed passive emotion work strategies (e.g., resignation, avoidance, reappraisal) and emotion work strategies that were aimed at remediating the lack of participation (e.g., problem solving, help-seeking) rather than resolving relationship conflicts.

The reasons students gave for these emotion work stances can be condensed into two. First, students sought to avoid aggravating the already problematic peer relationships that were engendered by uneven participation. They thought that confronting their peers about their participation-related failings would create more conflicts within the relationship. Some students would much rather suffer the inequity of bearing a larger part of the group work than lose the goodwill and friendship of their peers. Students who were implicated for social loafing, on the other hand, felt that their peers' negative reactions towards them (e.g., avoidance, marginalisation) were either warranted (i.e., acceptance, resignation) or could be reversed by implementing self-directed strategies (e.g., response modulation, increased effort). It has been suggested that where there is a high level of relationship conflict, there is also increased interpersonal risk (Meng, Fulk, & Yuan, 2005). Evidence from students' narratives shows that their emotion work stances towards peers seek to minimise this risk (e.g., of being rejected, or being subjected to harsh words). The second reason is an extension of the first. Students sought to avoid interpersonal conflicts that could jeopardise their achievement goals. By being non-confrontational, students were attempting to prevent any adverse reactions from their group mates that could undermine group functioning, and hinder the completion of the project and the attainment of other achievement goals (e.g., grades).

Students' narratives provided insights into the factors that might have brought about these emotion work stances. These stances can be a reflection of the values students assign to social and achievement goals, as mentioned above. For some students, positive peer relationship might be a 'hoped-for' but not an 'aimed-for' consequence of their pursuit of achievement goals within the group work context, a differential balancing of values that has significant implications for students' emotion work. Thus, the attainment of achievement goals had primacy over the maintenance of positive peer relationships; and students were willing to tolerate some interpersonal conflicts within the group as long as they could further their achievement-related interests. Consequently, their emotion work was generally task-directed, not peer relationship-directed.

Some students, on the other hand, framed these stances from the perspective of efficient allocation of resources. They reasoned that their resources (e.g., time, effort) were put to better use when employed in accomplishing tasks rather than resolving interpersonal conflicts. Furthermore, some students held the view that it was easier to effect change to the task aspect rather than the relationship aspect of the uneven participation situation. Thus, their emotion work strategies focused on solving task-related problems (e.g., micromanaging the loafer's task contribution) or avoiding relationship-related problems (e.g., taking over the loafer's part of the group work to avoid any interaction with the loafer).

Students' emotional competence and interpersonal competence are shown to be important determinants of effective group functioning (Blatchford, Kutnick, Baines, & Galton, 2003; Troth, Jordan, & Lawrence, 2012). From this perspective, students' avoidance of emotion work aimed at resolving peer relationship conflicts might be a reflection of their deficient emotional and interpersonal competence. It could be that some students simply lacked the skills to manage their and their group mates' emotions, and to negotiate interpersonal conflicts involving their peers, as some students alluded to in their narratives. Students' varying level of emotional and interpersonal competence might explain why some students found uneven participation problematic, while others did not. Some students reacted strongly to perceived uneven participation and allowed its negative impact to pervade peer relationship and group functioning, while others acknowledged its presence and dealt with their emotional responses with dispatch.

It is also important to point out that there are occasions that students' emotion work can lead to seeming uneven participation. What might be perceived as uneven participation can be students' deployment of avoidance strategies when dealing with emotion experiences related to aversive situations (e.g., handling hazardous chemicals), or part of temporary disengagement from group tasks to allow themselves time for emotional recovery from negative emotion experiences (e.g., setbacks or failures). This finding extends what was previously reported in another study—that students' off-task behaviours could be a consequence of negative emotion experiences during group work (Linnenbrink-Garcia et al., 2011).

While peers can be the cause of students' negative emotion experiences, they can also be valuable resources for emotion work, as discussed in the following subsection.

Resources for students' emotion work within the group work context.
Students' peer-centred emotion work narratives provide insights into peer
emotional support, group emotion, and group emotion norms.

Students' accounts showed that while group mates' actions and behaviours
can be the key factor in the majority of students' negative emotion
experiences within the group work context, group mates can also be the
most proximal source of emotional support. Group mates, because of
experiential and emotional similarity, are the most accessible source for
empathy and companionship when dealing with emotionally problematic
situations in the course of undertaking group work. Existing research
evidence suggests that anxiety when performing in social and evaluative
settings is reduced by being part of a group or by having co-performers
(Carron, Burke, & Prapavessis, 2004). The students in this study expected
to encounter many emotion-eliciting situations connected to the undertaking
of science inquiry projects; thus, for the majority of them, working with peers
in a group setting was part of anticipatory emotion work strategy.
Furthermore, students' narratives showed that group mates can be a source
of reliable emotional support when solving problems (e.g., finding a missing
resource), when dealing with teacher misbehaviours, when engaging in
emotion-eliciting activities (e.g., proposal defence, tedious laboratory work),
and when dealing with personal constraints (e.g., loss of motivation). They
are also the most expedient partners for social sharing and mutual
encouragement because of shared experiences and shared knowledge.

Group members also play an important role in influencing each other's
emotion experiences and in shaping group emotion to maintain effective
group functioning (see also Barsade, 2002; Järvenoja & Järvelä, 2009).
Some students suppressed displays of negative emotions so that they would
not negatively affect their group mates' emotion experiences. Other
students deliberately exhibited the opposite of their group mates' negative
emotional displays in order to influence group emotion and promote group
morale. Some students performed emotion work on their group mates in
order to promote enthusiasm, optimism, and engagement in the work of the
group. This process of being able to influence individual member or group
emotion by induction during interactions is referred to as emotional
contagion; previous research provides evidence that it occurs in groups, and
results in changes in group member's emotion experiences and affects
group dynamics (i.e., the increase in positive emotions leads to greater

cooperativeness, less group conflict, and perception of better task performance) (Barsade, 2002).

The emotion work that students performed in order to promote or inhibit the development of certain group emotions provides some clues to group feeling and display rules (see also Barsade & Gibson, 1998, pp. 84-ff, on group emotion as normative control; Delvaux, Vanbeselaere, & Mesquita, 2015, pp. 304-ff, on group emotion norms emerging from the interactions of group members). Two of the prevalent group feeling and display rules, which can be deduced from students' narratives are the following:

- Emotions related to demotivation are undesirable; they should not be allowed to infect the group.
- Aggressive expressions or displays of emotions (e.g., anger, frustration) directed to group mates are not acceptable; they are to be avoided.

These group feeling and display rules were resources for students' peer-directed emotion work insofar as they provided information about emotion experiences and emotional expressions or displays that the group considered to be appropriate and not appropriate. Moreover, students' accounts of how their fear of negative sanctions (e.g., negative peer rating, peer rejection) shaped their emotional responses or displays and emotion-related behaviours within the group work context provide further clues to the influence of these group feeling and display rules on students' peer-directed emotion work.

Evidence from this study shows that students' peer-directed emotion work is related to their social and academic goals, and is an important determinant of how well students function within the group work setting. For the students in this study, effective group functioning seems to be indicated by the attainment of academic goals and by minimal peer conflict. It has been proposed that self-regulatory processes, which include emotion regulation, can mediate or contribute to students' successful goal pursuit in both social and academic domains (Wentzel, 2005). This study provides some support for this proposal based on evidence from students' narratives, which shows that through instrumental deployment of emotion work strategies, some students were able to attain positive outcomes (or, at the very least, avert some negative outcomes) in both social and academic domains. This finding also underscores the significance of students' emotion work as one component of peer-related social competence in school.

11.4.4 Achievement Discourses and Students' Emotion Work

One novel contribution of this study to research on school science inquiry and on student emotions is evidence showing how the achievement discourses in this particular school both heightened the emotiveness of undertaking extended/open school science inquiry projects and provided resources for students' emotion work. This heightened emotiveness could be attributed to the messages these achievement discourses conveyed to the students about: (1) the strong association between achievement and students' science-based social identities; and (2) the extraordinariness of achievement.

Strong association between achievement and social identities. For the students in this study, the school science inquiry projects were an important venue for expressing and constituting their science-based social identities (see Section 10.2). As explicated in Chapter 10, the school's achievement discourses depict these social identities as past- (i.e., high achievers with aptitude for science and maths), present- (i.e., scholars in a science specialist school) and future-oriented (i.e., 'professionals and leaders in science and technology'), and evidence from students' narratives generally reflects their acceptance of these identities. It also noteworthy that, as far as can be ascertained in the narratives, students had never contested these social identities.

The school science inquiry projects provide students with a way of accumulating evidence that points to their possession of these social identities (Brunstein, 2000), and a way of trying out the future selves that these identities define (Markus & Nurius, 1986). The maintenance of these social identities is connected to achievement; and because the achievement discourses have made this connection salient, the school science inquiry projects assume greater significance. Thus, the undertaking of the projects is not only important to students' academic achievement goals, but also to their self-defining goal of maintaining these social identities. The concept of self-defining goals offers one perspective for understanding the impact of the achievement discourses on students' emotion experiences. According to Brunstein (2000):

> A self-defining goal [is] a higher-order aspiration that is closely tied to the self, but can be broken down into a set of more specific achievements through which it is linked to the performance of instrumental activities. Self-definitional achievements typically take the form of successful performances on identity-relevant tasks and thereby qualify as indicators of competence in a given self-defining

area. Correspondingly, unsuccessful performance on an identity-relevant task indicates a self-definitional shortcoming. (p.343)

From this perspective, students might consider the maintenance of their social identities as a self-defining goal, the undertaking of school science inquiry projects as a series of identity-relevant tasks, and success in attaining to the project-related standards as indicators of competence. The students in this study had connected their performance and outcomes in their science inquiry projects to their being high-achievers, scholars in a selective school, and researchers (present and future). These social identities were affirmed by their success in tackling the various science inquiry tasks, such as conceptualising a problem, designing an investigation, and conducting field work and laboratory experiments to gather data, and by the display of character traits such as independence, diligence and persistence. Consequently, the perception of failure (or underperformance) during the undertaking of their school science inquiry projects destabilised students' self-definitions related to their social identities and evoked negative emotion experiences, as their narratives show (see Section 7.6).

Evidence from the narratives shows students' persistence and motivational resilience in situations involving setbacks and failures. As mentioned earlier (see Section 11.3.2), students maintained their engagement, or strived to re-engage after encountering these challenging situations. With respect to self-defining goals, the manifestations of persistence and motivational resilience can be considered as students' subsequent attempts at other identity-relevant tasks, a constant striving to achieve the self-definitions relevant to these social identities (i.e., "vigorous goal striving", Brunstein, 2000, p. 343). Hence, it is suggested that students' emotion work facilitates this constant striving, and thus, plays an important role in students' pursuit of both academic achievement and self-defining goals.

Extraordinariness of achievement. The framing of achievement in terms of extraordinariness is underscored by the definition of 'excellence' that the school has presented to the students. In qualifying excellence using the phrases "beyond what is expected", "surpassing the usual" and "highest possible quality" in student-oriented school documents (e.g., student code of conduct), the school sets an indeterminate but nonetheless lofty standard for students' academic performance and outcomes.

It can be argued that the word "excellence" has become the catchword in many schools' mission statement, that it is a nebulous concept, and that its seeming ubiquity may have neutralised its discursive effect in many settings.

In this particular school, however, three school practices were found to have contributed to shaping students' interpretations of and perpetuating students' behaviours related to 'extraordinary achievement': one, by making student achievement public (e.g., via banners, media feature stories, website, student performance tracker on notice boards) and socially situated (e.g., by streaming or tracking); two, by providing opportunities for students to be exposed to external standards (e.g., via judges and fellow-competitors in national and international competitions, and interactions with scientists); and three, by creating student role models of achievement (e.g., via awards, grants, prizes). Through these three practices, the school was able to provide students with multiple representations of achievement, and to invoke the influence of social comparison, peer achievement, and social validation in maintaining the currency and saliency of the ideas that were conveyed to students about the extraordinariness of achievement.

One seemingly unintended consequence of making the message of 'extraordinary achievement' prominent and compelling is the negative emotion experiences of students while undertaking their science inquiry projects, which can be attributed in part to the distinctive context of the research setting. Significantly, because the students were high-achievers, the imposition of the aforementioned lofty standard on their already high self-expectations led to some students making extraordinary demands on themselves. The students' framing of their actions as "feats" in their narratives seems to indicate their belief that, unless they took on challenges and did extraordinary acts when undertaking their school science inquiry projects, they were failing or underachieving. Furthermore, evidence from students' narratives seems to suggest that this particular message of achievement had incited students to adopt multiple representations of achievement (e.g., approval of concept paper, completion of data collection, awards, prizes, and grants, in addition to grades) as part of their academic goals and aspirations (see Section 10.4.2).

Consequently, the achievement discourses might be conceived of as a contributory factor in producing a highly demanding learning environment (Pellerin, 2005), which evoked negative emotion experiences and engendered emotion work in students, as evidence from this study shows. This finding corroborates research evidence from previous studies which depicts highly demanding learning environments (e.g., law and medical schools) as emotionally distressing (Sheldon & Krieger, 2007), and shows that students in high ability classrooms experience more negative emotions

and less positive emotions than students in low ability classrooms (Pekrun et al., 2006, cited in Pekrun, 2006).

The foregoing discussion explicated how the messages of achievement related to extraordinariness and social identities engendered the discursive effect of heightening the emotiveness of situations that students encountered within an achievement context. However, these discourses also provided students with resources for their emotion work, as discussed in the following subsection.

Students' achievement discourses as resources for emotion work. The following discussion is underpinned by the idea that students can take up positions that are afforded by the various discourses of achievement and that the positions they assume determine the boundaries of what they can do and say (Willig, 2013). All but two of the students' achievement discourses—that is, except for 'achievement is an obligation' and 'achievement is a consequence of personal investment'—were identified as resources for emotion work.

The discourses related to the standards of achievement (see Section 10.4.2) provided students with multiple representations of achievement, as mentioned above. These standards of achievement translated into students' achievement goals. Generally, students had multiple achievement goals, relating to various standards. Thus, according to their narratives, examples of students' achievement goals are the following:

- 'doing my best' (personal standard),
- 'getting my group mate's approval for my contribution to the group output' (peer-related standard),
- 'completing data collection' (project milestone),
- 'getting a high grade' (school standard), and
- 'winning a research grant' (non-school standards).

Evidence from this study shows that these multiple representations of achievement served as resources for students' emotion work in situations related to: students' failure to achieve a goal, and perception of underperformance, of inadequacy, and of threats to the attainment of their achievement goals (e.g., setbacks). The students were observed to shift from one achievement goal to another in the aforementioned situations (see last part of Section 10.4.2). One explanation for this is offered below:

The multiplicity of representations of achievement that were available to the students appears to have enabled them to substitute a failed (or unattainable) achievement goal with another achievement goal. Similarly, in

situations that destabilised students' sense of self (see Section 7.6), these various achievement goals might have served as alternatives from which students can choose their identity-relevant goals. By shifting between these various representations of achievement with which they can experience success, students can increase their chance of supplanting their experience of failure with an experience of success, or of obtaining evidence of competence that affirms their sense of self. This emotion work stance, therefore, can potentially reduce the emotional distress that students experience in situations involving failure and threats to achievement and the sense of self, and can facilitate students' emotional recovery. Evidence from students' narratives alludes to the emotional and self-affirmatory benefits of experiencing success after a failure. This corroborates research findings that a subsequent experience of success after a failure on an academic task can have a rebound effect on students' motivation, elicit a sense of hope, and engender overall positive affect at the end of the task, despite negative emotion experiences in the interim (Sideridis & Kaplan, 2011).

Students' achievement discourses which framed their actions as 'feats' (see Section 10.3.2), on the other hand, provide them with an alternative position from which to deal with failure. Highlighting the extraordinariness of their actions seems to allow the students to use these discourses as a resource for reappraisal (an emotion work strategy) by affording them an alternative definition for achievement—that is, achievement not as a successful outcome but as extraordinary effort. Therefore, from within the 'feats' discourses, even when students fail to obtain a successful outcome, they can still perceive themselves (or be perceived by others) as achievers by virtue of the extraordinary effort that they expend.

Finally, the 'constraints' and 'choice' discourses (see Section 10.2.2) afford students with discursive resources for their self-protective emotion work. The 'constraints' discourse enables students to locate failure away from self; because from within the 'constraints' discourse, students cannot be blamed for failure that is caused by the failings of other people or by insurmountable circumstances. On the other hand, the 'choice' discourse allows students to assert the optionality of pursuing some achievement goals. From within this discourse, the decision to opt out of some achievement goals is merely an expression of agency and does not imply a failing or a lack of ambition.

11.5 Implications for Practice and Research

The following subsections delineate the significance of the findings of this study for teachers and for researchers.

11.5.1 Implications for Practice

The relevance of the research findings to teacher support for students' emotion work and to the design of learning environments is discussed.

Teacher support for students' emotion work. For young people in school, the teacher is still a key source of (adult) emotional support. However, students' emotion experiences in school, especially the negative ones, can be hidden (sometimes, deliberately) from teachers. This might imply that students view their emotion experiences in school as personal, and not a school matter. Furthermore, unless they adversely impact achievement outcomes, students' emotion experiences are largely relegated in the background; and it seems to be taken for granted that students are managing the emotional demands of the various learning environments that they encounter in school. Teachers, however, might not have a clear idea about what students specifically do. In fact, evidence from this study shows that some of the emotion work that students perform might be misinterpreted by teachers as problematic academic behaviour. This research draws attention to the possibility that teachers might be underestimating the emotional demands of the learning environments they create for students and the impact of such environments on students' emotion experiences in school.

Much of the deliberate emotional support that teachers provide to students can be described as generic (i.e., intended for a group of students or for the whole class) based on their perception of the prevailing group affect (i.e., "collective moods and emotions", Barsade & Knight, 2015, p. 22). However, students can have different emotion experiences in the same situation and different levels of competence in dealing with its emotional demands. This suggests the need for teachers to also attend to the emotional support needs of individual students. One issue that arise from this suggestion is the problem of how to make salient the emotion experiences of students and the specific emotional support that they need. The findings of this study can help with this problem. The thematic depiction of situations and the grouping of emotion work strategies into families can be used as a basis for designing heuristic tools to help increase teachers' awareness of the potential emotional demands of learning environments and the emotion work that

students perform. To demonstrate the possibility of this particular use of the aforementioned research findings, two examples of these heuristic tools had been designed and are presented below (Tables 11.1 and 11.2). The utility of these tools is illustrated using a composite of information from students' narratives.

By looking at their own context using the situation-based themes as a lens, teachers might be able to find some correspondence between the situations reported in this study and the situations in their particular setting. These themes, then, can be used as a framework for auditing the potential emotion-eliciting situations in particular learning environments.

Table 11.1 Framework for auditing the emotional demands of learning environments.

The framework is in the first column, while sample teacher entries are given in the second column.

Thematic Categories of Situations	Potential Emotion Eliciting Situations
Situations wherein students might encounter setbacks, failures, or hindrances to task completion	• Laboratory work – the equipment they need is not available in school
Situations that might make taxing demands on students' time, talent, and energy	• Data collection – availability of/access to research site coincides with quarter exam period, field work would consume some of the students' revision time
Situations that might negatively impact students' perception of themselves	• Comparison with peer achievement – student is one of the few in the cohort who have not started collecting data
Situations that might negatively affect peer relationship or peer support	• [Not applicable, student is working alone]
Situations that might negatively affect relationship with teachers or teacher support	• Meetings with teacher – negative feedback about work, questioning about understanding of their topic

The families of emotion work strategies featured in this study can be useful as a way of organising what students do when they perform emotion work. By providing a contextualised depiction of what students actually do to attempt to change their emotion experiences, this research foregrounds the behavioural manifestations of students' emotion work. By focusing on these behaviours, teachers might be able to be more strategic and specific in the

way that they plan and implement the provision of emotional support or intervention for students.

Table 11.2 Guide for identifying possible students' emotion work.

      The guide questions are in the first column. The second and third columns feature sample teacher responses.

Identifying Emotion Work	Indicator	Teacher Intervention
Does the student attempt to express or suppress his/her emotions, or moderate his/her emotional reactions?	Student cried after the proposal defence according to his classmates	I will call his mother to let her know and to ask her if she could get her son to tell her about his experience.
Does the student attempt to change his/her perception of or attitude towards an emotive situation?	[No data]	I will ask student what he thinks about what happened, and offer an alternative perspective, if needed.
Does student attempt to withdraw or disengage after encountering an emotive situation?	Student has not contributed to the group work of revising their research proposal	I will talk to his group mates and see how I could enable his group mates to encourage him.
Does the student attempt to change the emotive situation by seeking help or solving the problem, or to limit the negative impact of the situation?	Student asked another teacher for suggestions about alternative research problems	I will have a talk with this teacher to identify alternative solutions to the issues raised during the proposal defence without having the student change to a new research problem and ask this teacher to talk to the student again.

Evidence from this research suggests that students' emotion work is generally performed out of teachers' view, and can be deliberately concealed from teachers. By conducting an audit of the emotional demands of the learning environment and of possible emotion work by students, teachers will be able to assess the potential emotional impact of their pedagogical decisions and actions. Moreover, they will be encouraged to actively and creatively elicit feedback from students about their emotion experiences and possible emotion work in school. All the aforementioned information and understanding might help teachers to be planful and strategic in their provision of emotional support to students.

Design of learning environments. The findings of this research foreground the emotional demands of undertaking extended/open school

science inquiry. For science teachers, this suggests a need for critical examination of the way science inquiry is adopted for pedagogical purposes. Rather than simply assuming that any learning environment "that is actively engaging, flexible, social and cooperative and that promotes independent inquiry and problem-based learning" (Anderman, Sinatra & Gray, 2012, p. 102) will be beneficial to students, science teachers must consider that the complexities inherent in such learning environments might potentially result in unintended consequences, one of which might be an excessive demand for students' emotion work.

The setting of this study featured a form of school science inquiry that contains elements that are analogic to real-world research, and that, at times, afford students with opportunities to interact with members of the scientific community and participate in their practice. An extrapolation of the research findings beyond this particular setting suggests that the implementation of innovative learning approaches and the provision of opportunities for students to learn in settings outside of school might require students to function in novel and mutable learning environments. Some examples of these learning environments are: technology-enhanced learning environments (Wang & Hannafin, 2005), hybrid learning environments (Zitter & Hoeve, 2012), and 'new learning' environments (Simons, van der Linden, & Duffy, 2000). The research findings, therefore, have implications beyond school science inquiry.

The research findings underscore the trichotomy in the way peers, teachers and the social-cultural environment (e.g., via the achievement discourses) impact students' emotion work: they can either cause or contribute to the emotiveness of situations that students encounter within the learning environment; or, they can be a resource for students' emotion work; or, they can be both at the same time. Based on these, teachers, who have the responsibility of designing and providing learning environments to students, might be guided by the following considerations:

(*Social-cultural context*)

- How can the level of ambiguity and demandingness in the particular learning environment be managed so that the challenges presented by the learning environment will not overload students but will be at the right level to promote students' engagement and emotional resilience?
- What are the potential emotional impacts of students' goal pursuit within this learning environment, with respect to academic achievement, peer relationship, and self-defining goals?

- What are the potential emotional impacts of the key structural elements of the learning environment (e.g., assessment, expected outcomes, tasks, student groupings, achievement practices)?
- What are the messages transmitted to the students from/via the various social and cultural elements of this learning environment, and how might they impact or contribute to the emergence of social norms on emotion in the setting?
- What steps might be taken to communicate to students that they are not evaluated only on the equanimity that they project in school, but that part of the assessment will focus on the way they deal appropriately with the emotional impact of the challenges and difficulties that they encounter?
- Since it is assumed that students will be performing emotion work in this learning environment, what contextual affordances should be provided that will enhance their competence in performing emotion work?

(*Teacher Involvement*)

- What prior and ongoing support should be offered to students to help them develop their emotional, social, and academic competence, so that they will be able to function effectively within these learning environments?
- What teacher behaviours and actions might contribute to establishing supportive relationships with students in this learning environment?

(*Peer Involvement*)

- What structures of peer interactions and relationships are present in this learning environment? How will these impact the emotion experiences of students at the individual and group level?
- What contextual affordances should be provided to promote supportive peer relationships?

11.5.2 Implications for Research

This research is exploratory in nature, and, as such, has approached the analysis of data with a relatively open stance. In doing so, it revealed other findings that were interesting in themselves but could not be adequately addressed within the delimitations of this study. Four of these are explicated below and suggestions for further research are included.

Outcomes of students' emotion work. The present research focused on students' attempts to change their emotion experiences and did not systematically examine the outcomes of such attempts. There is some evidence, however, that some students were able to effect a change in their

emotion experiences, while others did not. Moreover, although a longitudinal analysis was not conducted, the series of narratives produced by the students seems to indicate that some students are more competent than others in managing their emotions in similar situations. Future research can look into students' successful and failed attempts in order to gain insights regarding—

- *How to define success and failure in students' emotion work, and the possibility of other outcomes outside of the success/failure dichotomy*.

Emotion work researchers have identified emotional dissonance, burnout, and impaired performance as some of the consequences of emotion work in emotionally demanding professions (e.g., Bakker & Heuven, 2006). Research that aims to identify similar consequences in students might be useful to educators and education researchers. Another focus could be the impact of students' emotion work on their long-term engagement in a particular academic discipline (e.g., science) and on their choice to engage with it beyond compulsory education (e.g., in university, or as a career).

Efforts were made during the early stage of the data analysis for this research to look into the consequences of students' emotion work. However, the analysis of students' narratives showed that the majority of the students found it difficult to untangle the difference between the consequence of performing emotion work and the consequence of the problematic situation, even when follow-up questions were asked and directive prompts were provided. Although a few students did refer to depletion of cognitive resources, emotional dissonance, and emotional numbness.   The aforementioned difficulty could be attributed to the age of the participants—that is, students in their mid-adolescence (15 to 17 years) might not be sufficiently self-aware about such matters. This implies the need to consider older cohorts or to employ other data collection methods for this research agenda.

- *What makes for successful students' emotion work*.

Researchers can examine patterns of deployment of emotion work strategies, the appropriation of social resources and contextual affordances, and goal coordination between the various goals of an individual student and between students within a group. It is conjectured that a series of narratives exploring and tracking students' emotion work in a particular situation or event can provide data for the aforementioned phenomena. The students who participated during the field work were given much latitude to choose what stories to tell, which resulted in individual students contributing a series

of stories on various topics. Future research must consider data collection approaches that strike a balance between the level of student autonomy needed to encourage continued participation, and the level of directivity needed to obtain relevant data.

Other-directed emotion work. Another line of research can focus on the emotion work that students do on other people (e.g., on peers and teachers) and on the group affect. There was evidence in this study of students' awareness of the feelings of their group mates, classmates, and teachers, and of other-directed emotion work that students performed. Although this has been included in the results reported in this study, for the most part, the research findings were focused on self-directed emotion work, as this was the main focus of the students' narratives as well. Admittedly, this was a result of the delimitation imposed by the elicitation prompts that were given to students. However, it was observed that, because the students were involved in long-term group work with peers and collaboration with the same teacher (i.e., teacher-student dyad), they could not escape the impact of group or dyadic processes and affect. An earlier discussion of the impact of students' positioning with respect to their group mates on their emotion work focused mainly on the emotion work of the individual student within the group. There was also some evidence reported in this study about students' teacher-directed emotion work (e.g., to create the impression of willingness to work even when they disliked the task). Future research can consider the reciprocal emotion work that takes place between the individual student and the group (see Delvaux et al., 2015) and between the teacher and the student.

Social norms of emotion. The sociological framing of emotion work has always underscored the influence of social norms of emotion, specifically feelings and display rules (Hochschild, 1979). The present research has not focused on social norms, although it has identified some of these (see Sections 11.4.2 and 11.4.3). Not many studies on students' emotion experiences in school have focused on social norms, as well; the one study that was found to give a more systematic look at this phenomenon was by Zembylas (2004), who investigated how teachers and students co-constructed emotional rules in class. The focus of the investigation, however, was not emotion work. It is suggested that future research should go beyond looking into how social norms influence the expression and display of emotions by students; rather, it should examine how these social

norms influence students' emotion work and, reciprocally, how students' emotion work constitute the social norms within the learning environment.

Students' emotion vocabulary. This research differs in approach to other studies in that it did not prescribe predetermined emotion labels to students. Instead, students' narratives featured the various labels for emotion and ways of depicting emotion experiences by students themselves. This study's focus on emotion work, however, meant that not enough attention was given to the students' emotion vocabulary. Nevertheless, it is noted that narratives are a good source of data for examining students' use of emotion labels, emotion metaphors, and emotion-related behaviour words (see Heelas, 1996). Heelas's (1996) study of emotion talk of various cultures shows how variance in emotion talk and how they are interpreted in different contexts can shed light on individual and cultural differences in managing emotions. A similar research agenda might also be pursued by researchers within the school context with respect to students' emotion vocabulary.

Lastly, it is proposed that there should be more conceptual engagement with students' emotion work. Much of emotion research in school has focused on the evocation of students' emotion in various domains (e.g., science, mathematics) and aspects of school work (homework, tests), and in understanding the regulation processes that students use to manage their emotions. There should be increased attention to the exploration of students' emotion regulation in school from the view point of "work".

11.6 Limitations of the Study

Four aspects relating to the limitations of the study are discussed below.

First, this study was set in a distinctive context with respect to the school and the students who participated in the study. Therefore, the findings of this study should be interpreted with this distinctive context in mind, and any application of the findings in other school settings should be done with the awareness that generalisability (in the statistical sense) is not offered by this study. However, because it is an investigation conducted within the naturalistic setting of school and it offers situated knowledge about students' emotion experiences in school, the research can be considered to have a high level of ecological validity (Brewer, 2000) and the findings of the research may be transferable in other school contexts that have some congruence with the context of this study (Tracy, 2010).

Second, the findings regarding students' emotion work are based solely on their narratives. The data from which the research findings were drawn featured only the students' perspective, and their own interpretations of the situations they encountered in school; although, it could be argued that the narratives were actually constructed intersubjectively with the researcher as imagined audience (for written narratives) or as interviewer (for narrative interviews). The findings of the research—regarding the characteristics of the learning environment, teacher-student relationships, peer-relationships, and school structures—reflect multiple subjective realities based on students' perceptions and the (insider) researcher's (subjective) apprehension and interpretation of students' perceptions. However, this does not mean that the research findings are devoid of truth, but that they are only one set of truth claims among the many possibilities.

Third, some conditions that were imposed by the research design have influenced the outcomes of this research. One, the participants, all volunteers, are considered to be a convenience sample. Therefore, no claims about representativeness could and have been made. It is possible that students who were too shy, or too busy, or, otherwise had opted out of participating due to various reasons, had stories to tell about their emotion experiences that were different from those contributed by the participants. Two, as mentioned elsewhere in this thesis, the elicitation of emotion work narratives yielded accounts generally about students' negative emotion experiences in school. This does not mean that students in this study did not have positive emotion experiences while undertaking extended/open school science inquiry projects, but that their emotion work was situated mainly within negative emotion experiences. Three, the long-term involvement of students who participated in the field work phase of the study might have engendered some form of "Hawthorne effect" (Adair, 1984) in that they became more aware of their emotion experiences and therefore, might have exerted more effort into managing them. Moreover, the act of narrating about their emotion experiences and emotion work was in itself emotion work, as some students in this study had claimed to have experienced emotional benefits from telling their stories to the researcher. Four, the *a posteriori* definition of the research question related to achievement discourses meant that the analysis was confined within the data sources that were already collected or available online. Therefore, because the students were not asked to address 'achievement' explicitly in their narratives, the analysis related to students' achievement discourses

and the links between achievement discourses and students' emotion work involved a high degree of speculation.

Fourth, the following matters are outside the scope of this research. One, the research findings do not address the effectiveness of students' emotion work strategies. Two, the research did not make any comparisons between the two groups of participants from two different cohorts. Three, although the approach used for analysing achievement discourses was Foucauldian discourse analysis, there was no attempt to locate the school and student achievement discourses within the wider discourses of achievement; because the focus of the research is on local discourses in school and how they impact students' emotion work.

11.7 Reflections on the Methodology

Some comments about the methods used in this research had been made within the discussion on 'Implications for research' (Section 11.5.2) and 'Limitations of the study' (Section 11.6). The following discussion is focused on reflections about the use of the narrative approach in this research.

The narrative approach was useful for eliciting personal accounts of emotion experiences from students. However, students' narratives reflect individual differences in the quality of the stories that students tell and their manner of storytelling. For example, students differed in how expansive they were, in how elaborate their stories were, and in how organised their thinking processes were when storytelling. Students differed in their emotion vocabulary and in the level of attention they gave to the affective aspects of their experiences. Consequently, students' narratives were not as polished and as tightly structured as literary works. There were gaps and incoherence in what they narrated; and there were narrative accounts that lacked closure. With respect to written narratives and narrative interviews, narrative interviews have a greater potential for being informative and offer the opportunity to test developing ideas during the interview, while written narratives are less messy and easier to handle during data analysis. Therefore, a conscious decision to ignore the inherent preference for tidy and neat narratives should be made when working with both kinds of narratives.

The narrative approach might not be successful when the research agenda involves the elicitation of students' in-the-moment accounts of emotion work. The telling of narratives of experience involves considerable sense-making

for students. Some of the students in this study expressed the need for some time (i.e., days or weeks) to pass before they could tell stories about their experiences. Other students who chose to tell stories merely hours after the events transpired could successfully depict the emotions they felt but not the emotion work that they did. There was a need to revisit the same story once time had elapsed in order to elicit an account of the emotion work that was done.

In the narratives of emotion work that were solicited for this study, it was difficult to disentangle emotion from related concepts such as mood, interest, motivation, and attitude. Some researchers provided their adult participants a pre-determined set of emotions to keep watch for and asked them to provide separate accounts for each emotion (Oatley & Duncan, 1994). Even with this design, the researchers reported that the inherent complexity of emotion experiences made for a complicated result—that is, "many emotions being mixed, …emotions changing, … a proportion of emotions being long-lasting moods" (p. 379). In the present study, no attempt was made to ask students to achieve a certain level of specificity in their stories to facilitate the isolation of emotions that were the target for emotion work, thereby differentiating emotion work from the self-regulatory processes directed towards mood, interest, motivation, or attitude. The cognitive demand of this task would have been onerous and would have dissuaded students from participating in the research. It is, therefore, expected that some arguments could be made that the findings of this study are not entirely about emotion work, but also include coping, motivational regulation, and mood regulation.

11.8 Concluding Remarks

This research underscores the role of emotion work in students' effective functioning in a learning environment characterised by high demandingness and high ambiguity. Within such an environment, exemplified in the undertaking of extended/open school science inquiry projects, students' emotion work is intricately associated with students' pursuit of academic, social, and self-defining goals. Specifically, the situations that students encountered that engendered emotion work relate to: experiences of failures, constraints, and competing demands; problematic relationships with peers and teachers; and, perceptions of underperformance and inadequacy. The emotiveness of these situations was heightened by discourses that associate achievement with students' social identities and with extraordinary acts. Students deployed a variety of emotion work strategies to directly

influence their feelings, to change their perceptions and attitudes, to disengage from the situation or from their emotion experiences, and to change the situation or contain its negative impact. They also demonstrated their agency in the way that they harnessed the resources and opportunities afforded by their social networks and by the achievement discourses for their emotion work. Students' emotion work was not merely for their well-being. Rather, students' emotion work served the instrumental goals of sustaining engagement in school work, managing the impact of problematic teacher and peer relationships, and maintaining their social identities.

The findings of this study point to the possibilities that might be opened up when students' emotion work is viewed as an achievement-related activity that teachers can scaffold and as a competence that they can help develop. The concept of emotion work positions students as agents with respect to their emotion experiences in school. The students in this study encountered numerous challenges and problematic situations as they engaged in a long-term undertaking. Yet they demonstrated resilience and achieved exceptional outcomes—a testament to their capability to negotiate the demands of a novel learning environment. Current trends indicate that the school-real world boundaries are becoming more diffuse, and learning environments tend to be amorphous and mutable. Students' emotion work, as the findings of this research suggest, can be one of the determinants of students' successful functioning in these ever-changing learning environments.

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Appendix A
Sample of Students' Emotion Work Narratives

This is an example of a written narrative, and it is presented here in its entirety. Only identifying details were removed, such as specific names of places and the name of the teacher/adviser.

The research study my group mates and I pursued was on the Diversity of Gastropods and Bivalves in the mudflats of [a particular] Bay […]. Our study was a descriptive research. One of the most stressful things we had to deal with was how to further improve the study so that people can benefit from it. And of course we had to deal with people underestimating what our study can do.

One major problem that we "fought" on was on where we will conduct our research. At first, we wanted to do it on rivers but some experts told us that it would be very difficult on our part. Then we decided on mudflats. My group mate suggested to do it in [a certain town]. I strongly disagreed on that one since I felt the place where he wanted to work on was too overused. The frustration I felt was added by the fact that my other group mate doesn't want to make the final decision. I asked my mother, and some other people what other places we can work on. At the time, I realized that doing a field study with our limited time in school was very difficult. We had to do site visits and we had to be there on low tides, so that we can really check the place out. Our adviser, helped us a lot in looking for a place. When we decided on the place, we had to ask permission of course and that included personally meeting up with the people in charge. We didn't know anyone and the place was at least an hour from the school. I was also frustrated by the fact that my group mate doesn't seem to think at first that our research was important. He had more important "priorities" he needed to attend to, he said. Added to the fact that I personally don't have the resources to do the work myself or with my other group mate. I was afraid we won't come up with a valid research. What I did was I tried to stay calm. I did the work that I can do. I was very careful not to offend either one of them or risk our research.

When we settled with our location, we then had trouble with our paper. It was hard looking for relevant articles for our kind of study in the Philippines, especially on molluscs. We also had trouble with our parameters. Our methods weren't finalized at the time either. We tried to look for more

articles on the internet. We tried looking at the upperclassmen's works. We also argued on what stuff we needed to include in the paper. Thankfully, […] our adviser helped us and found an article for us so that we can truly understand what we were doing. We settled on basing the methods on what we had even if they were not so similar.

It was hard doing the paper because we didn't communicate and it was frustrating. The one thing that kept me wanting to do my research was on how it could affect my grades. My group mate was mostly the cause of most of my frustrations. I was a person who wanted, who always passes my requirements on time while he was the type of person who likes to wing it. I had to text him every single night to remind him what to do. It wasn't helping with my stress on school work also, and I get sick a lot when I get stressed. The one thing that helped me was how I learned to stay calm and be patient. We were thankful to our adviser that he always manages to make time to help us. My mother also helped me to relieve most of the stress we felt.

I was thankful when we finished our data gathering. It felt rewarding when we were somehow recognized during the Research Congress. It felt good that we didn't fail at all.

In dealing with research, I learned that whatever the problems are, we will get through it as long as we work together and as long as we have patience. Stress helped me think more maturely but as a teenager, I don't want to live through it again.