

Science and Mathematics Education Centre

**Student attitudes and achievement in classrooms where
parents provide an authentic audience for student writing
utilising Information and Communication Technologies**

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**This thesis is presented for the Degree of
Master of Science (Science Education)
of
Curtin University**

August 2015

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

Signature:

Date: August 11, 2015

Abstract

The primary focus of the present study was an evaluation of student achievement and attitudes and the effectiveness of a programme to email student writing work to their parents while the work was in progress from drafting to publication. Parents were an intended audience for their children's work. The study utilised a mixed-methods approach which included questionnaires, surveys, interviews and email responses. The sample of 65 primary school Year 5 and 6 students from five separate classes was from a private, independent K-12 school in Western Australia. Once approvals were in place, the students participated in the study by having their usual writing class work emailed to their parents on a regular basis so that the parents could become an authentic audience for the work. The students completed the What Is Happening In this Class? (WIHIC) questionnaire in its Actual and Preferred forms, along with selected scales from the Technology Rich, Outcomes Focussed, Learning Environment Inventory (TROFLEI) questionnaire related to Computer Use. They also completed a researcher developed survey to ascertain their perceptions of the project and its efficacy. Ten students were interviewed. Teachers were presented with the survey data and asked about their perceptions of the impact of the research on their classroom learning environment and on writing development. Parents were also surveyed and ten were interviewed. The data from the WIHIC and TROFLEI questionnaires was analysed to determine the factor structure, reliability and the ability to differentiate between classes. Analysis of the data collected from the learning environment surveys revealed that these robust instruments were valid and reliable. Interviews with teachers, where the survey results were presented, resulted in significant changes to their teaching methodology to facilitate enhanced learning environments. This was particularly evident with the use of computers in the classroom and in ways to facilitate greater interaction between students with greater incorporation of group work and peer tutoring. Results of qualitative data revealed that parents who took the time to discuss their children's work with their children enjoyed being an audience for the work and that it had an impact on their children's attitude and performance in writing. The children revealed that knowing their parents would see their draft writing work had an impact on how they tackled their class work, often stating that they put in greater effort knowing their parents would be seeing their work. Parents noted that while they like

greater communication with the school and teachers, that they desired to see more than just the results, they wanted to see the actual classwork on which the results were based. Overall, the research results revealed that having draft student writing work emailed to parents had limited impact on the classroom learning environment but significant impact on student attitudes and performance in writing.

Acknowledgements

Firstly, I would like to thank Dr Tony Rickards for his tireless efforts as my supervisor for this research. He provided consistent guidance, direction, inspiration and encouragement over the often difficult period from the genesis of the research concept to its conclusion with the presentation of this thesis.

Secondly, I would like to thank all the staff at the Science and Mathematics Education Centre at Curtin University for their support of the research effort.

Thirdly, while I can't name the school concerned, I would like to thank the cooperating staff, students and parents for working with me on this journey. Your time and assistance are greatly appreciated.

Lastly, I would like to thank my wife Veronica who inspires me daily. Veronica has supported, encouraged and endured throughout the journey and I am deeply grateful for her. This thesis is dedicated to Veronica and to my three children, Jordan, Dylan and Caitlyn. God had truly blessed me in so many ways but particularly with my family.

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Chapter 1

Introduction

1.1 Origin of this thesis

The current research thesis has provided this full-time teacher and school-based researcher an opportunity to explore, research and evaluate a little explored facet of education. Based on personal experience and direct observation over a number of years, it had been noticed by the researcher that middle and upper primary-aged students struggled at times to understand the “what, how and why” questions related to their learning in the classroom. There was a lack of authenticity in what students felt that they had to work on in class. This was also raised by students directly who would sometimes ask, “Why are we doing this?” This triggered in the researcher a desire to try to help students better understand why certain tasks were being done in the classroom, particularly with respect to writing, and to seek a way to improve the authenticity and audience for student work.

During the researcher’s own teacher training experience, trainee teachers were thoroughly versed in the philosophy of the whole language approach to teaching and learning English as the most appropriate, if not the only, methodology to be utilised in the classroom. Aligned with this was the use of the “process writing approach,” (Graves, 1983) to facilitate learning to write. This approach was applied in the researcher’s classroom, as an attempt to generate interesting and engaging programmes of work, usually from a text base, to have the students produce a wide range of writing genres. Some wonderful learning took place with pieces of work regularly displayed on boards around the room, trips to the principal to display exemplary work and notes of encouragement sent home at the completion of the activities.

Over time, it became apparent that the students were in effect, really only writing for the teacher and perhaps their peers. Students would see other student writing in peer conferences as they revised and edited their work, and later enjoyed pieces read out to the whole class. For some students, it seemed as though they completed their hard

work for very little audience appreciation. For others, it seemed like there wasn't a great deal of point in trying their hardest to produce their best work when it was only seen by the teacher and a few others, with parents perhaps seeing the work at the end of term or semester. When the researcher anecdotally discussed this with students in his class, it seemed to the students and their teacher to be demotivating for the students that they didn't have an effective and personal audience for their work. (It's to be noted here that in the researcher's experience at the time, many junior primary teachers ensured that parents saw the daily writing efforts of their children but that was not as prevalent with students in Year 3 and beyond.)

In the researcher's current school, it's now not compulsory for teachers to send home a portfolio of student work during the year so parents might only see their child's work at the end of the year (if it's brought home at all) or when parents specifically ask to see student work.

As a parent of school-aged children, the researcher was also concerned that his own children's work was not seen frequently enough and requests to teachers also had to be made for the work to be made available. This caused a level of frustration and concern. The researcher and his wife wanted to be involved in their children's education and be able to encourage their efforts and assist where possible, to help them achieve the highest possible educational outcomes. Anecdotally, some parents in the researcher's school had expressed a desire to be more involved in their child's education. Granted, there were other parents who weren't as engaged in the education of their children, entrusting it to teachers with little parental input. However, regardless of how much parents want to be involved in their children's education, the researcher felt that procedures should at least be in place for parents to be able to make the choice to have their children's work available to them in an easily accessible, timely fashion.

1.2 Use of Information and Communication Technologies

Over a 20 year teaching career, the researcher has implemented and advocated for the increased utilisation of *Information and Communication Technologies* (ICT) in

education. ICT can be an engaging medium for students and enables a vast array of learning experiences and avenues for research and publication (Fraillon, Ainley, Schultz, Friedman & Gebhardt, 2014). ICT also provides a way for parents to be kept informed about their children's progress (Olmstead, 2013). Australian schools have been using ICT to varying degrees in education for over 30 years. For example, Queensland public high schools were supplied en masse with computers in 1985 as part of the Computer Literacy Project (Queensland Government, 2012).

When the researcher first started teaching in the early 1990's, a networked lab of 15 Apple Mac computers was connected to a solitary printer. The Internet was in its infancy and the school wasn't connected to the internet, though a colleague demonstrated a very slow connection to AARNET which seemed like a waste of time and effort at that point.

ICT has progressed a long way since those early days and has become far more accessible in terms of cost and availability. Over the course of the present research, accessibility to and capabilities of various ICT devices have improved exponentially. As a consequence, if this study were to be starting now, rather than finishing now, the research could now be tackled differently as students become better equipped with hardware that allows for much greater flexibility and connectivity. For example, at the researcher's daughter's school, each student now is required to have an Apple iPad. Parents regularly receive a photo, taken by the student and sent via email, of the front page of assignments and tests to keep track of student progress. While it is only the front page with the grade and any accompanying teacher comments, it is something to keep parents informed about student progress. Notwithstanding these great leaps forward in technology, it is the researcher's view that effective pedagogy remains at the core of effective teaching and learning, with ICT acting as an effective supplement to pedagogy.

The gradual implementation of the Australian Curriculum (ACARA, 2014), which has a major focus on the use of ICT's as one of the seven General Capabilities, has meant further development in the integration of ICT into the teaching program.

Funding received by many schools across Australia as part of the 2009 Digital Education Revolution meant that there was an intended 2:1 ratio of students to computers for students in Years 9-12. This funding has now been discontinued so schools have to address whether the 2:1 ratio can be maintained. Many schools have a much higher ratio, often 1:1 where the students provide, or are provided with, their own machines. Increasingly, schools are using portable digital devices to provide students with what has become known as ‘ubiquitous access’ to computing resources (Newhouse, 2014).

However, as Fluck (2011) noted, the national secondary scheme for computer provision has no corresponding scheme for primary schools. The primary school context therefore does not necessarily mirror the experience in high schools and there is often less access to computers. For example, the Victorian February 2014 census of computers in government schools found that the ratio of student accessible computers was 1:1.72 for primary students while the ratio was 1:1.04 for secondary students (Department of Education & Training, Victoria, 2014).

There seems to be a confluence of events at the present time where ICT access is becoming more prevalent with a hundredfold increase in technology investment by schools over the past 20 years (Lim, Zhao, Tondeur, Chai & Tsai, 2013), communication with parents via ICT is being promoted (Hornby, 2011; Olmstead, 2013), students are being equipped with devices of their own (Newhouse, 2014) and the Australian Curriculum is promoting greater integration of ICT across subject areas (ACARA, 2014). This study has been conducted over a period of great change and advancement in the use of ICT.

1.3 Theoretical Framework

Fraser (2001) noted that students spend approximately 15,000 hours in primary and high school. This is a huge time investment. He also noted that the classroom learning environment “so strongly influences student outcomes that it should not be ignored” (Fraser, 2001, p. 2). Pickett and Fraser (2010) explain that when you walk into some classrooms you can sense a positive atmosphere and they ask whether the environment

can be described and assessed. Perhaps partly due to nationalised testing, educators frequently focus mainly on cognitive achievement, which is very important, but can neglect what Fraser terms “human qualities” such as concern for community and others and commitment to the task at hand (Fraser, 2001, p. 2). As a means then to evaluate and assess the critically important classroom learning environment, many instruments have been developed to assist educators understand and improve what they do to influence those environments.

The field of learning environment research has developed a great deal over the last 45 years but has its base in earlier work. The basis for learning environment research was the work of Lewin (1936) whose field theory focussed on the relationship and interaction between people and environments (Robinson & Fraser, 2013). Murray (1938) built on Lewin’s work with the development of the needs-press model where personal needs (personality characteristics and motivation) and environmental press (external factors which help or hinder achievement of goals) could be described in common terms (Fraser, 2012b). Robinson and Fraser (2013) credit Lewin (1936) and Murray (1938) with laying the foundations for the development of learning environment scales as both recognised the relationship between the environment and human behaviour. The pioneering work of Moos (1968) and Walberg (1968) built on these foundations, from which many instruments to evaluate learning environments have been developed.

Walberg (1968) used a new measure known as the ‘Classroom Climate Questionnaire’ to analyse the classroom environments of 2000 students and 38 teachers participating in an experimental physics course across the USA. Relationships were found between teachers’ personalities and the climates of their classrooms, even to the point that “the personality patterns of the teacher, his needs, values and attitudes, predict the climate of his classes” (Walberg, 1968, p. 168). Walberg and Anderson (1968) continued to develop and test an instrument to measure learning environments and to predict learning outcomes while working on the Harvard Project Physics programme, a massive project to produce a physics course for junior high school and college students in the USA. Wahlberg developed the Learning Environment Inventory (LEI) while he was working on the Harvard Project Physics as a means to evaluate the courses (Fraser,

2012b). The LEI was then tested on other subjects beyond physics to determine its power to predict achievement in other curriculum areas such as Geography, History, English Literature and French (Walberg & Anderson, 1972).

Rudolph Moos (1968) developed a 'Social Climate Scale' (SCS) while working with correctional institutions in the USA. Building particularly on Murray's (1938) concept of people's behaviour being influenced by environmental factors, Moos (1968) surveyed 384 residents and 92 staff in mostly juvenile correctional facilities with the SCS, concluding that it was useful in discriminating between institutions and the ways they used treatment programmes for the residents. Moos (Insel & Moos, 1974) developed social climate scales that were used in a wide variety of institutions including psychiatric hospitals, correctional institutions, military training companies, university residences, schools and work environments. Ultimately, this work culminated in the development of the Classroom Environment Scale (CES, Fraser, 2012b).

Moos determined three general categories or dimensions which could be used to characterise learning environments. These dimensions are relationship, personal development and system maintenance and change (Insel & Moos, 1974). Relationship dimensions analyse the extent to which individuals are involved with the environment and how they support each other. Personal development dimensions consider opportunities in environments for personal growth and enhancement of self-esteem. The system maintenance and change dimension assesses the orderliness of environments, how they maintain control and how they respond to change (Insel & Moos, 1974). These dimensions are used widely, with scales in learning environment instruments often being aligned to these three dimensions developed by Moos.

Building on the pioneering research in the USA of Walberg (1968; Walberg & Anderson, 1968) with the LEI and Moos (1968; Trickett and Moos, 1974) with the CES, researchers have developed a variety of questionnaires to measure student perceptions of learning environments. The field of learning environment research spread from the USA to The Netherlands where the Questionnaire of Teacher Interaction (QTI) was developed by Wubbels and Levy (1991). Learning

Environments research also spread to Australia with the Individualised Classroom Environment Questionnaire (Fraser, 1990; Fraser & Fisher, 1982). A number of these questionnaires will be described in much greater detail in the next chapter. Analysing learners' perceptions of their classrooms has established clear connections between classroom environments and learners' academic and affective outcomes (Fraser, 1998b).

Adamski, Fraser and Peiro (2013) report that current research often uses instruments such as the What Is Happening In this Class and Science Laboratory Environment Inventory as they are very well-established and validated in many different contexts in English and other languages. However, Adamski et al. (2013) noted that while there has been a large amount of research focusing on schools and classrooms, only a few studies have researched the influence of both school and home on student achievement and attitude. This recognition leads on to this study which seeks to consider the theoretical background for research into parental involvement in education.

Henderson and Berla (1994) conducted a meta-analysis of 66 publications to do with family involvement in education. They concluded that the "family makes critical contributions to student achievement from the earliest childhood years through high school, and efforts to improve children's outcomes are much more effective when the family is actively involved" (Henderson & Berla, 1994, p. i). Henderson and Berla (1994, p. 1) go further when they stated, "The evidence is now beyond dispute. When schools work together with families to support learning, children tend to succeed not just in school, but throughout life."

In his historical overview of the literature, Muller (2009) noted that compulsory universal education in Western society brought about radical change. It emerged that traditionally families were seen as being primarily responsible for the social development of children and schools primarily responsible for teaching work-related skills and academic knowledge (Muller, 2009). However, over time, parents have also come to expect schools to also be responsible for developing values and effective behaviours in children, meaning that the boundaries between school and families have become blurred. Even so, the idea that families and schools can work collaboratively

in children's education "remains a radical departure from a culture in which families and schools still tend to see themselves as parallel but largely disconnected institutions" (Muller, 2009, p. 7). This is despite the fact that governments such as the Federal, State and Territory Governments of Australia and the USA Government have policies which encourage parental involvement in children's education (MCEETYA, 2008; US Department of Education, 1994).

The Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008, p. 11) stated:

Partnerships between students, parents, carers and families, the broader community, business, schools and other education and training providers bring mutual benefits and maximise student engagement and achievement.

Earlier, in 1994, the US Congress set out goals for the year 2000 in the Educate America Act. This Act included a goal that every school would promote an increase in parental involvement in education (US Department of Education, 1994).

Yoder and Lopez (2013) reported that parental involvement has been associated with academic achievement and positive development, higher grades in science and increased scores in standardised tests. Aligned with positive academic outcomes, parental involvement in schools also has an effect on the affective domain with elements such as engagement with school and a positive impact on young people (Yoder & Lopez, 2013).

It has to be noted at this point that parental involvement has been defined in a number of ways. For example, for some it could be interpreted as parent connection with the school, or help with homework, while others talk about communication between parents and school, participation in school activities and having a voice in school decision making (Yoder & Lopez, 2013). For the purposes of this study, parent involvement was limited to being an audience for their children's work through communications provided by emailing student work home and corresponding with

parents mainly via email. Some face to face communications were also engaged in as the study progressed.

There have been a number of barriers to parents becoming involved further in their child's education. Hornby (2011) developed a model to group factors which cause barriers to parental involvement into four categories: Individual parent and family, child, societal and parent-teacher. Individual parent and family factors included parents' life contexts, class and ethnicity and their beliefs and perceptions about parental involvement. Child factors included age, learning ability and behaviour while societal barriers included factors such as political, economic, historic and demographic. The fourth of Hornby's (2011) categories is to do with parent-teacher factors and included differing goals, attitudes, agendas and language. Epstein (2011) found that some teachers do not want to increase the amount of interaction with parents, unless it is on the teacher's terms, for example by contacting a parent if there is a problem with a child. A study of over 250 teachers in San Francisco showed that the majority did not want any further parent-initiated contact and often resented the contact that had been made by parents (Muller, 2009).

1.4 Objectives

This study was conducted with primary school students in English writing classes during their regular class times and with their regular teachers. The objectives of the study were to determine:

1. If there are associations between classroom learning environment and the use of ICT which provides students with authentic experiences of interaction, collaboration and audience?
2. If there are associations between student attitudes and achievement in writing when their parents participate in the writing process as an active audience during their children's work?

3. If the What Is Happening In This Class? (WIHIC) is a valid and reliable instrument when used with the primary age children in this study?
4. If the Technology Rich, Outcomes Focussed, Learning Environment Inventory (TROFLEI) is a valid and reliable instrument when used with the primary age children in this study?
5. Whether teachers perceive a difference between actual and preferred perceptions of their classroom learning environments?

1.5 Significance of this Study

The Melbourne Declaration on Educational Goals for Young Australians stated that, among many other things, successful learners “develop their capacity to learn and play an active role in their own learning” and “have the essential skills in literacy and numeracy, and are creative and productive users of technology, especially ICT, as a foundation for success in all learning areas” (ACARA, 2010, p. 7). The linking of essential skills in literacy and numeracy with ICT is significant in the context of this study. However, in one sense, the technology played a secondary role for the students as ICT was mainly being used to communicate with parents, except in a number of instances, where it was being used by some of the cooperating teachers to complete the literacy tasks the students were set.

Numerous studies have suggested that parent involvement in children’s education is critically important (Muller, 2009). However, researchers have noted that there has been limited study of the impact of parental involvement with student attitudes and achievement (Muller, 2009).

Literacy is critically important for student learning and participation in society. This study aimed to ascertain if there was any benefit evident in student attitude and performance in their writing if the student work was scanned and emailed to parents

in a timely manner so that the parents could become an authentic audience for their children's work.

This study is unique in that it considers links between student perceptions of their classroom environment and how having their work seen by their parents can affect their attitude and achievement in writing.

1.6 Overview of Research Method

This study used a mixed methods approach to obtain data through both quantitative and qualitative means. Reichardt and Cook (1979, p. 26), who were both evaluators "raised in the quantitative tradition" argued strongly that researchers don't need to choose between the two methods but rather be able to use the broadest range of methods to conduct research. This approach of combining methods is recommended by Fraser and Tobin (Fraser & Tobin, 1991; Tobin & Fraser, 1998) as studies completed this way provide greater depth than if only one method had been employed. Spinner and Fraser (2005) mentioned that the triangulation of data from various sources enhances the validity of findings through use of a range of methods which have their strengths and weaknesses.

Student questionnaires formed the quantitative part of the research to study the students' perceptions of their classroom environments and their perceptions on having their parents involved in their education. Parent surveys were another component of the quantitative data. The qualitative component of the research included interviews with the students and parents to gain further insight into their perceptions of the particular teaching programme. Due to the nature of the research, further qualitative data was gleaned from numerous email communications with parents. Teacher interviews were also conducted to obtain data on their perceptions of the learning environments and ways they sought to address questionnaire and survey results.

Quantitative data was analysed using Microsoft Excel and SPSS while the qualitative data was analysed manually to extract themes, patterns and trends from students, parents and teachers.

1.7 Overview of this Thesis

This thesis consists of six chapters and 11 appendices. This first chapter has introduced and summarised the purpose of this study and outlines its objectives. It also provides a brief overview of the research method, limitations and significance of the study.

Chapter 2 reviews literature pertinent to this study. In this chapter, literature describing learning environment research, information and communication technology use in education and research on parental involvement in education are presented. Reviews of literature from studies on the WIHIC and TROFLEI questionnaires are also examined.

Chapter 3 describes the research method used in this study. It outlines the research questions, student sample and the measures used to obtain the data. The historical background to the WIHIC and TROFLEI is elaborated upon. Data collection methods, sample and measures used to analyse the quantitative and qualitative data are discussed.

Chapter 4 presents the results of this study and includes the validation of the WIHIC and TROFLEI instruments with primary school children. It also presents data from qualitative measures including the researcher developed survey and interviews.

Chapter 5 presents a detailed discussion of the quantitative and qualitative research findings corresponding to the research questions.

Chapter 6 summarises all the materials presented in this study. It also discusses the limitations of the research and provides suggestions regarding implications for teaching practice. The relationships between quantitative and qualitative findings are highlighted and suggestions for future research based on the findings of this study are presented. Finally, conclusions are presented.

Following the references there are several appendices consisting of the consent letter, a sample parent letter, questionnaires, surveys and an example of teacher feedback.

1.8 Chapter Summary

This chapter has outlined the reasons for commencing this study stemming from the researcher's interests with student writing, ICT and parental involvement. The following sections outlined the use of ICT in education, the theoretical background for the study, its objectives and significance. The limitations of the research were outlined along with an overview of the research method used in the conduct of the study. Finally, a brief overview of each chapter was presented.

The next chapter, chapter 2, reviews literature pertinent to this study.

Chapter 2

Literature Review

2.1 Introduction and Overview

The previous chapter provided an overview of the research and outlined the reasons for this study. The chapter detailed how the study developed from the researcher's interest in learning environments and the effect of having an audience on primary children's school writing. The chapter presented an overview of the theoretical background, significance of the study and limitations of the study.

The main aims of this study were to research student attitudes and performance in writing when their parents provided an authentic audience for their work. Further to this, the study focussed on five writing classroom learning environments.

The first objective of this chapter is to outline the literature on studies of the effects of parent involvement in student education. There will be a particular emphasis on the impact on student writing performance in the context of having an audience for their work. The second objective is to review literature on use of ICT in education as ICT was used as a means to convey student work to their parents in a timely manner and as a means to obtain qualitative information from parents. The third objective is to review the literature on learning environment research, with a particular emphasis on the development of the WIHIC and TROFLEI learning environment surveys and on how teachers implement changes to enhance the learning environments of their classrooms.

2.2 Audience and student writing

Bean (2001, p. 23), reported her experience of talking with students engaged in writing tasks and finds that they can rarely inform her "who or what the writing is for." She feels that "audience and purpose are the keys to teaching writing processes and skills effectively" (Bean, 2001, p. 23). Anello (2002, p. 11), echoed this theme when she reported, "Many students write solely for their teachers. The spelling may be perfect

but the texts are often stilted, lack purpose and show loose structure. Providing a wide range of purposes and audiences creates a real environment for writing.” Sheko (2011, p. 6) also asserts that, “Normally, students write for the teacher who then returns the writing with feedback and a mark, so the writing isn’t shared.” However, when Sheko (2011) used blogs and social networks with her students she found that the students cared more about their writing knowing that it would be read by their classmates.

“It is not often that students ‘feel good’ about what they do in school,” wrote Davis and Davis (2005, p. 36). They contend that when “students create products that require interaction with other students or adults and share these products in a public forum – the learning stays with them.” (Davis & Davis, 2005, p. 36). To have students then ‘feel good’ about their school work it is important to provide real purpose and an audience.

Borton (2006) commented on how his school addressed the needs of students who were reluctant and underperforming writers. The school developed a model using a ‘Writing Workshop’ where students were exposed to modelling and encouraged to use their imagination. Part of the strategy included the children sharing their work with an audience. Toh (2005, p. 29), commenting within the context of preparing secondary students from non-English speaking backgrounds for English language university courses, proposed the idea that “writing means writing for people,” an idea that seems self-evident. Toh contended that writers need to be “more conscious of the audiences they are writing for” (Toh, 2005, p. 29) while Paltridge (2000) noted that students need to understand the expectations of the community they are writing for.

One of the key factors of the “Process Writing Approach” of Donald Graves (1983) is that writing is taught as a process so that the texts produced communicate clearly to particular audiences (Rivalland & Wooller, 2006). In the context of research on preparing upper primary students for secondary education in the writing area, Rivalland and Wooller (2006) interviewed a number of teachers on what they saw as the main issues being faced regarding writing. Among issues such as text structure, vocabulary and grammar were also the issues of audience and purpose (Rivalland & Wooller, 2006). Teachers felt that to prepare primary students to meet the needs of

secondary curricula there “needed to be clearer expectations of which particular purposes, audiences and genres were needed” (Rivalland & Wooller 2006, p. 23).

In their article on Multimodal Responses to Literature in Years 5-8, Chase et al. (2012), explored the use of Web 2.0 tools in planning, composing and publishing to improve student writing. They tested the hypothesis that Web 2.0 tools would increase student engagement in the writing process. They found this hypothesis to be true and that students “loved the opportunity to write for authentic purposes and for a wider, online audience” (Chase et al., 2012, p. 53). Dukic (2007, p. 23), wrote that “educators mostly agree” that Internet publication of student work “has a powerful effect on students’ engagement in learning” as it gives students the ability to show their work to other students, teachers, family and friends.

Wright (2011), commented on factors that go together in a successful classroom writing program. Among practices like teachers reading extensively, conferencing with students, risk-taking and high expectations, is the element of multiple options for publication as “writers gain satisfaction from the responses of other to their finished pieces” (Wright 2011, p. 8). Wright (2011, p. 8) continued, “Student writers are consistently reminded of the reading needs of the target audience and begin to make informed decisions about how best to publish their writing.”

Cruickshank (2011) also mentioned how important an audience is for student writing. In her study, before her students began writing, she had them conduct interviews with the chosen audience of students in other classes. She found that the students were excited about their writing tasks as they had a greater sense of direction and understanding of audience (Cruickshank, 2011).

Warschauer, Arada and Zheng (2010) investigated the use of laptop computers in K-12 classrooms across the United States and found that the greatest impact of laptops was on student writing. Warschauer (2006, in Warschauer et al., 2010) found that students, using laptops daily with an internet connection, write, revise and publish more, get feedback on their writing and produce higher quality writing. However, the

researchers found that schools were slow to adopt one to one laptop programs, partly as a result of the high cost.

The use of much cheaper netbook style laptops alleviated the cost issue and enabled schools in the Littleton Public Schools district to implement a one to one laptop program with a variety of tools such as blogs, wikis, chat, email and social media allowing the students to write, collaborate and communicate across the district. Warschauer et al. (2010, p. 222) also found that contact with professionals or authors from outside the district can have a big impact on students as they were “more motivated to write for an authentic outside audience.”

Lo and Hyland (2007) wrote from the background of a study of English language students from non-English speaking backgrounds in Hong Kong. Here, a sense of having a wider audience for the high achievers’ writing presented a challenge due to “increased potential for criticism” and loss of ‘face’ (Lo & Hyland, 2007, p. 229). Lower achievers were also concerned about loss of face but were able to view it more positively, as participating more in the community (Lo & Hyland, 2007).

2.2.1 Audience and student writing summary

The importance of audience in the development of children’s writing has been highlighted by numerous researchers and teachers (Anello, 2002; Bean, 2001; Rivalland & Wooller, 2006; Sheko, 2011). Students often write for the teacher and their writing is not shared (Sheko, 2011) and don’t ‘feel good’ about what they do at school (Davis & Davis, 2005). Sharing work with an audience assists underperforming and reluctant writers (Borton, 2006). Preparing primary students for secondary schooling meant that students needed to be made aware of the purpose and audience for writing (Rivalland & Wooller, 2006). Using Web 2.0 tools engages students and allows them to publish their work to an online audience (Chase et al., 2012) with Internet publication affecting student engagement in learning (Dukic, 2007). The introduction of laptop computers into classrooms had the greatest impact on student writing (Warschauer et al., 2010) with wider publication options and responses to their writing leading to greater satisfaction with the task (Wright, 2011) while students were

more excited about their writing tasks when they understood the audience (Cruickshank, 2011). However, a wider audience can also provide challenges through cultural differences where students do not want others to see their work (Lo & Hyland, 2007).

2.3 Parental involvement

“It is well-established that building home-school partnerships is a powerful avenue for increasing the satisfaction of parents and the community with schooling and for improving schools” wrote Merkley, Schmidt, Dirksen and Fulher (2006, p. 12). However, the same authors noted that, “typically, parents find it difficult to get information from their uncommunicative children about what happened during school” (Merkley et al., 2006, p. 12). Merkley et al. (2006) then went on to use an Internet based system to improve the communication between parents and teachers about student work, with positive results. The researchers set up a programme where teachers and tutors were trained in using email and an online portal to display children’s work, including video and audio clips, and to communicate with parents concerning the reading and writing development of their children. Merkley et al. (2006) reported on the improvement in the comprehension and confidence of a student with the parent being enthusiastic about being able to see and hear her child’s progress through using the technology. The study has some similarities with the present research in that it was seeking to improve student outcomes through parent involvement facilitated by ICT. It differed in largely being a case study reporting on one tutoring situation outside a school context.

Parental involvement has a role in improving educational outcomes and has been acknowledged for over 45 years (Hornby, 2011). Defined by Jeynes (2005, in Hornby, 2011, p. 1) as “parental participation in the educational processes and experiences of their children”, involvement includes supervising homework, listening to children read, attending parent education workshops and parent-teacher meetings. The term “parent” is used for anyone in the extended family who takes on a parenting role with children, including grandparents and foster parents (Hornby, 2011).

Drawing on results of reviews and meta-analyses, Hornby (2011) noted that there is ample evidence for parental involvement's effectiveness in enabling children's academic achievement, with effect sizes for parental involvement calculated between 0.38 to 0.74, depending on school context. As will be explained later with respect to ICT, Hattie (2012) calculates the average effect size of educational interventions at 0.4, meaning that generally, parental involvement "has a substantial impact on children's academic achievements" (Hornby, 2011, p. 2) with the average effect size across all schools calculated at 0.51.

Jeynes (2007) undertook a meta-analysis of 52 studies covering over 300,000 students in the USA to consider the effect of parental involvement on urban secondary school students' educational outcomes. He found that parental involvement is significant with an effect size of about 0.5 of a standard deviation "for overall educational outcomes, grades, and academic achievement when no sophisticated controls were used" (Jeynes, 2007, p. 99). He also found that the effects of parental involvement held across a variety of populations and cultures.

Hornby (2011) noted that besides academic considerations, there are other benefits of parental involvement for children, teachers and parents. These include improved attitude, behaviour and school attendance by children, improved parent-teacher relationships and teacher morale and increased parental confidence in their own parenting and interest in their own education. However, there is a gap between the acknowledged benefits in the research and the practice in schools with a survey by Binns, Steinberg and Amorosi (1997, in Hornby, 2011) finding that 83% of teachers in a USA survey considering that parental involvement levels should be increased while a UK survey reported that 72% of mothers wanted to be more involved in their children's education (Williams, Williams & Ullman, 2002, in Hornby, 2011).

Hornby (2011) found in a New Zealand context that much of the research on parental involvement has been published in local reports and students' theses, summarised in a New Zealand Ministry of Education major report which included selected international research. The report is "the source of the finding that effective partnerships between parents and schools result in improved outcomes for children" (Hornby, 2011, p. 43).

A regular review of schools in New Zealand resulted in recommendations that nearly 75% of the 233 schools that were reviewed should improve their engagement with parents (Bull, Brooking & Campbell, 2008, in Hornby, 2011). Another study of home-school partnerships in New Zealand and international case studies concluded that there was little evidence to support the benefits of home-school initiatives as opposed to extensive support for the beneficial effects of “naturally occurring or spontaneous parental involvement in education” (Bull et al., 2008, in Hornby, 2011, p. 44). Hattie (2009) also noted the low effect size of 0.16 for home-school programs while there was an above average effect size of 0.51 for overall parent involvement.

As the current study concerned primary school students, evidence of parental involvement within a similar context was considered. Hornby (2011), after noting the research above, conducted a study by interviewing the principals of 22 rural schools in the Canterbury region of New Zealand and 21 urban schools in Christchurch, New Zealand, on their school’s practices concerning parental involvement. He found that there was a wide diversity of school practices regarding parental involvement such as parents acting as a resource through helping with literacy and numeracy in the classroom or with musical or cultural performances, communicating with parents through newsletters, phone calls, notes to and from parents and encouraging parents to drop in to school. Only six of the rural schools reported using email to maintain communications with parents while no figure was stated for this communication method in the urban schools.

Key findings of the New Zealand survey described above, were that no school had written policies for parental involvement, with parental involvement being organised on an ad hoc basis, a lack of specific ideas to involve parents from diverse cultural backgrounds, little priority on parent education, minimal focus on parent support and limited teacher training concerning working with parents (Hornby, 2011).

In a meta-analysis of 41 studies covering over 20,000 participants, Jeynes (2005) examined the relationship between parental involvement and academic achievement of urban elementary students in the USA. In this study, which preceded his 2007 study of secondary students, Jeynes (2005) found that there was a significant relationship

between parental involvement and academic outcomes, at a level of between about 0.7 to 0.75 of a standard deviation unit. Jeynes (2005, p. 259) commented that “this is close to what Rosnow and Rosenthal (1996, in Jeynes, 2005) described as a large effect size (about 0.8).” Similar characteristics to his later study were also found in that parental involvement has an influence on educational achievement largely regardless of gender, ethnic group and socioeconomic status (Jeynes, 2005).

According to Rodriguez, Collins-Parks and Garza (2013), one of the most cited researchers concerning parent involvement is Joyce Epstein. Epstein’s (1995) model of parent involvement includes six overlapping types of involvement. These are:

- Parenting, where schools help families to establish a supportive home environment.
- Communicating, where schools engage parents in two-way communication about children’s progress and school.
- Volunteering, where parents assist at school, home or elsewhere.
- Learning at home, where families are provided with information from the school on how to help their children with homework.
- Decision making, where parents are involved in school committees and governance.
- Collaborating with the community, where community resources are identified and integrated to strengthen programmes provided by the school.

While Rodriguez et al. (2013) found the model useful, they found that there were three areas in which the model fell short. These were parents’ agency, students’ agency and parental expectations and aspirations. By parents’ agency Rodriguez et al. (2013, p. 52) explain that Epstein’s model puts schools and teachers in the role of “initiators and mediators of parental involvement” and appears to ignore ways in which parents might already be involved with their children’s learning or influencing the learning environment. Rodriguez et al (2013, p. 53) also mentioned that Epstein’s model, and much of the literature on parental involvement, portrayed students as “silent and receiving participant(s)” whereas they propose a model that includes the role students can play regarding parental involvement in their own education. The researchers also

highlighted a category on parental expectations/aspirations, an aspect that “has the greatest impact on student achievement” (Rodriguez et al., 2013, p. 53).

Hong and Ho (2005) drew on longitudinal research data across four ethnic groupings in the USA in their study of parental involvement. They concluded that the more parents communicated with their children about educational activities and the greater the parental hopes and expectations of their education, the more students aspired and achieved academically (Hong & Ho, 2005). Fan (2001) used part of the same data set as Hong and Ho (2005) which was the National Education Longitudinal Study (NELS) of 1988 in the USA. Among Fan’s (2001) conclusions was that parental aspirations for their children’s education had a consistent positive effect on their academic growth.

2.3.1 Parental involvement summary

Parent involvement has been acknowledged as having a role in improved educational outcomes for over 45 years (Hornby, 2011) with parent satisfaction with schooling increased through home-school partnerships, though parents find it hard at times to get information from their children (Merkley et al., 2006). Parental involvement has been shown to have effect sizes mostly greater than the average effect size of educational interventions (Hattie, in Hornby, 2011) while a meta-analysis with elementary students has shown an effect size of between 0.7 and 0.75 of a standard deviation (Jeynes, 2005) and a meta-analysis of secondary students demonstrated an effect size of about 0.5 of a standard deviation (Jeynes, 2007). While there is ample research evidence of the benefits of parental involvement, in practice, the evidence is less compelling, particularly through lack of written policies and limited teacher training on working with parents (Hornby, 2011). Analyses of earlier data collated in the USA have indicated that parental expectations and aspirations have a significant, positive effect on student achievement (Fan, 2001; Hong & Ho, 2005; Rodriguez et al., 2013).

2.4 Information and Communication Technologies (ICT) in education

30 years ago, Seymour Papert, a leading proponent of technology, famously said that the computer would “blow up the school” (Papert, in Selwyn, 2012). He indicated this

to be the system where students were in age based classes, teachers running exams and following a curriculum, a system which “is based on a set of structural concepts that are incompatible with the presence of the computer” (Papert, in Selwyn, 2012, p. 11). Selwyn (2012) noted that many educational technologists express views implicitly informed by Papert’s sentiments where they call for radical change or even the dismantling of schools as we know them. However, Selwyn (2012, p. 14) argued that schools will continue with their “industrial-era” structures but that there is need for some change for schools to make the most of digital technologies and to get the most out of digital technology users.

It is important to begin this section with a brief definition of what is meant by Information and Communication Technologies (ICT). There are various definitions of what ICT consists of. For example, Martinovic and Zhang (2012) include items such as personal computers, laptops, printers, LCD projectors, palm devices, iPods, mobile phones and the Internet while a Canadian curriculum document (Ontario Ministry of Education, 2009, in Martinovic & Zhang, 2012), includes multimedia resources, databases, Web sites, digital cameras and word-processing programmes. For the purposes of this overview the researcher has taken the broader view of what ICT is defined as and would now include items like the iPad and similar Android or Windows tablet devices.

This section of the Literature Review considers ICT in education by first giving an historical context (Section 2.4.1), then considering the impact of ICT in teaching and learning (Section 2.4.2) and finally consideration is given to ICT in collaboration and communication (Section 2.4.3).

2.4.1 ICT in education, a brief historical context

According to a report by the Education and Health Standing Committee, Legislative Assembly, Parliament of Western Australia (2012) on the role of ICT in Western Australian Education, technology has played a part in education for over 70 years. The report’s historical perspective covers technologies such as the mimeograph of the 1940’s, headphones introduced in the 1950’s for listening stations, slide rules for

calculations used from the 1950's until the calculator took over around 1974, videotapes used from around 1951 to 2012, educational television from 1958 to the present day, the photocopier introduced by Xerox in 1959 and still in use but with predictions that it will become obsolete with more digital creation of documents rather than actual paper products, and the filmstrip viewer of 1965 which allowed individual students to watch filmstrips at their own rate. This was something that the authors saw as a possible precursor to the iPad (Education & Health Standing Committee, Legislative Assembly, Parliament of Western (2012).

Other devices the committee mentioned include the hand-held calculator which allowed teachers to try more complicated problems and which freed up significant amounts of class time, the CD-ROM drive which enabled entire encyclopaedias to be stored on a single disk with audio, graphics, photographs and video all accessible from a personal computer, the hand-held graphing calculator from 1985 which made advanced maths like algebra much easier, the personal computer, including laptops and notebooks, which has seen rapid expansion since the 1980's, the interactive whiteboard which allows the computer monitor to be emulated and controlled on a large board and seen as an "easy-entry" technology for teachers as they fit in with many teachers' current practices (Education & Health Standing Committee, Legislative Assembly, Parliament of Western Australia, 2012, p. 7).

The introduction in 2010 of the Apple iPad and computer networks are the final two technologies mentioned by the committee as having significant impact on education. The committee drew a distinction between technology, which was largely confined to helping students with note taking, making technical or mathematical calculations or supplementing textbooks, with information and communication technology which was seen as a "game changer" as "it can deliver content instantly, bring distant individuals together, and make administrative processes faster" (Education & Health Standing Committee, Legislative Assembly, Parliament of Western Australia, 2012, p. i).

According to White (2008, p. 7), citing the work of Cailliau and Gillies (2000), the real starting point for ICT in education was the 1989 proposal by Cailliau and Berners-Lee for the management of documents using computers, envisaging a service which

“could share files, documents, information, dialogue, graphics, sound files and more,” which Cailliau and Berners-Lee called the World Wide Web or www. The development of the www from 1990 until the dotcom crash of 2001 provided schools, training colleges and universities with the capacity for an information service, with websites being created which were largely text based without much consideration for being user friendly (White, 2008). This technology was seen as a passive “push” model of communication (Levine, Locke, Searls & Weinberger, in White, 2008). This is commonly called Web 1.0, having an informational orientation with largely static webpages, like an electronic version of a reference book or library (Pegrum, 2009).

From 2001, services like Google, Wikipedia, Facebook and Twitter began to appear and removed the need for desktop applications like Microsoft Word, Excel, PowerPoint and similar programmes, moving the www towards becoming a read/write platform where there could be interactive communication, commonly known as Web 2.0 (White, 2008). Pegrum (2009) sees Web 2.0 as more like a collaborative toolbox and less like a thing, such as a book, or a place, such as a library.

White (2008) sees the combined internet and www maturing as a platform for communications, productivity and social networking which has no precedent in history. White (2008, p. 7) summarised Bosco’s research stating, “today we’re in a period where verbal and written communication operate electronically, globally and more personally than ever before, which has profound implications for education, business and research.”

White (2008) summarised his brief historical overview of ICT in education with three implications: the computer is no longer a standalone device but a device for productivity and communication; the trend towards software as a service applications like Google and Twitter means that users no longer have to purchase desktop software but do require internet access and the expectations of experienced users are changing from a push to a pull communication model.

2.4.2 Impact of ICT in teaching and learning

The results of a four year study implementing ICT use in the United Kingdom concluded that “as technology was embedded, schools’ national test outcomes improved beyond expectations” (Somekh et al., 2007, p. 6). Other impacts noted by the authors included that there was greater interaction between teachers and students when using presentation technologies effectively. ICT enabled greater personalisation of learning, facilitated more effective assessment of learning and had a greater impact on attainment levels in primary schools compared to secondary schools (Somekh, et al., 2007).

In a 2004 report titled *Australia’s Future using Education Technology*, Geoff Spring argued that, “ICT could be a major force for improving education while enabling choice for learners” (Spring, in White, 2006, p. 4).

White (2006) later outlined outcomes that the effective use of ICTs in education can lead to. These include:

- More engaged students
- Improved learning outcomes
- More effective teaching and learning without significant increases in teacher workload
- Reduced costs
- Improved educational services, and
- Economic benefits.

In a Canadian study, the *Wireless Writing Project*, where primary age students in Grades 6 and 7 were supplied with laptop computers, the perceptions of teachers, parents and students were that writing improved during the project (Jeroski, 2003). This writing improvement was quantified using data from in-class and controlled writing assessments. Aligned with improvements in writing achievement, teachers, parents and students were enthusiastic about using laptops and their impact on achievement, motivation and attitude along with positive changes in technology skills (Jeroski, 2003).

In another study involving laptop computers Zheng, Warschauer and Farkas (2013) indicated that technology advocates believe one-to-one laptop programs assist student writing but that there has been little research to support the claim. Their study researched 2,158 upper elementary students to determine the effect of daily access to laptops on their writing outcomes and processes. They found improved English language achievement in a Californian district in the research but test score gains in a Colorado district were not statistically significant.

Zheng et al. (2013) noted however, that in both districts significant gains were made by at-risk student groups such as Hispanic students and students from low income backgrounds. They suggest that, “well-planned use of laptops and digital media can help diverse learners improve their literacy processes and outcomes” (Zheng et al., 2013, p. 1).

Moseley and Higgins (in Kennewell & Beachamp, 2003) identified three advantages provided by ICT in teaching literacy and numeracy:

- Capacity to present or represent ideas in multiple forms
- Facility to provide students with feedback as they worked
- Capacity to easily change the presentation of information.

These researchers found however, that students in classes whose teacher was classified as an “intensive” user of ICT, only had about half an hour per week to use ICT to improve literacy and numeracy (Kennewell & Beachamp, 2003). Typically, UK primary school teachers used ICT for free choice activities, extension or support work and rewards more than they used it for word processing and projects or instructional work for the whole class (Kennewell & Beachamp, 2003). This was over 10 years ago and ICT use in teaching and learning has changed considerably over that period with a much greater expectation that ICT will be integrated into the classroom.

Earlier, in 1998, The Adelaide Declaration on National Goals for Schooling in the Twenty-First Century (MCEETYA, 1999) demonstrated the significant role of ICT within education when it stated that students leaving school “should be confident, creative and productive users of new technologies, particularly information and

communication technologies, and understand the impact of those technologies on society.”

Ten years later, in the very influential Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008, p. 13) it says, “As a foundation for further learning and adult life the curriculum will include practical knowledge and skills development in areas such as ICT and design and technology, which are central to Australia’s skilled economy and provide crucial pathways to post-school success.” Implicit in this statement is the importance of students learning to use ICT as a basis for school learning and later, lifelong learning.

Earlier in the declaration there is a significant statement on the use of ICT in education and its effectiveness (MCEETYA, 2008, p. 5).

Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade.

The goals expressed in the Melbourne declaration have been promulgated through later curriculum documents. The Australian Curriculum (ACARA, 2014), highlights the need for K-12 students to learn to use ICT for a range of purposes (Pegrum, Oakley & Faulkner, 2013). As an example, students in the foundation level are expected to “understand concepts about print and screen, including how books, film and simple digital texts work” (ACARA, 2014). Consequently, from the beginning of their formal education, Australian students are expected to be learning about conventional printed texts and digital texts. Aligned with this requirement, the Australian Curriculum stipulates seven general capabilities (ACARA, 2014), one of which is ‘information and communication technology capability’. Under this capability, students are expected to learn how to use ICT effectively across all curriculum areas (Pegrum, Oakley & Faulkner, 2013).

The specific organising elements of the ICT general capability stipulate that students are able to:

- Apply social and ethical protocols and practices when using ICT
- Investigate with ICT
- Create with ICT
- Communicate with ICT
- Manage and operate ICT (ACARA, 2014)

For students to learn and apply these capabilities means that teachers are being called on to facilitate the learning. Martinovic and Zhang (2012), in their two-year study of a total of 87 pre-service teachers in Canada, refer to UNESCO recommendations for pre-service teachers to develop their technology literacy. UNESCO (2008, in Martinovic & Zhang, 2012) recommended that teachers be trained so that they can support students in activities like problem solving and projects, along with supporting student learning through designing ICT-based communities and communication channels.

Martinovic and Zhang, (2012), found that the pre-service teachers were increasingly knowledgeable about ICT and skilled in its use and that they valued ICT most when they could use it to prepare for classes or present information to their classes, rather than for collaboration or communication. Having the pre-service teachers valuing ICT more for preparation and presentation suggests a more teacher-centric view of the value of ICT (Martinovic & Zhang, 2012).

Hermans, Tondeur, van Braak and Valcke (2008) studied the impact of primary school teachers' educational beliefs on the classroom use of computers. In their study of 525 teachers, they characterised teachers' educational beliefs as traditional or constructivist and found that teacher beliefs are significant factors in explaining why teachers adopt computers in the classroom. Their results showed that there was a positive effect on constructivist beliefs of computer use in classrooms while traditional beliefs have a negative impact on integrated classroom computer use.

Prestridge (2012) used a questionnaire to survey 48 teachers in four Australian Catholic primary schools to ascertain their ICT beliefs and practices in the classroom. The survey results were analysed to divide teachers into groups or 'factors' according to their level of ICT use, with two teachers from each of the four factors being interviewed and having their curriculum documents analysed. Prestridge (2012) found that there were connections between the level or factor allocated to the teachers with their beliefs and practices with ICT integration.

At the foundational level the two teachers used ICT at a basic level such as showing pictures to the whole class on a data projector, using the internet for research, developing spreadsheets or relying on other teachers to teach ICT concepts to their class (Prestridge, 2012).

The next teacher level outlined was the developing level. Here, the two teachers interviewed used ICT mainly for whole class activities using pre-packaged content delivered on interactive whiteboards. The teachers believed in open-ended tasks that could enable collaboration and communication but these beliefs weren't realised (Prestridge, 2012).

The third level teachers in the study described themselves as competent with ICT and interested in using ICT in their classrooms. These teachers wanted to develop the ICT skills of their students for real world application in their work and social lives, focussing more on the functionality of ICT than using ICT as a tool to enhance learning (Prestridge, 2012).

The final level teachers focussed on using ICT to support open-ended problem solving tasks with teachers facilitating learning, with an emphasis on ICT enhancing the learning process rather than the ICT product. Prestridge (2012, p. 457) draws the conclusion that there "is a relationship between ICT competence, confidence and practice" with teachers who were more comfortable with technology being more confident with using ICT in their classrooms.

Tay, Lim, Lim and Koh (2012), studied pedagogical approaches for ICT integration in a Singaporean primary school's English and mathematics classes. Their findings suggested differences in the pedagogical approaches of English and maths teachers, where the English teachers used ICT much more frequently than maths teachers and facilitated their students to learn *from* and *with* technology while the maths teachers primarily used a learning *from* ICT pedagogy.

Educators have come to realise that 'technology' is about a lot more than technology (Pegrum, 2009). Motteram and Ioannou-Georgiou (in Pegrum, 2009) argued that the three P's of e-learning are pedagogy, pedagogy and pedagogy. Pegrum (2009) commented that this point hasn't always been as obvious as it now seems and that it still may not be obvious to everyone. Pegrum's (2009) study considers technology in education through a series of lenses to bring aspects into sharp focus while blurring others. Thus he contemplates technological, pedagogical, social, socio-political and ecological lenses. In the pedagogical lens Pegrum (2009, p. 25) asserts that "web 2.0 opens up spaces for constructivist, collaborative pedagogies" which educators can work with or against, meaning that those working against the grain of web 2.0 can use it "narrowly as an electronic add-on to automate information transmission and skills practice."

In a later article, Pegrum, Oakley and Faulkner (2013) again express a similar vein of the dangers of seeing technology being emphasised rather than pedagogy and content. They stated that pedagogy and content should take precedence or at least be equally valued, as in the TPACK model mentioned below. Commentators on the field of mobile learning, where mobile devices such as tablet devices like iPads and smaller devices like iPods are used, also point out that it is the way technology supports teaching and learning that is important, not the technology itself (Pegrum, Oakley & Faulkner, 2013).

Koehler, Mishra and Yahya (2007, in Loveless, 2011) conceptualised a model to describe teacher knowledge which incorporated content, pedagogy and technology with their 'Technological Pedagogical Content Knowledge' (TPCK) model. Koehler, Mishra and Yahya (2007, in Loveless, 2011, p. 307) "argued that intelligent

pedagogical uses of technology require the development of a complex, situated form of knowledge.”

In earlier research by Loveless (2003, in Prestridge, 2012, p. 451) of primary teachers’ perceptions of ICT and their pedagogy, Loveless found that ICT perceptions were fashioned by teachers’ “identity and participation in wider cultural and social spheres which influence the professional arenas and setting in which they practice.” Loveless (2003, in Prestridge, 2012) grouped teachers’ ICT perceptions into three categories: ICT in society where teachers talked about the impact of ICT on children’s future working lives, ICT capability where teachers discussed the ICT skills children required as a subject and as a cross curricula tool and finally ICT in schools where teachers talked about integration of new technologies in schools.

Stevenson (2008) describes four common metaphors used by researchers for digital technology in pedagogical situations; namely, tutor, tool, environment and resource. In his survey of 48 primary and secondary teachers working with 58 learner groups he investigated how the different uses of technology impacted teaching and learning practices. He describes how two basic teaching and learning structures emerged from his analysis, teacher-centred and student-centred, each with specific attributes of the methods of dialogue and teacher practice. Stevenson found interactions between teacher and student ICT expertise, how ICT was used and lesson structure.

When ICT was used as a tool or resource, which accounted for 89% of the activities in the survey, comparing the two metaphors showed that differences were seen in control of technology, the spread of technologies used, the intended and achieved outcomes and the task focus. Stevenson (2008, p. 850) noted that “corresponding differences can be found in the pedagogical structure of the activities, with a greater emphasis on learner-centred activities in the case of the “tool” approach, where learners controlled the types of digital technologies that were used.”

When ICT is considered a resource, Stevenson (2008) further noted, teaching was enhanced but when ICT was used as a tutor, tool or environment, learning was enhanced.

Zucker (2008) proposed that ICT use in schools should enable six goals to be met. One specifically addressed to teaching included that ICT use should make teaching more interesting as a position and therefore attract people who are interested in working in a school environment.

Continuing with Zucker's (2008) set of six goals that ICT should meet in a school context were several that related very specifically to students. He postulates that ICT should better prepare students for life after school by improving academic achievement through a more challenging curriculum, greater use of problem solving in instructional strategies and more effective assessments. ICT use should make schools more interesting for students through creating a more relevant and engaging environment that extends beyond a more traditional, narrow focus on academics to connect with the world outside the classroom. ICT use should also enable the needs of a diverse spectrum of students to be addressed so that all students can benefit from their education.

Selwyn (2009, p. 364) considered many current definitions of young people, such as 'digital natives', 'net generation' and 'net savvy' popular in media, as ways of describing the generation of young people who have grown up with digital technologies and who are seen as confident "and often 'expert' computer users." Selwyn contended that the digital native literature is not necessarily accurate or objective with claims about young people's abilities rarely grounded in rigorous, empirical studies. Selwyn (2009) noted that instead of a positive outlook of young people being involved in collaborative communities creating content, in fact they are more likely to be solitary, passive consumers of media with surveys showing that many adolescents use technology for game playing, text messaging and retrieving online content.

Project Tomorrow (2014) surveyed over 325,000 students in the USA to understand their current use of digital tools and resources to support schoolwork and enable out of school learning. They also sought to find out the students' aspirations for using digital tools and resources within new, innovative learning environments. They regard the digital native / digital immigrant scenario as a type of mythology, where students

are seen as technologically savvy while educators and parents are unable to ever be on par with the students' skill levels.

Project Tomorrow (2014, p. 2) asserts that it's time to move beyond the myth to what they term "a new digital learning playbook" which takes into account the differences in how students use and aspire to use technology. They found that teachers use a wide range of technologies such as online textbooks, portals and teacher created videos, with a quarter of Grade 3-5 students and almost a third of Grade 6-12 students using school provided mobile devices (Project Tomorrow, 2014, p. 3).

The survey also found that students were using mobile devices at school and home for self-initiated learning purposes, with high school students reporting an average of 14 hours per week using technology for writing while students were also reporting a preference for digital reading over printed text for their schoolwork and personal reading (Project Tomorrow, 2014, p. 6).

Warschauer and Matuchniak (2010, p. 179) take a view that ICT is having a "profound effect on modern life." Quoting Harnad (1991, in Warschauer & Matuchniak, 2010, p. 179), they assert that ICT is the "fourth revolution in the means of production of knowledge." This fourth revolution followed on from the previous three revolutions of language development, writing development and the printing press. While the previous revolution of the printing press took centuries to be realised, since it depended on the industrial revolution, the ICT revolution is developing simultaneously with a new economic revolution based on a transition from an industrial economy to an informational economy (Warschauer & Matuchniak, 2010).

Describing educational settings in the USA, where teachers in lower socioeconomic areas had to contend with students who lacked English language and computer skills or were considered at-risk, along with pressure to increase test scores, resulted in an acknowledgement that it was difficult for the teachers to use technology well (Warschauer & Matuchniak, 2010). Warschauer's studies (2000, 2004, 2006, in Warschauer & Matuchniak, 2010), found differences in the types of constructivist activities between lower and higher socioeconomic schools with lower socioeconomic

schools carrying out activities like writing newsletters or finding information on web pages, with limited goals such as developing basic computer skills, rather than developing higher order thinking skills, understanding and analysis which occurred more often in higher socioeconomic schools.

While there is much commentary on the positive contribution of ICT to teaching and learning (Jeroski, 2003; Somekh, et al., 2007; White, 2006), aligned with curriculum documents which stipulate its use in the classroom (ACARA, 2014), there is also a significant body of work which cautions educators regarding the incorporation of ICT into teaching. For example, Cuban (2001, p. 72) completed research amongst schools in Silicon Valley, where there is a high concentration of major technology companies, only to find that over half of elementary and middle school teachers didn't use computers for classroom instruction. When Grade 5 school students completed surveys on computer use, it was found that they used computers for only about 24 minutes per week. Webb (2007, p. 19) summarised Cuban's work by saying that the case studies "demonstrate some of the challenges, complexity and uncertainty for teachers and schools involved in incorporating the use of ICT into their programs."

In a recent blogpost Cuban (2014) mentioned that evidence for digital technologies transforming teaching, along with student engagement and achievement is "not only sparse but also unpersuasive even when some studies show a small 'effect size'." He cites the work of Hattie (in Cuban, 2014) who examined over 180,000 studies representing 50 million students to calculate 'effect sizes' of innovative teaching practices, ranking them from 0.1 (hardly noticeable) to 1.0 (a full standard deviation or almost one year's growth in student learning). Hattie (2012) found that a typical innovation effect size was 0.4. Examples of effect sizes for practices include, class size (0.21), direct instruction (0.59), feedback (0.75) and teaching meta-cognition strategies (0.69). However, when it came to computer use, the effect sizes were much smaller, and most were below the 0.4 level seen as typical. For example, web-based learning (0.18), programmed instruction (0.24) and computer-assisted instruction (0.37) (Hattie, 2012). Only 'hypermedia instruction' (0.41) was found to have an effect size greater than 0.4 with the average for all studies of the effect of computers being 0.31 (Hattie, in Cuban, 2014; Hattie, 2009).

Nichol and Watson (2003), in an editorial in the *British Journal of Educational Technology*, characterised the role and nature of ICT in education as having two poles: optimistic-rhetoric and pessimistic-rhetoric with academic research in a floating position on the spectrum between these two poles. They stated that the optimistic-rhetoric, which has held the field, was the driving force for the spending of billions in the UK to fund ICT in education but that academic researchers have found that claims about the impact of ICT not borne out and that there is little to show for the investment in educational ICT. They stated, “Rarely in the history of education has so much been spent by so many for so long, with so little to show for the blood, sweat and tears expended” (Nichol & Watson, 2003, p. 132.)

2.4.3 ICT in collaboration and communication

Again referring to Zucker’s (2008) six goals, mentioned earlier, there are two goals that address collaboration and communication. Zucker (2008) asserts that ICT use should enable parents and the community to be more involved with children through access to school information and provision of quality resources for children and parents to use at home. His final goal is that ICT use should enable more efficient accountability since information about student academic results and schools will be more accurate, timely and available to parents.

An online survey of 294,399 K-12 students, 42,267 parents, 35,525 teachers, along with librarians, administrators and technology leaders by Project Tomorrow in 2010-11 revealed that 96% of teachers and 99% of administrators used communication tools to connect with peers or parents (Project Tomorrow, 2011).

Mestry and Grobler (2007) summarised Swap’s (1990, in Mestry & Grobler, 2007) four basic models of parent involvement in education. The first is the protective model, which assumes that parents delegate responsibility for educating their children to schools with the goal of reducing parent teacher conflict. While the school is accountable, there is little parent intrusion, though there are structures for collaboration and communication. The second model is summarised as the school-to-home transmission where parents are effectively asked to support the school’s objectives and

activities, assuming that parents endorse the importance of these objectives and activities through collaboration and communication. Lontos (1992) characterises this approach as not very successful in reaching at-risk families and often reflects educators' unwillingness to view parents as equal partners in their children's education. Swap's third model is summarised by Mestry and Grobler (2007) as curriculum enrichment where parent contributions expand and extend the school's curriculum, with teachers and parents assumed to work collaboratively. The final model outlined by Swap is summarised by Mestry and Grobler (2007) as parent-teacher partnership, where the goal is for teachers and parents to work together collaboratively in the successful education of all children. Mestry and Grobler (2007, p. 178) summarised this as a true partnership "based on collegiality and mutual understanding of the roles and responsibilities of parents and the school." Swap emphasised the importance of collaboration and communication between teachers and parents regarding children's education at a time when ICT was not widely available.

Olmstead (2013) noted that while the importance of parent involvement has been widely studied, many principals and teachers reported that a lack of parent involvement was an impediment to increasing student achievement at school. For this reason, she studied whether emerging technologies could facilitate better parent involvement and parent-teacher communication.

Olmstead (2013), in her article 'Using Technology to Increase Parent Involvement in Schools' used a mixed-methods approach of surveys and interviews of 89 parents and seven teachers to determine whether teacher communication through technology promoted parent involvement with their children's academic lives and to ascertain the perceptions of teachers and parents on the effectiveness of technology to promote parent involvement and parent connectedness with the teacher and school. She found that email was the preferred method of communication for both parents and teachers but that the type of teacher message or message frequency was not in line with parental expectations (Olmstead, 2013).

Olmstead (2013) also found that parents checked school and classroom websites for updates on a regular basis but that some teachers did not keep their websites current,

with teachers saying that updating websites was time consuming. She stated, “Parents and teacher both placed a high value on keeping parents informed about student progress and saw the value in using technology as a means for keeping parents involved” (Olmstead, 2013, p. 36).

Communication is a fundamental tool used in education to convey concepts, information and ideas, with ICT providing new ways for teachers to present this to learners (White, 2006). While verbal and written communication have been a basic tool for centuries to transmit information, ICT now provides educators with global access to unlimited information in a connected world (White, 2006).

In a later thesis titled ‘Diffusion of ICT in Education and the Role of Collaboration: A Study of EdNA’ White (2010, p. 81) defined collaboration as “the process of co-creating knowledge while sharing physical or virtual space” as it involves a process of co-creation, involves technology and involves sharing physical or virtual spaces. A major focus of White’s (2010) work was on teachers collaborating with other teachers within the context of community, particularly a virtual community provided through access to ICT. As collaboration only happens where there is community (Tapscott, 2006, in White, 2010), it reflects people coming together for a common purpose, something Lave and Wenger (in White, 2010) described as ‘communities of practice’. Wenger (2004, in White, 2010, p. 84) defined these communities as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.”

Zhao and Frank (2003) surveyed 19 elementary schools in their comparison of schools to an ecosystem. They found that 84% of teachers communicated with parents through newsletters, email or class website at least monthly, with 53% communicating weekly or more frequently.

Hornby (2011, p. 34) mentioned that most parents are able to collaborate with teachers through reinforcement of classroom programs, while at times, parents might not be able to do this, causing frustration for teachers “since they realize that collaboration between home and school results in children making greater progress.” Hornby (2011,

p. 35) continued, “while involvement in home-school programs, or other requests for parents to carry out work with their children at home, should always be offered to parents, including those who have not collaborated in the past, it should be expected that a small proportion of parents will not participate.”

2.4.4 Summary of ICT in education

In various forms, Information and Communication Technologies (ICT) have played a part in education for over 70 years (Education & Health Standing Committee, Legislative Assembly, Parliament of Western Australia, 2012) but the real starting point for ICT in education was the World Wide Web (WWW) which developed initially as an information service until the dotcom crash of 2001, before transitioning into a more interactive platform known as Web 2.0 (White, 2008). ICT integration into schools has been proposed as leading to benefits such as more engaged students, improved learning outcomes and more effective teaching and learning (White, 2006), improved writing achievement (Jeroski, 2003; Zheng et al., 2013) and the facility to provide students with feedback as they work (Kennewell & Beauchamp, 2003).

Policy documents state the importance of ICT in education (MCEETYA, 2008) with corresponding incorporation into curriculum documents (ACARA, 2014) which state that K-12 students need to learn to use ICT for a range of purposes (Pegrum, Oakley & Faulkner, 2013). Consequently, teachers need to develop their technology literacy so they can support student learning (Martinovic & Zhang, 2012), especially as teacher beliefs about technology influence classroom practice with ICT (Hermans et al., 2008; Prestridge, 2012; Toh, Lim, Lim & Koh, 2012). What is particularly important for teachers using ICT is their pedagogy (Pegrum, 2009) as it is not the technology that it is important, it is the way technology supports learning (Pegrum, Oakley & Faulkner, 2013) so that learners are better prepared for life after school (Zucker, 2008). These learners, even from elementary school age, are using school-provided mobile devices, with high-school students reporting an average of 14 hours per week using technology for writing and preferring digital reading over printed text (Project Tomorrow, 2014), showing that ICT is having a profound effect on modern life (Warschauer & Matuchniak, 2010).

For all the positive contributions of ICT to education, significant cautions to unrestrained integration in education exist (Cuban, 2001; Webb, 2007), especially when the effect size of technology innovations has generally been found to be smaller than the average educational innovation (Hattie in Cuban, 2014) and academic researchers found little impact of ICT on educational outcomes for the finance invested (Nichol & Watson, 2003).

ICT has been found helpful in communication with parents (Project Tomorrow, 2011) with email preferred by parents and teachers (Olmstead, 2013), enabling collaboration between parent and teacher regarding children's education (Hornby, 2011; Zhao & Frank, 2003).

2.5 Learning Environment Research

To analyse the learning environment of classrooms from students' perspectives, a large number of instruments have been developed over the past 40 years. This section provides an overview of ten popular learning environment research instruments. They have been developed and trialled many times and found to be valid and reliable tools to use across a wide range of educational institutions.

Ten tools are discussed in this section, including the What Is Happening In this Class? (WIHIC) questionnaire and the Technology Rich Outcomes Focussed Learning Environment Inventory (TROFFLEI) as they were the instruments used in this research. The instruments are organised in focus from primary through to tertiary applications. The instruments outlined in this section are:

- My Class Inventory, MCI (Section 2.5.1)
- Questionnaire on Teacher Interaction, QTI, (Section 2.5.2)
- Learning Environment Inventory, LEI (Section 2.5.3)
- Classroom Environment Scale, QES (Section 2.5.4)
- Individualised Classroom Environment Questionnaire, ICEQ (Section 2.5.5)
- Constructivist Learning Environment Survey, CLES (Section 2.5.6)
- Science Laboratory Inventory, SLEI (Section 2.5.7)

- College and University Classroom Environment Inventory, CUCEI (Section 2.5.8)
- What Is Happening In this Class?, WIHIC (Section 2.5.9)
- Technology Rich Outcomes Focussed Learning Environment Inventory, TROFFLEI (Section 2.5.10)

2.5.1 My Class Inventory (MCI)

The My Class Inventory instrument was developed from the Learning Environment Inventory (LEI) so that it was suitable for use in Primary schools with children aged 8 – 12 years (Fisher & Fraser, 1981; Fraser & O'Brien, 1985). It was also found to be suitable for use with junior high school students, particularly those students with reading difficulties. Designed to reduce fatigue in younger children, the MCI has five scales with simple wording so that it is easy to read. It contains 38 questions which students respond to using 'Yes' or 'No' but versions have since modified this to a three point format of Seldom, Sometimes and Most of the time. A shorter 25 item MCI was also developed (Fraser, 1998b). Fisher and Fraser (1981) reported alpha reliability scores for the five scales of 0.62 to 0.78 for individual students and from 0.90 to 0.96 for classes.

2.5.2 Questionnaire on Teacher Interaction (QTI)

The QTI has its roots in The Netherlands and was developed with the basis of a theoretical model of proximity (cooperation and opposition) and influence (dominance and submission) (Fraser, 1998b). The original version of the QTI had 77 items across eight behaviour aspects using a five-point scale ranging from Never to Always (Fraser, 1998b; Wubbels, Brekelmans & Hooymayers, 1991). An American version with 64 questions was developed in 1988 (Wubbels & Levy, 1991). Typical items include "She/he gives us a lot of free time" (Student responsibility and Freedom behaviour) and "She/he gets angry" (Admonishing behaviour). A shorter 48-point version of the QTI was developed to make the instrument more accessible to teachers (Wubbels, 1993).

Initially developed for use in a high school context, the QTI was then modified for use in primary schools. Goh and Fraser (2000) adapted the 64 item long form of the QTI and the 48 item short form QTI for use with elementary students, validating the new instrument in Singapore. A Malay version was later developed and validated with elementary school children in Brunei Darussalam (Scott & Fisher, 2004). Wubbels (1993) reported reliability (alpha coefficient) figures of between 0.68 and 0.90 for students and between 0.60 and 0.84 for teachers.

2.5.3 Learning Environment Inventory, (LEI)

The LEI (Walberg & Anderson, 1968) was developed and validated in the 1960s and was associated with evaluating the research related to the Harvard Project Physics (Fraser, 1998b). The instrument has a total of 105 statements across 15 scales with seven statements per scale. There are four response choices using the Likert responses of Strongly Agree, Agree, Disagree and Strongly Disagree with the scoring direction reversed on some items (Fraser, 1998b). Typical items include, “All students know each other very well” from the Cohesiveness scale and “The pace of the class is rushed” from the Speed scale (Fraser, 1998b). Reliability of the LEI scales ranged between 0.61 and 0.86 for an early study by Walberg and Anderson (1968).

2.5.4 Classroom Environment Scale, (CES)

With its basis in a research programme at Stanford University conducted by Moos investigating a diverse array of human environments including psychiatric hospitals, prisons, university residences and work environments, the CES was developed by Trickett and Moos (1974). The final version of the CES contained nine scales with ten True-False responses in each scale. “The teacher takes a personal interest in the students” (Teacher Support) and “There is a clear set of rules for students to follow” (Rule Clarity) are some typical items in the CES. Trickett and Moos (1973) reported reliability coefficient results for the CES scales of between 0.67 and 0.86.

2.5.5 Individualised Classroom Environment Questionnaire, (ICEQ)

The ICEQ was developed to assess aspects of more individualised classrooms compared to conventional classrooms (Fraser, 1998a). Its initial development was guided by research on individualised, open and inquiry-based education (Fraser, 1998b). The final published version of the ICEQ (Fraser, 1990) contains 50 items with ten items in each of the five scales. Each item has response choices of Almost Never, Seldom, Sometimes, Often and Very Often with the scoring often reversed (Fraser, 1990). Typical items include “The teacher considers students’ feelings” (Personalisation) and “Different students use different books, equipment and materials” (Differentiation) (Fraser, 1998a). The ICEQ was developed and validated by Rentoul and Fraser (1979) who administered the questionnaire three times, once with a group of students and twice with different groups of teachers. Alpha reliability coefficients ranged between 0.67 and 0.86 across the three administrations (Rentoul & Fraser, 1979).

2.5.6 Constructivist Learning Environment Survey, (CLES)

In the constructivist concept of learning, knowledge is individually and socially constructed (Jonassen, 1999) by learners making sense of the world, based on their interpretations of experiences in the world. This cognitive process builds on the knowledge learners have already constructed and involves negotiation and consensus building (Fraser, 1998b). As knowledge can’t be transmitted, instruction should contain learning experiences that promote construction of knowledge (Jonassen, 1999). The CLES was developed to help researchers and teachers assess the degree of classroom alignment to constructivist principles and assist teachers to change their teaching practice (Fraser, 1998b). The original CLES has 36 items with five responses available for each item ranging from Almost Never to Almost Always. “I help the teacher decide what activities I do” (Shared Control) and “Other students ask me to explain my ideas” (Student Negotiation) are typical items in the CLES (Fraser, 1998b). Tylor, Fraser and Fisher (1997) reported alpha reliability scores of between 0.61 and 0.95 for the CLES scales.

2.5.7 Science Laboratory Inventory, (SLEI)

The SLEI was developed to assess science laboratory class learning environments in senior high school and tertiary levels (Fraser, 1998a). It has 35 items across five scales with seven items in each scale. Each item has five response choices; namely Almost Never, Seldom, Sometimes, Often and Very Often. Some typical items include “We know the results that we are supposed to get before we commence a laboratory activity” (Open-Endedness) and “I use the theory from my regular science class session during laboratory activities” (Integration) (Fraser, 1998a). Fraser, Giddings and McRobbie (1995) reported alpha reliability coefficients of 0.71 to 0.91 for the 5 scales of the Actual SLEI and between 0.64 to 0.92 for the Preferred version of the SLEI.

2.5.8 College and University Classroom Environment Inventory, (CUCEI)

Fraser and Treagust (1986) developed the College and University Classroom Environment Inventory (CUCEI) after noting that little work had been done on assessing higher education classrooms that were similar to primary and secondary school contexts in terms of class size (Fraser, 2012b). Prior to developing this instrument, work had focussed on institution level or school level environments (Fraser, 2012b). The final form of the CUCEI contained seven scales with seven items in each scale, with four possible responses, (Strongly Agree, Agree, Disagree and Strongly Disagree). Typical items include, “Activities in this class are clearly and carefully planned” (Task Orientation) and “Teaching approaches allow students to proceed at their own pace” (Individualisation) (Fraser, 2012b). Fraser and Treagust (1986) recorded reliability (alpha coefficient) results of between 0.70 and 0.90 for the individual Actual CUCEI and between 0.65 and 0.82 for the Preferred CUCEI. Using the class as the unit of analysis, they recorded the reliability of 0.81 to 0.96 for the Actual questionnaire and from 0.78 to 0.90 for the Preferred questionnaire.

2.5.9 What Is Happening In This Class? (WIHIC)

The WIHIC questionnaire was used in this research to assess students' perceptions of their classroom learning environment. For that reason, it is described in greater detail than the previous questionnaires. Following this section is a description of the TROFLEI, another questionnaire used in this research. Selected scales of the TROFLEI were used to assess a particular emphasis on technology and student attitudes to subject not contained in the WIHIC.

Regarded as a questionnaire that brings parsimony to the field of classroom learning environment research, the WIHIC questionnaire combines modified versions of the most salient scales from a variety of other questionnaires (Fraser, 1998b). It is the classroom instrument used most often worldwide today (Fraser, 2012b). The WIHIC questionnaire adds further scales to do with educational concerns such as equity, cooperation and constructivism. Originally, the WIHIC questionnaire contained 90 items in nine scales. Following statistical analysis of data from 355 junior high school science students and interviewing the students about their perceptions of the classroom learning environments, the wording and importance of individual items, the original WIHIC was refined (Fraser, Fisher & McRobbie, 1996). Data analysis from 50 classes and a total of 1081 Australian students (Aldridge & Fraser, 2000) led to the adoption of the final form of the WIHIC which contains 56 items in seven scales of eight items (Fraser, 2002). The seven scales are: Teacher Support, Involvement, Investigation, Task Orientation, Cooperation and Equity. Students respond to the items with the five alternatives of Almost Never, Seldom, Sometimes, Often and Almost Always. See Table 2.1 for a description of each scale and a sample item from each scale in the WIHIC.

Table 2.1 Descriptions of seven WIHIC scales, sample item and alignment with Moos' schema

Scale name	Scale description	Sample item	Moos' schema
Student cohesiveness	The extent to which students know, help and are supportive of one another.	I make friendships among students in this class.	Relationship
Teacher support	The extent to which the teacher helps, the friends, trusts and is interested in students.	The teacher is interested in my problems.	Relationship
Involvement	The extent to which students have attentive interest, participate in discussions, do additional work and enjoy the class.	I give my opinions during class discussions.	Relationship
Investigation	The extent to which skills and processes of enquiry and their use in problem solving and investigation are emphasised.	I carry out investigations to answer the teacher's questions.	Personal Development
Task orientation	The extent to which it is important to complete activities planned and to stay on the subject matter.	I pay attention during this class.	Personal Development
Cooperation	The extent to which students cooperate rather than compete with one another on learning tasks.	I cooperate with other students on class activities.	Personal Development
Equity	The extent to which students are treated equally by the teacher.	I receive the same encouragement from the teacher as other students do.	System Maintenance and System Change

Adapted from Fraser (1998b)

The relationship of learning environment scales to Moos' conceptual framework has been part of classroom environment research and theory since the early 1970's (Dorman, 2003). As mentioned earlier, Moos characterises human environments as having relationship dimensions, personal growth and system maintenance and change dimensions. Relationship dimensions deal with the nature and intensity of personal relationships while personal growth dimensions focus on personal development and self-enhancement (Dorman, 2003). System maintenance and system change dimensions assess an environment's orderliness, clarity of expectations, maintenance of control and how responsive it is to change (Dorman, 2003). Moos' schema relationship to the WIHIC scales is therefore included in Table 2.1 to demonstrate how the WIHIC scales align with the schema he developed.

Since its inception and validation, the WIHIC questionnaire has been cross-validated in many different studies, including with primary-aged children, and in many different countries and contexts. These countries include Australia, USA, Taiwan, Indonesia, South Korea, South Africa, UK, Canada, India, United Arab Emirates and Singapore (Fraser, 2012b). The instrument has been translated into a number of languages including Spanish, Indonesian, Arabic and Chinese (Fraser, 2012b). As the current research concerned primary school age students, descriptions of the findings of studies concentrating on this age of students are outlined below.

Allen and Fraser (2007) used a modified version of the WIHIC to assess Grade 4 and 5 students' and their parents' perceptions of classroom learning environments in South Florida. Analysis of the data collected in this study supported the factorial validity, internal consistency, reliability and the ability to differentiate between students' perceptions in different classrooms. They also found that students and parents preferred a more positive classroom environment to the one experienced, with the parents displaying a greater difference between the actual and preferred responses. The researchers found associations between some learning environment dimensions such as task orientation and student outcomes, particularly attitudes. Using qualitative methods, the study suggested that both students and parents were generally happy with the classroom environment though students preferred greater investigation while parents preferred more teacher support (Allen & Fraser, 2007).

Adamski et al. (2013) used a modified Spanish version of the WIHIC questionnaire to investigate relationships between Hispanic Grade 4-6 students' perceptions of parental involvement in schooling, Spanish classroom learning environment and student outcomes in terms of attitudes and achievement. Analysis of the data demonstrated support for the internal consistency and reliability of the questionnaire. The study found strong associations for parental involvement with students' learning environment and student outcomes and for the classroom learning environment with student outcomes. Examination of the data collected from the WIHIC questionnaire and other measures used in the study indicated that the home environment was more influential over students' attitudes than the classroom while the classroom had greater influence than the home environment in achievement terms (Adamski et al., 2013).

Peer (2011) used five scales from the WIHIC questionnaire, along with scales from the CLES and TOSRA, to assess the learning environment and attitudes of 1081 gifted and high ability primary students in four Singaporean schools. Using between four and eight items per WIHIC scale, Peer found that the WIHIC was capable of differentiating significantly between classes and that there were statistically significant gender differences for Involvement, Teacher Support, Task Orientation and Cooperation along with statistically significant grade level differences for Teacher Support, Task Orientation and Cooperation.

Pickett and Fraser (2009) used the WIHIC questionnaire with a group of 573 Grade 3-5 students in Florida. They used the WIHIC to evaluate a mentoring programme for seven beginning teachers in terms of changes in learning environment in the teachers' school classrooms. The WIHIC was revised and modified to make it more suitable for younger students. The modifications included using a three point scale of Almost Never (1), Sometimes (2) and Almost Always (3) rather than the original five point scale and "slight changes to a few items" (Pickett & Fraser, 2009, p. 15). The mentoring program was found to be successful in terms of improvements over time in the classroom learning environment and students' attitudes and achievement through use of MANOVA and effect sizes. The factorial validity of the WIHIC was also supported.

2.5.10 Technology Rich Outcomes Focussed Learning Environment Inventory, (TROFLEI)

The Technology Rich, Outcomes Focussed, Learning Environment Inventory (TROFLEI) was developed in response to education systems focusing on student outcomes or results, rather than on syllabus or curriculum (Fraser, 2012b). To evaluate a new innovative school, which had an emphasis on outcomes and ICT, Aldridge and Fraser designed the TROFLEI to assess the school environment (Fraser, 2012b). The TROFLEI contains all WIHIC scales (see above for description of WIHIC) and then adds three other scales that were seen as important for evaluating the context of the new school they were investigating. These scales were the Differentiation scale from the ICEQ to assess the extent of teachers catering for differences in student abilities,

rates of learning and interests, the Computer Usage scale to assess how much students use computers to communicate with other students and to access information and finally the Young Adult Ethos scale to assess the extent that teachers give students responsibility and treat them as young adults (Fraser, 2012b).

An innovation that the TROFLEI introduced was the side by side nature for students to record their actual and preferred perceptions of the classroom environment. It has a total of 80 items that are responded to using a five-point scale (Almost Never, Seldom, Sometimes, Often and Almost Always) (Fraser, 2012b). The TROFLEI built on the WIHIC questionnaire to develop a comprehensive instrument that included a focus on technology and outcomes in secondary classrooms (Aldridge, Dorman & Fraser, 2004).

Benson (2012) used the TROFLEI with upper primary classes in New Zealand. Results from her research indicated that the TROFLEI was a valid and reliable instrument for use with upper primary students. Statistically significant correlations were made between students' attitude and achievement outcomes with each of the TROFLEI learning environment scales.

In another study in New Zealand, Koul, Fisher and Shaw (2011) used the TROFLEI due to interest in technology-rich environments and the new science curriculum in New Zealand. The study reported on the validation of the TROFLEI and an examination of learning environments in technology-rich classrooms in New Zealand with a sample of 1027 students in 30 science classrooms from grades 7-13. Results from the study indicated that the TROFLEI was a valid and reliable instrument for both actual and preferred versions of the questionnaire. The research found that students desired more technology to be incorporated into their classrooms and that females generally perceived their technology-related learning environment more positively (Koul et al., 2011).

2.5.11 Teacher implementation of change through presentation of research data

Sinclair and Fraser (2002) begin their article on changing classroom environments with a candid quote from Ginott (1971).

I have come to the frightening conclusion that I am the decisive element. It is my personal approach that creates the climate. It is my daily mood that makes the weather. I possess tremendous power to make life miserable or joyous. I can be a tool of torture or an instrument of inspiration, I can humiliate or humor, hurt or heal. In all situations, it is my response that decides whether a crisis is escalated or de-escalated, and a person is humanized or de-humanized. If we treat people as they are, we make them worse. If we treat people as they ought to be, we help them become what they are capable of becoming.

Ginott (1971, in Sinclair & Fraser, 2002) highlights the impact that teachers can and do have on the classroom learning environment. Sinclair and Fraser (2002) noted that while there has been considerable research on student perceptions of classroom learning environments, relatively little had been done to help teachers improve their environments. Sinclair and Fraser's (2002) study validated the Elementary and Middle School Inventory of Classroom Environments (ICE) in a North Texas setting and assessed the effectiveness of teachers implementing changes in response to student perceptions of the actual and preferred learning environment. In response to being presented with student perceptions of the learning environment, teacher reflection and discussion, assistance from the researchers if desired and implementation of changes, the researchers noted positive changes of between 0.25 and 0.50 of a standard deviation when the classroom learning environment was reassessed. Interestingly, Sinclair and Fraser (2002) noted gender differences in student perceptions and how attempting to change the learning environment required different interventions based on gender. This aspect of their research bears some similarities with Koul et al. (2011) mentioned in the section above where females viewed classroom learning environments more positively than males.

Fraser (2012a) documented three case studies of teachers implementing changes in their classroom in response to student perceptions in learning environment questionnaires. In each of these classrooms, through presentation and interpretation of the data, teacher reflection and discussion with the researchers and support for change implementation, post intervention reassessment noted a positive change in the students' perceptions of the learning environment.

With about 30% of the variance in student achievement attributed to teachers (Hattie, 2009), Bell and Aldridge (2014) sum up Hattie's (2009) research conclusion by stating "while teachers can and do have a positive effect on student learning, expert teachers make the greatest difference." Bell and Aldridge (2014) reported on a longitudinal research study where teachers were provided with student data from two instruments developed in their research. These instruments were the Constructivist-Oriented Learning Environment Survey (COLES) questionnaire to assess the learning environment and the Attitudes and Self-Belief Survey (ASBS) to assess student enjoyment of the subject and their academic efficacy. Over the course of three years in one of the schools taking part in the study, teachers were supported by the school leadership and with professional development, to implement changes to their teaching practice in order to enhance the classroom learning environment. In what Cohen (1992) would describe as 'moderate' change, four of the 11 scales of the COLES, Teacher Support, Equity, Personal Relevance and Cooperation, reported positive effect sizes of between 0.24 and 0.34 standard deviations (Bell & Aldridge, 2014). One COLES scale, Student Cohesiveness, reported a decline of 0.25 standard deviations, with the school then implementing further professional development on cooperative learning strategies and formative assessment to enhance student cohesiveness. From the ASBS there was an improvement of 0.15 standard deviations in the effect size of the academic self-efficacy beliefs, an improvement Cohen (1992) would describe as 'small'.

2.5.12 Summary of Learning Environment Research

The analysis of classroom learning environments from student perspectives has seen the development of a large number of instruments over the last 40 years. Among these

many instruments are the My Class Inventory, Questionnaire on Teacher Interaction, Learning Environment Inventory, Classroom Environment Scale, Individualised Classroom Environment Questionnaire, Constructivist Learning Environment Survey, Science Laboratory Inventory and College and College and University Classroom Environment Inventory which were all described in this chapter.

The two instruments chosen for this study were the What Is Happening In This Class? (WIHIC) and the Technology Rich Outcomes Focussed Learning Environment Inventory (TROFLEI). The WIHIC is regarded as the instrument used most often today (Fraser, 2012b) and brings parsimony to the field of classroom learning environment research (Fraser, 1998b). The instrument has been cross-validated in many studies across different countries, languages and contexts (Fraser, 2012b), including with primary-age children (Adamski et al., 2013; Allen & Fraser, 2007; Peer, 2011; Pickett & Fraser, 2009). The TROFLEI incorporates the WIHIC scales and was developed due to education systems focussing on outcomes adding scales for Differentiation, Computer Usage and Young Adult Ethos (Fraser, 2012b). It too has been used with primary age students (Benson, 2012).

An often overlooked factor in learning environment research has been assisting teachers to improve their practice (Sinclair & Fraser, 2002). However, studies have shown that when teachers are supported to implement changes to their teaching practice, positive results in terms of the classroom learning environment have been realised (Bell & Aldridge, 2014; Fraser, 2012a; Sinclair & Fraser, 2002).

2.6 Chapter Summary

This chapter has presented the literature relevant to this study. The chapter was divided into sections that presented literature concerning the writing process, with particular attention to audience, parental involvement in children's education, ICT in education and learning environment research. The WIHIC and TROFLEI questionnaires were described in detail.

The following chapter outlines the research method used in the conduct of the current research.

Chapter 3

Research Method

3.1 Introduction

The previous chapter presented the literature review and outlined the theoretical underpinnings and background to this study. The study integrates the use of learning environment assessment instruments, use of ICT in education, and the impact of parent involvement in children's education. As the study was conducted with Primary School students, there is particular emphasis on this sector and the role that parents can play as a meaningful audience for their children's writing. The development of two learning environment assessment instruments of particular interest to this study, the WIHIC and TROFLEI, was presented along with the reasons for their selection and application in this research.

This chapter outlines the method used in this study, the research questions, the learning environment assessment instrument selection, how the student sample was selected, data collection and data analysis. This study combines a number of student, parent and teacher variables with the researcher as a participant observer.

This study utilised a mixed methods approach that combined various quantitative and qualitative data collection methods to assess the classroom learning environment and also incorporates data about the impact parents can have on their children's writing when they become an audience for that work during its production, and not just at completion of the work.

3.2 Preparation for the study

Having completed a course of study in the use of Learning Technologies, particularly Information and Communication Technology (ICT), the researcher became interested in completing further research into the effective use of ICT in the classroom. As a generalist primary school teacher, the researcher was particularly interested in the writing process and encouraging students in their endeavours to become better writers.

The researcher had a background of training in the Process Writing Approach championed by Graves (1983) to teaching writing. Tribble (in Badger & White, 2000) summarised a typical process writing model as having four stages: pre-writing, composing/drafting, revising and editing. The process is cyclical, as the writer may return to the pre-writing stage after editing or revising. An example given by Badger and White (2000) of the process approach has learners brainstorm ideas about the topic of houses in the pre-writing stage, then select and structure their ideas to provide a plan of a description of a house and the first draft in the composing/drafting stage. Following that, after discussion, the writer could revise their first draft before finally editing or proof-reading the text.

During the researcher's experience as a teacher it became evident that more able writers could become demotivated when their excellent quality draft writing attempts were revised and edited, often only requiring minor alterations before their work was "published". Publication meant they had to rewrite, and often illustrate, their entire accounts, a frequently laborious process which took a considerable amount of time as they often wrote longer accounts. In addition, few people beyond the teacher and classmates saw their work when it was completed. Often, parents did not see the work for months after it had been completed.

Less-accomplished writers in the classroom often struggled with the tasks and required considerable input from teachers to review, revise and edit their work before it too was "published". Parents viewing this work months later could get a distorted sense of the their child's achievement if they only considered the published version of the writing without checking through the draft writing to see the amount of teacher input to get it to the standard presented.

Motivation and student attitudes were other factors that teachers contended with. While teachers expended considerable effort in creating engaging programmes and tasks, students were aware that their own efforts were effectively for the teacher. Parents, as an audience for their children's work, did not factor into the equation as the time until they saw the work could be several months, far too late to be effective.

This led the researcher to consider other avenues where ICT could facilitate and enable new opportunities to engage with an authentic audience for the children's work. An authentic audience for this project is understood as an audience beyond the classroom teacher, in particular, parents. The context of an audience beyond the classroom teacher is in keeping with projects such as that by Weider (2013) who reported on an online environment for publication of student work. Bigelow and Vokoun (2007) suggest that teachers give writing assignments to students which consider an audience outside the classroom. They stated, "We must give students an authentic writing situation and allow them to write for an audience that they care about" (Bigelow & Vokoun, 2007, p. 109).

Others such as Rowen (2005), suggest that the audience consists of people such as book authors that the students write to, or experts his students could ask questions or other classrooms students could interact with. Chen and Brown (2012) studied six adult English as a second language (ESL) writers to determine the effects of an authentic audience for their writing. They report that Web 2.0 concepts have enabled learners to connect with a "widely distributed authentic audience" (Chen & Brown, 2012, p. 435). The audiences their students wrote for in their three tasks were other international students, two government employees and American students. Chen and Brown (2012) found that the students were motivated to learn new vocabulary and focus on how to write sentences precisely.

In a report to the Carnegie Corporation, Graham and Perin (2007) outline 11 elements of effective writing instruction to improve the writing of adolescents in middle and high schools. One of the strategies is the Process Writing Approach "which interweaves a number of writing instructional activities in a workshop environment that stresses extended writing opportunities, writing for authentic audiences, personalised instruction, and cycles of writing" (Graham & Perin 2007, p. 5). In later explaining this process writing strategy, the authors mentioned that one of the activities is "emphasising writing for real audiences" (Graham & Perin 2007, p. 19). It is this context that the researcher has used for parents to be a real or authentic audience for their children's work.

The researcher completed an extensive background literature search before settling on the use of ICT as a means to facilitate communications with parents so that they could become an audience for their children's work in writing while the writing was in the process from pre-writing to publication. ICT provided an avenue to allow the children's work to be viewed in various stages of development, whether their parents were at home, at work, on remote mine sites or overseas. This work could be discussed with the child outside the school context, commented on by interested parties and celebrated to provide encouragement for the children's efforts, while the writing was in the development stage. On a number of occasions, parents and students reported on their work being sent to grandparents and relatives in other countries to celebrate their achievement.

Permission to conduct this study had to be sought from the University ethics committee, school administration, cooperating teachers, parents and students. This process took longer than expected, particularly with respect to the type of instrument to be used to assess the classroom learning environments. Following negotiation with my supervisor and the cooperating teachers, the What Is Happening In This Class? (WIHIC) and the Technology Rich and Outcomes Focussed Learning Environment Instrument (TROFLEI) were chosen for use in assessing the classroom learning environments.

Following administrative approvals, parent and student permissions were sought before commencing the study. Approximately 150 students were offered the opportunity to take part in the study. In the first year of the study, 90 families were contacted and in the second year 60 families were contacted and offered the opportunity to be involved. Of those offered participation, 65 responded positively and took part in the research. More will be developed later in explanation of the lower than envisaged participation rate in a school which welcomes parental involvement in their children's education.

To facilitate the study, access to photocopiers with an emailing function was crucial. Being able to have the student work scanned quickly, emailed to the researcher and then forwarded to the parents with a covering letter to explain the work was necessary

for the research objectives to be carried out efficiently. Although the copiers used (Fuji Xerox, Apeos Port) had the facility to directly email any address, it was felt important that the work was sent through the researcher's email address to facilitate inclusion of a covering letter and the opportunity for direct email responses to the researcher, rather than the generic school address used by the copiers. This added to the time taken to email scanned documents but was considered to be overall a much more efficient and personalised system to work with.

3.3 Research Questions

This section has the purpose of developing the objectives presented earlier in section 1.5 into research questions that will be addressed in this study.

Having completed studies in the use of ICT in education the researcher was keen to implement a programme where ICT could be used to allow interaction between children and their parents with respect to their regular classroom work. Having also completed preliminary work in learning environment research, the researcher was interested in the impact on the classroom learning environment of having a system in place where parents could become more involved in their children's education if they chose to. This led to the development of the first research question.

Research Question 1.

Are there associations between classroom learning environment and the use of ICT which provides students with authentic experiences of interaction, collaboration and audience?

One of the researcher's interests lay in the area of encouraging the development of student writing through using an authentic audience while providing the opportunity for parents to become more informed and involved in their children's education. As a parent of primary and secondary aged children, the researcher often wanted to be kept more informed of their progress and to see and comment on their work. Sometimes this was not easy to achieve and meant that requests had to be made for children's work to be sent home. This triggered some thought in that ICT provides a simpler

avenue to keep parents better informed of what their children are achieving at school and that they could not only be kept informed but could become an effective audience for their children's work, with the hoped for outcome that parental involvement might lead to improved attitude and effectiveness in writing competency. This interest led to the development of the second research question.

Research Question 2.

What associations are there between student attitudes and achievement in writing when their parents participate in the writing process as an active audience during their children's work?

Much consideration was given to the particular learning environment assessment instrument to be utilised in this research. As outlined in section 3.2, the QTI was the initial choice of instrument but this had to be changed to an instrument that the cooperating teachers were more comfortable with. Hence, the WIHIC instrument was chosen to assess students' actual and preferred views of their classroom learning environments. While it might have been the second choice, the WIHIC is regarded as a well-established questionnaire that has been validated extensively (Adamski et al., 2013; Allen & Fraser, 2007; Fraser, 2012b). The WIHIC is able to provide a reasonably clear indication of how students perceive their 'actual' and 'preferred' classroom environments. The WIHIC has been validated in numerous instances so the next research question addressed the validation of the WIHIC in this instance.

Using the WIHIC instrument changed the focus of the study from a concentration on the interactions between teachers and their students inherent in the QTI instrument towards examining the actual and preferred classroom learning environments. While the focus of the study was changed, it was actually an advantage for the research as it enabled parents to be further involved. They were able to participate in surveys and interviews to express their perceptions of the impact on their child's learning environment. Consequently, the third research question was modified to validation of the WIHIC instrument (Appendix 6 and Appendix 7) instead of the QTI.

Research Question 3

Is the WIHIC (What Is Happening In This Class?) a valid and reliable instrument when used with the primary age children in this study?

With an interest in ICT usage the researcher was keen to see how primary school students felt about the use of ICT in education. The participating school initially had a dedicated ICT specialist teacher for the primary school and a small computer laboratory equipped with 16 computers where half a class would come at a time for lessons in computer use. This laboratory was dismantled and the teacher moved to other duties as priorities changed and it was seen as more of a responsibility of classroom teachers to instruct students in computer use.

The researcher was interested in assessing how students felt about computer use when they didn't have regular access to ICT equipment in their classrooms. Each classroom had one computer available to students and there was a lab which teachers could book, equipped with 20 computers, not enough to accommodate an entire class for 1:1 access. The TROFLEI (Appendix 8) instrument was used for the assessment questions on computer use, attitude to the subject of writing, attitude to computer use and academic efficacy. The reason the entire TROFLEI was not used was due to the WIHIC questions being easier for primary classes to understand as there are separate questionnaires for actual and preferred responses. The TROFLEI also has a "Young adult ethos" scale which was not relevant for the primary age students completing the inventories. It was not included in the questionnaires given to the students.

Research Question 4

Is the TROFLEI (Technology Rich, Outcomes Focussed, Learning Environment Inventory) a valid and reliable instrument when used with the primary age children in this study?

With the concentration on the learning environment in the classrooms, it was considered important to assess the difference between the actual and preferred responses of students. These were to be presented to the teachers in summary form

for them to scrutinise and determine if they perceived a difference between the actual and preferred options recorded by the students.

An opportunity would then be given for the teachers to reflect on the results of the questionnaires before deciding to make any modifications to how they managed the learning environment. This then led to the final research question which concerned whether teachers perceived a difference between the actual and preferred perceptions of students.

Research Question 5

Do teachers perceive a difference between actual and preferred perceptions of their classroom learning environments?

3.4 Instrument Selection

As has been outlined in the previous chapter, there is a variety of learning environment assessment instruments available. The particular instrument selected to assess the learning environments of the school had to be suitable for the children and agreed to by the staff.

Initially, it had been envisaged that the Questionnaire on Teacher Interaction (QTI) would be used in the research but this was not possible in the school at the time. As a means to ensure the research proceeded and to assess the perceptions of students concerning the learning environment, rather than their perceptions of the interactions between students and teachers, different instruments were considered. The WIHIC was seen as a very good compromise learning environment survey which was suitable for the school and relatively easy for the students to comprehend.

The WIHIC questionnaire provided the basis for the development of the TROFLEI with all seven scales included in the instrument (Aldridge, Dorman & Fraser, 2004). The TROFLEI has the actual and preferred responses on the same line next to a statement. For example, the first statement of the questionnaire is, "I make friends

among students in this class,” with the student to select an actual response and a preferred response for that statement.

As the research was conducted with primary aged students, it was seen as more appropriate to continue with the format of the WIHIC instrument as the actual and preferred questionnaires were completed as separate surveys, with the wording of each survey conveying the meaning. Using the example of the first question again, the WIHIC has the preferred statement as, “I would make friendships among students in the class.” The actual statements are the same in WIHIC and TROFLEI.

Several scales of the TROFLEI instrument were to be used to cover areas like computer use and attitude to computing, attitude to the subject of writing and the students’ perceptions of their academic efficacy in writing. TROFLEI scales that were not included in the questionnaires completed by the students were Differentiation and Young Adult Ethos. The Young Adult Ethos scale was omitted as it was considered to be not relevant to the age of the students in this study. The first question in the scale is “I am treated like a young adult” which the researcher felt would not relate to students aged 10 – 12 years. The Differentiation scale was omitted as it was not within the primary focus of the research questions and the researcher was mindful of not causing survey fatigue from the young participants. It was omitted to keep the survey shorter and more manageable for the participants.

The students completed the two WIHIC questionnaires, then the TROFLEI questions separately, as this focussed on the specific data to do with computer use and attitudes to the subject of writing.

3.5 Selection and description of the sample

Once the teachers agreed to proceed and the school had granted permission, parental and student approvals were sought. An explanatory letter (Appendix 1), information sheet (Appendix 2) and consent form (Appendix 3) were sent to all members of a total of 5 classes over two years, representing approximately 150 students. A presentation

with question and answer time was offered to the parents of the four Year 6 classes and one Year 5 class which had been selected to take part in the study.

These classes were selected on the basis of the entire Year 6 cohort of students being able to participate in the first year in which the research took place and then with two separate classes the following year. One classroom teacher took part in both years of the study, and the researcher's class took part in the second year.

The school selected to participate in the study was the school at which the researcher worked at the time. This meant that the study could be an immersive one in which the researcher was closely involved with the participating teachers and students, providing assistance as required and able to keep track of developments in the process. In the second year of the study the researcher's class was involved, leading to even greater involvement as a teacher participant. As a participant researcher, there is the potential for researcher bias to influence the results. This was minimised by using considerable quantitative data, using the same questions in interviews for all participants regardless of teacher and not including any researcher responses to surveys.

The school is a single campus, non-government, independent, private K-12 school, located in the suburbs of Perth, Western Australia. It has an enrolment of approximately 1,100 students. The students come from a variety of suburbs, most from within a 15 kilometre radius of the campus. This means that the school caters to a diverse range of socio-economic groups. A significant number of students (40%) were not born in Australia. The school has a large population from South Africa (20%), and smaller numbers from United Kingdom (4%), Zimbabwe (2.5%), New Zealand (2%), Malaysia (1.5%), Philippines (1%), Kenya (1%), India (1%) and Romania (1%).

During the period where the students' work was being emailed to their parents it was a benefit to have the researcher in the school where the research was taking place. Work samples from the participating students were collected on a regular basis by the participating teachers, individually scanned by the researcher and emailed to the researcher from the scanning photocopier before being forwarded to parents via email with an explanation of what the work sample entailed.

While approximately 150 students and their parents were offered the opportunity to take part in the research, only 65 parents provided consent to participate, 43% of the student population of those classes. It is the right of every participant to agree to participate or not and to withdraw at any time without prejudice. However, the researcher was disappointed as there are no other cohorts in other schools that would have had so many similar variables that they could participate in this unique study.

Of those who didn't participate, most of the parents simply didn't respond even after a follow up letter. A number of parents refused permission for their children to participate in the research. The lower than expected participation rate was disappointing and meant that the research was conducted over two years instead of one, as originally planned. In addition the use of a more detailed qualitative and even autoethnographic approach was utilised to improve triangulation and data quality.

3.6 Data Collection

This study combined two methods to collect data, namely quantitative and qualitative methods. This combination of methods is a means to enrich the validity of the research findings (Fraser, 1999). As the methods were used concurrently, they will be discussed together.

Conducting the research had a number of phases. The initial phase entailed obtaining student work from cooperating teachers, then scanning and emailing the student work to parents in a timely manner, usually within one to two days of the work being carried out by the student. As work was received by the researcher from the cooperating teachers, it was scanned and emailed to the researcher's school email account. A covering email (Appendix 4) was attached to the work and it was emailed to each individual student's parents. Part of the cover letter asked for a response to acknowledge receipt of the completed work and if the work had been discussed with the children. Some parents consistently responded to each piece of work while others did not respond to say they had received and/or discussed it with their children.

While this phase of the research was proceeding, the students completed their assessment of the classroom learning environments, using the WIHIC in both the actual and preferred forms. They also completed a separate questionnaire at the same time which utilised selected scales from the TROFLEI instrument.

Following the phase of the research where the students' parents were receiving the emails with the students' work attached, the students completed a researcher developed survey (Appendix 9) to glean their opinions of the efficacy of the facility of having their work being available to their parents more readily and having their parents as an audience for their work.

Also following the emailing phase, parental permission (Appendix 5) was sought for interviews to take place. Interviews were conducted with eight parents and ten students to provide further insight into their perceptions of the research. A list of questions was developed by the researcher with parents given the option on how they and their children could be interviewed. Some chose a phone interview while others chose to be interviewed at the school. In all, eight parents and ten children were interviewed. This represented approximately 12% of the parent sample and 15% of the student sample. With permissions granted, responses were recorded on a mobile phone and later transcribed by the researcher.

Following collection and aggregation of the data contained in the WIHIC and TROFLEI learning environment instruments, feedback sessions were provided for each of the participating teachers to present the findings for their classes. Teachers were given graphs of the results with the actual and preferred results for the WIHIC and TROFLEI superimposed on the same graph. Teachers were again consulted following time to consider the findings and implementation of any changes in their classrooms that could impact the learning environment. Their insights concluded the aggregation of data for the research project.

3.7 Data Analysis

Over the course of this research several phases of data collection and detailed interviews were conducted which resulted in a significant amount of data being collected.

The first phase involved communication with parents as the students' work was being emailed.

The second phase, which overlapped the first phase, involved the administration of the learning environment surveys, compilation of results and feedback to teachers.

The third phase involved the administration and analysis of the researcher designed student surveys.

The fourth phase was the administration and analysis of the parent surveys.

The final phase included interviews with the cooperating teachers. The initial teacher interviews were conducted to present and discuss the learning environment survey results. Follow up interviews were conducted later to consider any changes the teachers had made in their teaching practice as a means to enhance their classroom learning environments in the light of the learning environment surveys. These phases of the research combined both quantitative and qualitative research methods.

3.7.1 Communication with parents

Once the research proposal had been accepted and ethics clearance granted, the researcher briefed the teachers on the method and management of the research and outlined their involvement. This included the management of student work which was to be scanned and emailed to parents. The teachers were involved in the dissemination and collection of permission slips and fielding any initial enquiries from parents. The permission slips contained information about parent briefings held each afternoon for a week immediately after the end of the school teaching day to enable parents to easily

attend since many parents picked up their children at school. A small number of parents utilised these opportunities to ask questions about the research before granting their permission for involvement.

Once the research programme was under way, the researcher received student work in batches, scanned it on the school's photocopiers and emailed it to the researcher's email address. The scanned work was then forwarded individually as an attached document in PDF format to the parents of each participating student. The PDF document style was used since it is one that could be easily viewed regardless of operating system or type of device. Each email was personally addressed and had a generic note in the body of the email explaining the task (Appendix 4). Parents often responded to the email acknowledging receipt of the work and sometimes explaining how they utilised the information. This information provides a valuable insight into the parent perspective. Responses included how the work had been passed on to relatives within and outside Australia as it was easily forwarded via email, or how the parents were working with their child on areas of need highlighted through receipt of their child's work.

As the research progressed, a number of parents communicated with the researcher on an ad hoc basis since the researcher was employed at the school in which the research was taking place. Many positive conversations ensued, again highlighting the benefit of having an immersive study where the researcher was part of the programme.

3.7.2 Analysis of learning environment surveys and teacher feedback

At the beginning of the research intervention, students completed the WIHIC and TROFLEI learning environment surveys. They completed the WIHIC actual survey first (Appendix 6), then the WIHIC preferred (Appendix 7) and lastly the selected segments of the TROFLEI (Appendix 8). The student responses were all recorded directly onto the photocopied surveys. The students completed these questionnaires in class groups supervised by the researcher in a separate classroom to their regular

classroom. The students' regular classroom teachers remained with the students not participating in the research and were not involved with the completion of the surveys.

The researcher then compiled the responses into an Excel 2010 (Microsoft, 2010) spreadsheet. The five possible Likert responses of Almost Never, Seldom, Sometimes, Often and Almost Always were coded as 1, 2, 3, 4 and 5 respectively. A random selection of questionnaires was given to a colleague who checked the validity of the coding in the spreadsheet.

The first phase of data analysis involved calculating class means and standard deviations using Excel 2010 (Microsoft, 2010) for each scale of the WIHIC Actual, WIHIC Preferred and TROFLEI questionnaires. This information was presented to the cooperating teachers in graphical format. Differences of 0.5 or greater in the class means for each question in the actual and preferred student responses were inserted beside the corresponding questions in the WIHIC and TROFLEI surveys so that teachers had the particular question alongside its corresponding difference (Appendix 12). Teachers then considered any changes they might like to make to the classroom learning environment, knowing their students' preferences.

The second phase of the learning environment survey analysis comprised calculations to determine the validity and reliability of the instruments being used. The Excel 2010 (Microsoft, 2010) spreadsheet was prepared and imported into SPSS (IBM, 2010). Using SPSS, the validity and reliability of the WIHIC in actual and preferred forms were calculated. SPSS was also used to calculate the validity and reliability of the TROFLEI scales used in this research. An inter-item analysis was conducted for each question in the WIHIC actual and preferred scales, along with the scales used in the TROFLEI. This was carried out to ascertain whether there were any items with a low item-remainder correlation and whether any items should be removed from further analysis.

As a means to determine the internal structure of the learning environment surveys used, the data was subjected to a principal components factor analysis with a varimax rotation.

Determining whether individual items in the learning environment scales used in the questionnaires had internal consistency and reliability, a Cronbach alpha reliability coefficient was calculated for each using individual and class means as the index of internal consistency. This data is reported in Chapter 4.

Further analysis of the learning environment surveys included a one-way ANOVA and Eta² to determine if the surveys were able to distinguish significantly between the perceptions of students from the different classes involved in the research.

3.7.3 Post intervention student surveys

At the conclusion of the research intervention, students were asked to complete a researcher developed survey (Appendix 9). This survey was analysed to determine trends in student perceptions of the research process with particular attention to the research questions on attitude and achievement in writing, along with student perceptions of the frequency of parental involvement in their child's education.

The survey responses were coded and added to the master spreadsheet for quick retrieval and analysis.

3.7.4 Analysis of parent surveys

In a similar vein to the student surveys, parents were also asked to complete a researcher developed survey at the conclusion of the research. These responses were coded and recorded in a separate spreadsheet for efficient retrieval and analysis. The number of parents who responded to the survey was limited.

3.7.5 Student, parent and teacher interviews

The final phase of data analysis consisted of analysing interviews of students, parents and teachers to ascertain qualitative data support for the quantitative data collected.

The interviews were conducted over the phone and face to face. The interviews were transcribed and kept in a spreadsheet for analysis.

Miles and Huberman (1994) provide a framework for qualitative data analysis. They suggest that the three steps of analysis are data reduction, data display and conclusion drawing and verification. Guided by the five research questions, the data collected in this present study was first reduced by selecting the data relevant to the research questions and condensing it by grouping similar statements, then setting aside information not aligned with the research questions. The second step from Miles and Huberman (1994) involves data display. In this process the data was organised and arranged into categories in a text based spreadsheet in Microsoft Excel. This tabulated display facilitated the identification of trends, patterns and themes. Miles and Huberman's (1994) final step is conclusion drawing and verification. In this step, the researcher revisited the data many times to verify and confirm the trends, patterns and themes. From these revisits to the data, conclusions were then formulated as they appeared from the data.

3.8 Chapter Summary

This chapter has outlined the method in which the research was conducted. It has described how the researcher's interest developed in the topic from the basis of working with students in developing their writing ability. The research considers how the involvement of parents through the means of ICT could impact on student achievement and attitude, along with the learning environment. The process undertaken in conducting the research was presented in detail, including the selection of learning environment analysis instrument, selection of participants, method of communication with parents, collection of data and finally, analysis of data collected.

The next chapter will present the results of the research.

Chapter 4

Results

4.1 Introduction to analyses and results

The previous chapter discussed the research method, outlining how the research was conceived from a background of the researcher's interest in using ICT as a means of having parents involved in assisting the development of student writing. The chapter gave an overview of how the research was conducted, the participants, data collection, data analysis and selection of the learning environment assessment instruments used in the study.

This chapter presents the analyses and results of the research, including the quantitative and qualitative data collected. It is set out in the following sections:

- 4.2 Reliability measures and sample size
- 4.3 Validity and reliability of the WIHIC and TROFLEI scales used
- 4.4 WIHIC and TROFLEI scales average item means and standard deviations
- 4.5 Gender differences in average item means
- 4.6 Student qualitative data
- 4.7 Parent qualitative data
- 4.8 Teacher qualitative data
- 4.9 Chapter summary and conclusions

4.2 Reliability measures and sample size

One of the limitations of the research was the low sample size and lower than expected participation rate which could possibly influence the statistical reliability and factor discrimination when analysing the quantitative data.

Writing within a context of psychological testing, Charter (2003) reviewed literature on sample sizes and reliability. For example, Nunnally and Bernstein (1994, in Charter, 2003) suggested that 300 participants was a minimum while Nunnally, in a

much earlier work (1967, in Charter, 2003) said that a sample of 300 participants was relatively small. Segall (1994, in Charter, 2003) also called 300 participants small while Kline (1986, in Charter, 2003) gave 200 participants as the minimum sample size. Charter (1999, in Charter, 2003) concluded that a minimum of 400 participants was needed to provide sufficient reliability. Charter's (2003) paper continued with that same standard of 400 participants as a minimum but stated that this doesn't mean we don't report on sample sizes below that standard. In fact, he stated that "reliabilities should always be reported regardless of sample size" (Charter, 2003, p. 124).

Charter (2003) acknowledges that there are many factors, including time required, expense and research topic, which could make it impossible to base a study on 400 or more participants and then asks researchers to report sample size and confidence levels for the reliability coefficient, explaining why the sample size is small. In the context of the present study, the sample size is small for a number of reasons.

Reasons for the small sample size relate to the school context of the study. The study was conducted as an immersive study in the researcher's place of employment and was limited to Year 5 and Year 6 classes over a two year period. Theoretically, this would have provided access to approximately 270 students had all participated. This would be below the suggested 400 from Charter (2003) but above Charter's (2003) acknowledgement that for high reliability tests with a coefficient 0.95 and above, 250 participants would be sufficient for reliability analysis. Based as it was in the researcher's own school, the study was limited to participants from the sample school as this was a unique sample and was the only group available that could have ready access to parents, students and a consistent school culture, curriculum and cohort.

Another aspect of the research was the collection, scanning and emailing of student work. This component of the research would have been an onerous task for one person to coordinate and manage within the context of maintaining a full-time teaching load while potentially contacting 90 to 150 families. With the logistics of parent contact considered before the research commenced, it was envisaged at that stage that the sample size would have to remain small to allow for this part of the research to be conducted.

Another limiting factor in obtaining a greater number of participants was that many parents did not grant permission for their children to take part in the research so the researcher was unable to accommodate full classes of students. Some parents thought that the time commitment would be too great, some were not interested in their children taking part, some refused permission, as was their right to do so, while others simply did not respond to notes sent home with their children.

The participant children who had parental permission were also asked if they would like to take part, with 100% participation on their part. It is for these reasons the sample size for the study was small. However, this does not invalidate the student responses, nor the data. It simply makes the analysis of the quantitative data potentially less reliable than data obtained in larger studies.

As will be demonstrated in the tables and analyses below, some data delivered unexpected results. The unexpected results did not replicate the statistical reliability and factor determination which has been a feature of the WIHIC and TROFLEI learning environment assessment tools. As mentioned earlier in the review of literature, these instruments have been validated over many years in many studies across various countries and age groups.

4.3 Validity and reliability of the WIHIC and TROFLEI scales used

As mentioned previously, two of the aims of the present study were to assess the validity and reliability of the WIHIC and five scales of the TROFLEI learning environment evaluation tools with Year 5-6 upper primary students aged 10 to 12 years. Both of these learning environment assessment tools have been widely validated in numerous studies, including studies with primary school aged students. This study used a small sample and sought to determine if the WIHIC and TROFLEI were valid learning assessment tools as part of this research. Both research questions will be addressed simultaneously in the reporting below.

As a means to examine the internal structure, validity and reliability of the 56 item WIHIC Actual, 56 item WIHIC Preferred and 40 items used in the TROFLEI

questionnaires, the data was analysed in a number of ways. The data from each questionnaire was subjected to a principal component factor analysis with varimax rotation and Kaiser normalisation. The initial factor analysis was conducted in an restricted manner as it attempted to locate seven factors each in the WIHIC Actual and Preferred and five in the TROFLEI.

Completing this analysis lead to the identification of items whose removal improves the internal consistency reliability and factorial validity of the questionnaires. The criteria for removing or retaining questionnaire items in the factor analysis were that the item must have a factor loading of at least 0.40 on its own scale and less than 0.40 on any other scale. Convention holds that the minimum value for a meaningful factor loading is 0.40 (Stevens, 1992, in Pickett & Fraser, 2009). The process of removing items which fail to meet the factor loading criteria is commonly practised. For example, Peer (2011) removed nine of 70 items in her Singaporean survey while Koren (2013) removed three items in his study using the WIHIC in the USA. Following the removal of items and scales which did not meet the factor loading criteria, five factors (scales) from the original seven for the WIHIC Actual questionnaire remained, six factors (scales) from the seven for the WIHIC Preferred questionnaire were left and four of the five factors (scales) for the TROFLEI questionnaire remained. This data is presented in tables 4.1, 4.2 and 4.3.

The WIHIC Actual and Preferred versions and TROFLEI scales were all treated separately in the factor analyses as they were presented separately to the students and are distinct in their own right. This is also why there are different scales and items excluded from each questionnaire.

Table 4.1 Factor Analysis Results for WIHIC Actual

Item	Factor Loadings				
	Involvement	Investigation	Task Orientation	Cooperation	Equity
IN A 17	0.66				
IN A 18	0.83				
IN A 20	0.74				
IN A 22	0.76				
IV A 25		0.73			
IV A 27		0.66			
IV A 29		0.63			
IV A 30		0.77			
IV A 31		0.76			
IV A 32		0.77			
TO A 33			0.72		
TO A 34			0.62		
TO A 35			0.67		
TO A 36			0.70		
TO A 37			0.69		
TO A 38			0.50		
TO A 40			0.53		
CO A 42				0.53	
CO A 44				0.72	
CO A 46				0.84	
CO A 47				0.67	
CO A 48				0.70	
EQ A 50					0.76
EQ A 51					0.78
EQ A 52					0.79
EQ A 53					0.79
EQ A 54					0.76
EQ A 55					0.63
EQ A 56					0.80
% Variation	5.79	11.82	8.39	7.46	28.59
Eigen Value	1.68	3.43	2.43	2.17	8.29

The sample consisted of 65 students in five classes

Principal components factoring with Varimax rotation and Kaiser normalisation

Student Cohesiveness and Teacher Support scales removed

Items removed from scales as indicated by numbers missing between 17 - 56

Total proportion of variance is 62.05%

Table 4.2 Factor Analysis Results for WIHIC Preferred

Item	Factor Loadings					
	Student Cohesiveness	Teacher Support	Involvement	Investigation	Task Orientation	Cooperation
SC P 04	0.65					
SC P 05	0.71					
SC P 07	0.67					
SC P 08	0.74					
TS P 09		0.70				
TS P 11		0.79				
TS P 12		0.63				
TS P 13		0.85				
TS P 15		0.81				
IN P 17			0.77			
IN P 18			0.88			
IN P 19			0.60			
IN P 20			0.77			
IV P 25				0.81		
IV P 26				0.86		
IV P 27				0.84		
IV P 28				0.74		
IV P 29				0.76		
IV P 31				0.79		
TO P 33					0.78	
TO P 34					0.88	
TO P 36					0.89	
TO P 37					0.84	
TO P 38					0.78	
TO P 40					0.77	
CO P 41						0.83
CO P 42						0.80
CO P 43						0.73
CO P 44						0.76
CO P 45						0.69
CO P 46						0.82
CO P 47						0.77
% Var	5.23	6.11	4.32	10.08	39.27	11.76
Eigenvalue	1.73	2.02	1.43	3.33	12.96	3.89

The sample consisted of 65 students in five classes

Principal components factoring with Varimax rotation and Kaiser normalisation

Equity scale removed

Items removed from scales as indicated by numbers missing between 01 and 48

Total proportion of variance is 76.78%

Following removal of scales and items, the WIHIC Actual demonstrated a total percentage of variance of 62.05% made up of 5.79% (Involvement), 11.82%

(Investigation), 8.39% (Task Orientation), 7.46% (Cooperation) and 28.59% (Equity). The eigenvalues ranged from 1.68 (Involvement) to 8.29 (Equity). The factor analysis for the WIHIC Actual supports to some extent the factorial validity of five of the original seven scales of the questionnaire when used with Year 5 and 6 students.

The WIHIC Preferred demonstrated a total percentage of variance of 76.78% after removing scales and items to ensure satisfactory factor analysis. The proportion of variance was made up of 5.23% (Student Cohesiveness), 6.11% (Teacher Support), 4.32% (Involvement), 10.08% (Investigation), 39.27% (Task Orientation) and 11.76% (Cooperation). The eigenvalues ranged from 1.43 (Involvement) to 12.96 (Task Orientation). The factor analysis for the WIHIC Preferred therefore supports to some extent the factorial validity of six of the original seven scales of the questionnaire when used with Year 5 and 6 students in a Western Australian primary school.

The TROFLEI scales utilised in the questionnaire, like for the WIHIC questionnaires, were subjected to factor analysis to determine the factorial validity of the scales. This factor analysis resulted in the removal of the Academic Efficacy scale from the five scales presented to the students.

Table 4.3 Factor analysis results for TROFLEI scales

Item	Factor Loadings			
	Computer Use Actual	Computer Use Preferred	Attitude to Subject	Attitude to Computer Use
CU A 3	0.70			
CU A 4	0.55			
CU A 5	0.72			
CU A 6	0.81			
CU A 7	0.56			
CU P 1		0.41		
CU P 2		0.72		
CU P 3		0.68		
CU P 4		0.59		
CU P 5		0.81		
CU P 6		0.73		
CU P 7		0.74		
CU P 8		0.58		
ATS 17			0.74	
ATS 18			0.77	
ATS 19			0.84	
ATS 20			0.85	
ATS 21			0.57	
ATS 22			0.75	
ATS 23			0.72	
ATS 24			0.68	
ATCU 25				0.73
ATCU 26				0.86
ATCU 27				0.61
ATCU 28				0.68
ATCU 29				0.63
ATCU 30				0.71
ATCU 31				0.52
ATCU 32				0.76
% Var	7.53	11.75	22.96	13.23
Eigenvalue	2.18	3.41	6.66	3.84

The sample consisted of 65 students in five classes

Principal components factoring with Varimax rotation and Kaiser normalisation

Academic Efficacy scale removed

CU A 1, CU A 2 and CU A 8 questions removed.

Total proportion of variance is 55.47%

As mentioned earlier, the Young Adult Ethos and Differentiation scales were not presented to the students due to the school context and due to the fact that the sample was primary aged students. Following removal of the Academic Efficacy scale and items which did not produce a factor loading of 0.40 in their own scale and less than

0.40 on any other scale, the TROFLEI scales demonstrated a total percentage of variance of 55.74% made up of 7.53% (Computer Use Actual), 11.75% (Computer Use Preferred), 22.96% (Attitude to Subject) and 13.23% (Attitude to Computer Use). The factor analysis for four of the five TROFLEI scales therefore supported to a certain extent the factorial validity of the TROFLEI questionnaire when used with Western Australian primary students in Years 5 and 6.

Following the factor analysis of the WIHIC, Actual and Preferred, and TROFLEI questionnaires, to determine the internal consistency reliability of the questionnaires, the Cronbach alpha reliability coefficient was calculated as an index of scale internal consistency (Pickett & Fraser, 2009). The Cronbach Alpha Coefficient was calculated for two units of analysis, namely using the individual student and class mean as the item of analysis. Cronbach's Alpha Coefficient measures the internal consistency of an assessment tool or that each scale item assesses a common construct (Pickett & Fraser, 2009). Pickett and Fraser (2009) stated that most researchers consider values of more than 0.70 as acceptable.

Table 4.4 Internal Consistency (Cronbach Alpha Coefficient) and Ability to Differentiate Between Classrooms (ANOVA Results) for WIHIC

Scale	No of Items	Unit of Analysis	Alpha Reliability	ANOVA Results (eta ²)
WIHIC Actual				
Involvement Actual	4	Individual Class Mean	0.85 0.89	0.08**
Investigation Actual	6	Individual Class Mean	0.84 0.92	0.10**
Task Orientation Actual	7	Individual Class Mean	0.81 0.87	0.09**
Cooperation Actual	5	Individual Class Mean	0.82 - 0.11	0.06**
Equity Actual	7	Individual Class Mean	0.90 0.79	0.05**
WIHIC Preferred				
Student Cohesiveness Preferred	4	Individual Class Mean	0.87 0.93	0.04**
Teacher Support Preferred	5	Individual Class Mean	0.90 0.90	0.02**
Involvement Preferred	4	Individual Class Mean	0.85 0.87	0.08*
Investigation Preferred	6	Individual Class Mean	0.94 0.93	0.08*
Task Orientation Preferred	6	Individual Class Mean	0.95 0.98	0.14*
Cooperation Preferred	7	Individual Class Mean	0.93 0.94	0.07*

* $p < 0.05$

** $p < 0.01$

The sample consisted of 65 students in five classes

The eta² statistic represents the proportion of variance explained by class membership as it is the ratio of 'between' to 'total' sum of squares. (Note that in this research class sizes varied between 9 and 18)

Table 4.5 Internal Consistency (Cronbach Alpha Coefficient) and Ability to Differentiate Between Classrooms (ANOVA Results) for TROFLEI

Scale	No of Items	Unit of Analysis	Alpha Reliability	ANOVA Results (eta ²)
TROFLEI				
Computer Use Actual	5	Individual	0.75	0.05**
		Class Mean	0.79	
Computer Use Preferred	8	Individual	0.83	0.15**
		Class Mean	0.73	
Attitude to Subject	8	Individual	0.90	0.07**
		Class Mean	0.94	
Attitude to Computer Use	8	Individual	0.85	0.03**
		Class Mean	0.88	

* $p < 0.05$

** $p < 0.01$

The sample consisted of 65 students in five classes

The eta² statistic represents the proportion of variance explained by class membership as it is the ratio of 'between' to 'total' sum of squares. (Note that in this research class sizes varied between 9 and 18)

An analysis of variance (ANOVA) was conducted on the data for each scale of the WIHIC and TROFLEI to ascertain the questionnaires' ability to differentiate between the perceptions of students in different classes.

The eta² statistic provides an estimate of the strength of relationship between class membership and the dependant variable, which in this case, is each scale of the WIHIC and TROFLEI that remained after factor analysis was conducted (Pickett & Fraser, 2009). The final column in Table 4.4 displays the ANOVA results in terms of the eta² statistics, the ratio of 'between' to 'total' sum of squares. Each of the WIHIC Actual and TROFLEI scales discriminated significantly between classes with a significance level $p < 0.01$ while all scales of the WIHIC Preferred questionnaire also discriminated significantly with two scales (Student Cohesiveness and Teacher Support) having a significance level $p < 0.01$ while the other four scales had a significance level $p < 0.05$.

Some anomalies were evident in the reliability data when compared to other studies which validated the WIHIC and TROFLEI questionnaires, for example Koul et al. (2011) and Pickett and Fraser (2009). The first anomaly is that it was reasonably expected that using the class mean as the unit of analysis would increase the Cronbach alpha reliability coefficient. This was the case for the majority of the scales but a

number of scales demonstrated a reverse relationship where the reliability coefficient for using the class mean as the unit of analysis than for when using the individual as the unit or analysis. This inverted expectation was noted in the WIHIC Equity Actual scale, WIHIC Preferred Investigation scale along with the Computer Use Preferred scale from the TROFLEI. It was an unexpected result for these scales and again can more than likely be attributed to the small sample size producing anomalous results.

The second anomaly discovered in the data analysis was noted with some scales returning negative alpha reliability coefficients. This was totally unexpected and suggested that the data coding was perhaps incorrectly carried out. The coding was triple checked and the statistical analyses were conducted many times to determine if there was fault with the coding of the student responses and the subsequent analysis in SPSS. The codings were determined to be accurate and the analyses were run several times with the results being replicated. Again, the probability is that the small sample size of the data influenced the reliability coefficient. With a greater sample size it could be expected for these anomalous results to be ironed out. There was also a large disparity in the class sizes which could have impacted on the results as the class sizes varied between nine and 18.

4.4 WIHIC and TROFLEI scales average item means and standard deviations

The above factor analysis and internal reliability coefficient meant that several scales and a number of questions had to be omitted to maintain a suitable reliability factor and to ensure that questions presented a factor loading of at least 0.40 on its own scale and less than 0.40 on any other scale. However, prior to this data analysis, the scale means and standard deviations had been calculated so that teachers could be presented with results for their classes.

The data they were presented with included the complete data set for the actual and preferred forms of the WIHIC and TROFLEI scales rather than only the questions that remained after factor analysis and reliability calculations. The “raw” data represented the students’ responses to the questionnaires and was being used to ascertain their perceptions of the classroom learning environment. While statistical analyses

determined that four of the scales, from a total of 19, and 42 other questions, from a total of 120 remaining after the removal of four scales, needed to be removed to ensure satisfactory factorial validity and internal consistency reliability, the students had perceived the classroom learning environment in the manner they recorded. So as therefore not to invalidate the students' perceptions, their perceptions were all included for every scale when considering the scale means and standard deviations. It was this data that was reported to the cooperating teachers also, another reason for the inclusion of all the responses below.

This analysis of scale means and standard deviations ascertained that the means of the students' preferred responses were consistently higher than their responses for the actual classroom learning environment. This appears to demonstrate that the students desired a learning environment that showed more student cohesion, experienced increased teacher support, had the students involved to a greater extent, involved a higher degree of investigation, had students more focussed on tasks, demonstrated greater cooperation and in which the students felt that they were treated more equitably by the teachers. The students also desired to use computers to a greater extent in their classrooms. This is the overall result from the combined means.

Table 4.6 displays the scale means and standard deviations for each scale of the WIHIC and TROFLEI. It also presents the calculation of difference between the means for the Actual and Preferred scales. The smallest difference between actual and preferred scales was 0.08 for the WIHIC Task Orientation scale. The greatest difference was seen in the TROFLEI Computer Use scale where the difference was 1.27. If we only considered the WIHIC scales, the average difference between the Actual and Preferred means was 0.29. The Computer Use scale was the only TROFLEI scale where the students completed Actual and Preferred responses. The difference between the means on this scale was very large with a 1.27 gap between the two means, demonstrating the students desired much more time using computers in the classroom.

Table 4.6 WIHIC and TROFLEI Average Item Mean and Standard Deviation

Scale	Average Item Mean		Difference	Average Item Standard Deviation	
	Actual	Preferred		Actual	Preferred
WIHIC					
Student Cohesiveness	3.89	4.18	0.29	1.25	0.90
Teacher Support	3.61	3.82	0.21	1.08	1.03
Involvement	3.26	3.71	0.45	1.14	1.07
Investigation	3.08	3.53	0.45	1.04	1.04
Task Orientation	4.33	4.41	0.08	0.84	0.84
Cooperation	3.70	4.03	0.33	1.05	1.01
Equity	3.92	4.17	0.25	1.15	0.98
TROFLEI					
Computer Use	2.32	3.59	1.27	1.42	1.36
Attitude to Subject	2.90	-	-	1.21	-
Attitude to Computer Use	3.17	-	-	1.63	-
Academic Efficacy	3.18	-	-	1.16	-

Table 4.6 includes the standard deviations for each scale in the Actual and Preferred forms. Standard deviation is a measure of the average deviation from the mean for a set of scores. The lower the value, the more tightly grouped the responses are. The higher the number the greater the disparity of the scores. In this research it was found that one scale had a tightly grouped set of responses in both the Actual and Preferred questionnaires. This was the Task Orientation scale. This demonstrates that the students felt their classes knew what work needed to be completed and that the students desired their learning environments to function this way. The two scales with the greatest standard deviations were both related to computers, one being computer use (1.42 Actual, 1.36 Preferred) and the other being attitude to computer use (1.63). These results tend to suggest that computer usage and attitude to computer use had the greatest amount of diversity of opinion with some students enjoying their use of computers while other students did not feel the same way.

Figure 4.1 Whole Sample Scale Means

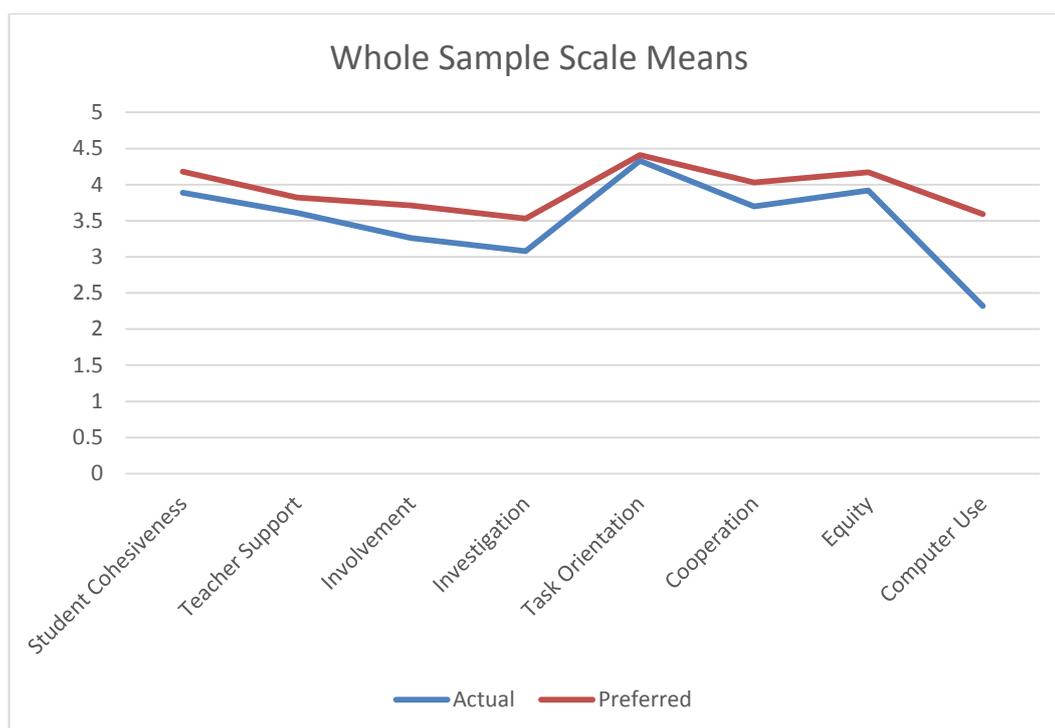


Table 4.7 WIHIC and TROFLEI Average Item Mean For Each Gender

Scale	Average Item Mean Actual			Average Item Mean Preferred		
	Male	Female	Difference	Male	Female	Difference
WIHIC						
Student Cohesiveness	3.61	4.08	0.47	4.05	4.29	0.24
Teacher Support	3.50	3.69	0.19	3.86	3.76	- 0.10
Involvement	3.23	3.28	0.05	3.56	3.81	0.25
Investigation	3.13	3.05	- 0.08	3.24	3.73	0.49
Task Orientation	4.29	4.37	0.08	4.21	4.56	0.35
Cooperation	3.65	3.73	0.08	3.79	4.19	0.40
Equity	4.02	3.85	- 0.17	3.98	4.33	0.35
TROFLEI						
Computer Use	2.23	2.31	0.08	3.75	3.47	- 0.28
Attitude to Subject	2.77	2.98	0.21	-	-	-
Attitude to Computer Use	3.17	3.17	0.00	-	-	-
Academic Efficacy	3.19	3.12	- 0.07	-	-	-

4.5 Gender differences in average item means

Part of the scale means and standard deviation analysis was to determine whether there were any differences in how girls and boys perceived the learning environment. 13 scales had the girls determining the learning environment more positively than the

boys. Only five of the 19 scales had girls with a mean score lower than that for boys and one scale had identical means. The greatest differences were noted in Student Cohesiveness Actual scale (0.47) and in the Investigation Preferred scale (0.49).

The next two highest differences in the WIHIC Actual questionnaire showed that girls perceived that there was greater Teacher Support and that they had a better attitude towards the subject of writing compared to the boys. However, it is in the WIHIC preferred questionnaire that there are consistently higher differences between the girls' expressed preferences compared to the boys. In order of difference, the girls preferred a classroom learning environment that was, as stated earlier, more Investigative (0.49), had greater Cooperation (0.40), showed greater Task Orientation (0.35) and Equity (0.35), had more student Involvement (0.25) and demonstrated greater Student Cohesiveness (0.24). Only Teacher Support Preferred had the boys recording a higher mean than the girls by 0.10.

4.6 Student interview and survey data

Along with the quantitative data collected through the WIHIC and TROFLEI questionnaires, students completed a researcher developed survey. Selected students were interviewed to gain further information on their perceptions of the classroom learning environment and on the impact of using ICT to provide them with authentic experiences of interaction, collaboration and audience. The survey and interviews were used to determine if there were any associations between student attitudes and achievement in writing when their parents participated in the writing process as an active audience. This data was collected to address the first two research questions.

With respect to the impact on the learning environment itself, students reported a variety of opinions on the effect on the learning environment through the conduct of the research.

As was mentioned earlier, the number of students participating in the five classes ranged from nine to 18 students. In classes with a total of 32 students this meant that less than a quarter to just over half of the class participated in the research. This ratio

of participating to non-participating students could have impacted the determination by the students that the research had little impact on the learning environment.

When interviewed, as a means to consider the students' opinions on who they were writing for when they were given writing assignments at school, they were asked directly who they thought they were writing for. Students mostly felt that they were writing for the teacher with some variations that included themselves and parents. Typical responses are listed below. Note that all names mentioned in the data below are not the real names of the students, parents or teachers. The names were changed to protect the anonymity of the research participants.

When you do your writing at school, who do you feel you are writing for?

Myself and teacher. Jerry

The teacher, my parents, myself, I don't know. Olga

The teacher. Rhett

I feel am writing for myself. Lee

The teacher. Adrienne

I do not really think about it but I know that when I write, my parents will see what I have written. Anthony

Students were then asked about whether it would make a difference to their effort if they knew that their parents were going to see, or be an audience, for the work soon after it was drafted at school. This was to determine if there would be any difference in their attitude to the task of writing, knowing that they would have the opportunity to interact, and potentially collaborate, with their parents as an authentic audience for their work. Most of the students interviewed mentioned that they would try harder, knowing their parents were going to view the work.

The interview question was “If you knew that your parents were going see your work straight away (be an audience), do you think it would make a difference to your efforts and how well you do with the task?” Typical student responses were:

I might try harder. Jerry

I think I would try harder. Olga

I would try harder because my parents were going to read it. Rhett

I think I might try harder and make less mistakes if I knew my parents would see my work. Lee

I will work harder. Adrienne

*When I work I try to do my best, but I would still make extra efforts.
Anthony*

Students were then asked how they felt about discussing their work with their parents. Interesting responses emanated from this question, mostly to do with the quality of work produced. If they felt they had produced ‘good’ work, then they were happy to discuss it. Otherwise, some of the students felt that they were embarrassed or didn’t want to talk about their work if they thought the work wasn’t considered ‘good’.

Students were asked, “How do you feel about having your parents discuss your work with you?” Some typical responses were:

If the piece of work was good, I liked discussing it with my parents but if it wasn't so good I didn't really like talking about it. Olga

It doesn't bother me. Rhett

I would feel good if my parents discussed my work with me because they would help to correct my mistakes and make me do better work. Lee

It will be helpful but if the work isn't good, feel embarrassed. Adrienne

I feel happy discussing it with my parents because they can offer suggestions to help me in future. Anthony

The next question related to whether there would be a difference in the way students work if they knew other people, besides the teacher, would view and discuss their work. This was to ascertain their ideas on the influence of audience and a sense of purpose to writing. Only one student suggested that it wouldn't make a difference while the other students felt that it would make a difference, with several students explaining why.

The next interview question was, "Do you think having other people, besides your teacher and class mates, to discuss your work with would make a difference to how you work?" Some representative student responses were:

Yes. Jerry, Rhett

Definitely! I would try harder to do my best. Olga

Yes. I would put more effort and work harder if other people besides the teacher and classmates discuss my work with me. Lee

No. Adrienne

Yes, because they have different ideas. Anthony

As in the Project Tomorrow (2014) survey, it is enlightening to elicit student opinions on how technology can be used in the classroom context. The classrooms had access to a computer lab equipped with 20 desktop computers along with bookable trolleys

of laptop computers. Each classroom was also equipped with interactive whiteboards with multimedia capability, digital cameras and video cameras. With this background, the students were then asked what they felt were the best ways to use technology in the classroom. Students expressed a desire for greater access to and use of technology in the classroom, including expressions of desire to have their own devices rather than school provided technology. A number gave indications of how they would like to use the technology, including for research and creation of multimedia.

Students were asked, “What do you think are the best ways to use technology in the classroom? What would you like to do with the technology we have?” They responded:

Having my own iPad or laptop. Jerry

The school should give everyone an iPad to use in the classroom to help them with work and find out information. Olga

I think we should have one PC each during computer time would be good. Also the chance to do more on computers would be good like create movies, interviews, short recordings, publishing blogs and learning to create websites. Rhett

The best way to use technology is for research and study. I would like to do a lot of research with the technology we have. Lee

I would like to work more on the computers. Adrienne

I would like to use the technology for planning and design when we do projects and I would also like to make use of a wider field of knowledge on the Internet. Anthony

The next interview question was about emailed work, and asked, “How do you think having your work emailed has affected your classroom?”

Some students had a positive view of how the project affected the classroom learning environment, including one who felt the project made them smarter. Typical responses are listed below.

I think it makes people in the class make sure they do their best. Cade

*The teacher would say, "Your parents will see this, do a good job!"
Jamison*

Some people perform better. Selena

They all started doing better in writing. William

Everyone has improved in writing. Rhett

It made us smarter. Marcus

It has made us more attentive. Trent

However, others felt that the project hadn't really affected the classroom learning environment.

It hasn't affected the class. Darren

It does not really affect the classroom. Jeff

I don't think that anything changed. Nestor

As will be discussed at greater length in the next chapter, one of the limiting factors of the research was that classes did not have a critical mass of students participating in the project. This meant that the teachers were dealing with, at best, just over half the class participating and at the other end of the spectrum, about a quarter of students involved. This meant that their teaching programmes largely remained unchanged.

Feedback from the student questionnaires came into effect in subsequent classes as the interventions were conducted later in the year and the feedback to teachers occurred once the emailing of student work had been completed.

Students were then asked, “How do you think having your work emailed has affected your attitude to writing?”

Similar responses to the question above about how the learning environment was affected were also reflected in the answers to the question on how the project affected their attitude to writing. Many students reflected that having their parents see their writing encouraged them to work harder and to do their best with their writing. Responses along this line were given by just under half the students. Some students mentioned that they were motivated or encouraged to improve their writing standard knowing that their parents would see it. Other students mentioned being happier because they have an audience for their work with one student saying explicitly that he feels better because someone other than his teacher would see the work. Other typical responses were:

It has encouraged me to do my best to make my parents proud. Cade

I like it better. Trent

I can do my best and then people can try and work more harder. Miriam

Having my work emailed has made me happier to know that my parents are getting to see how I did, which lets me know to keep trying hard in English. Bailee

It has motivated me to keep writing. Trent

*I think knowing Mum and Dad read my writing I try to work harder.
Nestor*

I try to do better. Mack

It encourages me more to work to a higher standard. Jamison

It made me want to work harder. Adele (and several other students with a similar response).

It helps me to do better work. Selena

Now I know my parent see my work so I try harder. John

It makes me want to do my very best. Shakira

I have gotten a better attitude. Jeff

By trying to do really well because your mum and dad see it. Olga

It would have probably made me enjoy it more. Eleanor

It makes me feel better because someone, other than my teacher, will see my work. Jonathan

It has encouraged me to do better. Gianna

One student liked the practical side of the project as his work was being emailed home and he didn't have to worry about forgetting his work.

I don't forget to get it because it is emailed to me; how affected my attitude, I'm willing to do it. Ken

Other students noted there were potential positives from their parents viewing their work. This ranged from getting help with the work and being encouraged by parents to being praised for their work. Others took this a little more negatively to assert that

they were now feeling more pressure because their parents were an audience for their work or that their parents were pushing them to complete higher standard work.

It has encouraged me to do a great job so my parents can praise me.

Gianna

A lot because my parents can help me too. Nadia

They know what I am doing and know how to help. Mack

It's OK but Mum is pushing me a bit. Shay

I think I have more pressure on me. Darren

Finally, approximately one third of the entire group of students reflected that the project hadn't really affected their attitude to writing. A number of these students were asked why and they mentioned that their parents didn't really talk to them about the project. It is evident that some parents signed on to receive the scanned work home but then did not share or discuss the work with their children when it was emailed to them.

This project hasn't really affected my attitude to writing because my Mum and Dad don't really talk to me about this project. Tina

I don't think my attitude has changed much. Jamison

My attitude hasn't really changed. It hasn't affected me because my parents haven't told me if they got any of my work or not. Raylee

The next interview question asked, "How do you think having your work emailed has affected your performance in writing?"

Students responded to this question in a variety of ways, some writing simply that they felt that their writing had improved while others gave some explanation of why they thought their writing had shown improvement. Students acknowledged some benefit of having their work emailed such as being able to work on it at home with parents able to offer suggestions on how to improve or actually help the students with their work. A number of students commented more on the affective dimensions of their performance, mentioning that the project encouraged them to do better work or that they were more confident since their parents became an audience for their efforts. However, as was reflected in the question above, a number of students commented that the project hadn't affected their writing performance or that they didn't know their work was being emailed home as their parents hadn't discussed the work with them. Other students noted specifics about their writing that they felt had been impacted by the project. For example, Lee wrote that he now wrote longer accounts than previously while Jarod felt that his grammar had improved since taking part in the project, though he adds, "not much else" had improved.

I find it has improved. Cade

I'm better at writing. Kaitlyn

It would be much better. Lawrence

It helps me to do better work. Selena

Made me write more. My stories were longer. Lee

I definitely have better grammar, but not much else. Jarod

It has made my writing improve. It has made my writing go well. Rhett

I do write better. Theo

I think I do it better. Olga

I have gotten a little better. Marcus

I think I write better because I know someone else will see it. Jay

I can think about the next project and write better. Miriam

Well, it's made me want to work harder because my parents look at my work. Raylee

It was better because I could work on it at home. Gianna

I think it improves my writing and my parents can tell me how to improve my writing. Ray

I feel I need to be a bit more careful. Jadon

To work a bit faster. Madison

By seeing my mistakes and filling them in. Kaitlyn

I am more conscientious and I try to be a bit better. Mack

It makes me do better by doing my best. Shakira

Some students, knowing that their parents would see their work as it was in the process of drafting, rather than completed “neat” or “published” copy, concentrated on making their work more legible.

My writing is now neater and not as messy as it was before and I try my best. John

I tried to write very neat so my parents can read. Tania

Some students acknowledged the help their parents gave them with their work once it was emailed to them. This included responses such as how parents could explain how writing could be improved to how praise inspired greater confidence in the student.

My parents tell me how to improve my writing and I think it makes my writing better. Ray

If I do bad my mother can tell me how to do better. Miriam

I feel more confident when writing from the praise and tips parents have given. Jamison

So Mum can talk to me about the stuff that I have trouble with. Jeff

Other students felt that the project did not have any impact on their writing. Some then explained that they were unaware that their parents were receiving their work, even though this had been explained to them by their class teachers.

I didn't know my work was being emailed to my parents, so I didn't try harder. Jade

It hasn't affected my performance. Ken

It didn't affect it at all. Gianna

Nothing different happened. Terry

I don't think there was an affect. Robert

Two students acknowledged that the project didn't really have any effect on their performance because they always completed work to the best of their ability anyway.

It does not affect my writing, I do my best in everything I do at school.

Jesse

I always do my best anyway but it is nice they will see it. Jacklyn

Finally, students were asked if they had “Any other comments you would like to make about this project.”

Students were at liberty to comment on any aspect of the project with this question. Some chose to mention the classroom learning environment survey while most commented on their writing and whether it had improved through interaction with their parents after receiving the emailed copy of their work.

This is a good way to see how some children think about this class. Miriam

It was a smart thing to research and it has come along very well. Gianna

Well I think it's really good and I would ask it to continue. Nadia

Well I think it's a great idea and it's awesome for my parents to see my work. Gianna

It's a good idea I reckon. Jack

Without them going into a great deal of detail, a number of students noted that they were working harder and that the project helped them to reflect more on their work and how it could be improved.

I believe that it has made me work harder. Nestor

I'm also able to reflect on my work a few days later, and find my faults and learn from it. Jamison

It helps me to do better work at school. Selena

Some students noted the benefits they experienced from having the work emailed. These included aspects in the affective domain to do with the encouragement they felt when their parents noticed their work and expressed encouragement to their child.

It has attracted attention to my writing from my parents. Tammy

It's good that they can see my work. Ray

My Mum said that she liked my work because I tried. Jeff

It's really good that when I got a good mark my Mum would straight away see and encourage me. Cade

A number of students didn't like the project as it involved communication with parents. One student in particular mentioned a number of times his dissatisfaction with having his parents able to monitor his classwork more closely. He thought it was sneaky and was going behind his back, even though he had the process explained beforehand. Others felt that they then had to work at home on their school assignments and this just created extra work or had them endure a parental lecture on how to improve.

I don't like it. It is being sneaky. I don't like it. I think that it is sneaky and I don't trust my teacher anymore. I don't like my teacher sending work home. Rhett

I sometimes have to work all the time and it gets annoying and sometimes they give me a lecture. Darren

In a researcher developed survey, the students had the opportunity to respond to several questions and select suggested responses for benefits and disadvantages of the system to provide their parents the opportunity to be further involved in their children's education by being an audience for their writing. Table 4.8 is a summary of the

responses received from the 65 participants. It is to be noted that the whole sample did not necessarily respond to each question or gave non-valid response such as circling two answers. This is the reason that the total number of respondents for each question does not always equal 65.

Table 4.8 Student survey response summary

	Almost never	Seldom	Some-times	Often	Almost always	Average
Prior to this research, how often did your parents see your writing?	5	15	23	12	3	2.88
Prior to this research, how often would you parents help you with your writing at home?	11	16	16	14	4	2.74
Since this research project, how often did your parents see your writing?	5	8	14	17	15	3.49
Since the research project, how often would your parents help you with your writing?	10	14	14	16	6	2.90
How often would you like your parents to see the writing you do at school?	4	13	18	17	9	3.23
<hr/>						
What benefits have you noticed since your parents started receiving your work by email? (Tick all that apply)						
My parents are more involved with my writing now.	26					
My parents talk to me about my learning more.	33					
It helps me to know that someone else will see my work, not just my teacher.	36					
My parent give me an audience for my writing.	26					
It's good for my parents to see my work during term not just at end of semester.	43					
My parent are more aware of my strengths and weaknesses with writing.	46					
<hr/>						
What disadvantages have you noticed since your parents started receiving your work this way? (Tick all that apply)						
It was time consuming.	12					
My parents were not sure how to help me.	6					
My parent found it difficult working with me.	5					
My parents had trouble with the technology like the computer.	7					
My parents weren't sure what to do.	6					
I wasn't sure what to do.	12					
My parents didn't talk to me about my work.	14					
I was a bit embarrassed having them see my work.	25					
<hr/>						
	Yes	No				
Has this process been helpful for you and your parents?	41	8				
Would you like your parents to continue being involved in this way?	40	15				
Do you feel it is helpful to have the work emailed?	41	13				

From this survey, it is evident that the majority of the students felt that having their work emailed to their parents had been helpful. 41 out of 49 (83.67%) who responded to the question selected “Yes” that the facility had been helpful to themselves and their

parents. 40 out of 55 (72.72%) wanted to continue being involved in having their parents receive their draft writing subject work by email for their parents to be an authentic audience while 41 out of 54 (75.93%) felt it was helpful to have their work emailed.

The number of students who selected the two lowest frequency responses of Almost Never and Seldom for how often their parents saw their work decreased from 20 to 13 while the number who selected Often and Almost Always for the same measure, more than doubled from 15 to 32 when comparing the frequency parents saw their writing before the research and after it. While there was a substantial increase in parents viewing their children's work, there was only a negligible increase in the students' perceptions of how often their parents would help them with their work. This fits in with the written responses and interview data where children mentioned they were not sure that their parent received the work as they didn't discuss it with their children. 14 students checked the box for the statement, "My parents didn't talk to me about my work."

When asked about the benefits of the project, 26 of the 65 respondents agreed that their parents were now more involved with their school work while just over half of the students (33) checked the box to agree that their parents talked more about their work since the project was running. More than half the children (36) responding agreed that it was helpful to have someone other than the teacher to view their work while 26 of them considered that their parents were now an audience for their work. More than two thirds of respondents (43 out of 65 or 66.15%) selected the response that it was good for their parents to see their work during the school term rather than only at the end of semester, when only a sample of their work would be collated into a portfolio and sent home with their semester reports. An even larger number (46 out of 65 or 70.77%) chose the response that their parents were now more aware of their strengths and weaknesses in writing.

Considering the section devoted to potential disadvantages of emailing student work to parents, the greatest response (25 of 65 or 38.46%) was to the suggestion that the students could feel a little embarrassed by their parents seeing their work. This

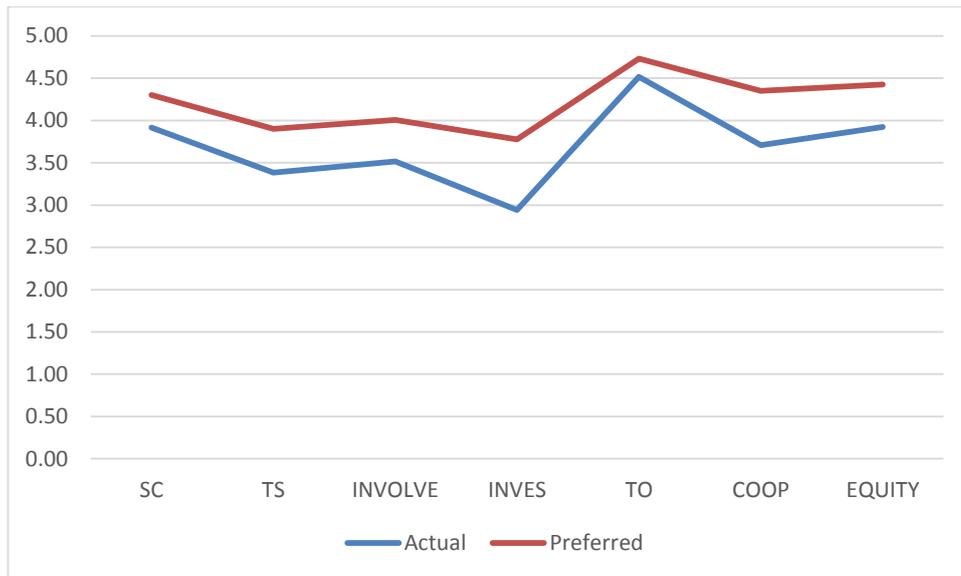
response was also noted in interviews where a number of students commented along similar lines and where some students noted that they tried to work more neatly knowing their parents would see their work. This is interesting in the light that they decided to work more neatly for their parents but didn't consider that this should be the case when writing with only their teacher viewing the work. 12 of the students (18.46%) felt that it was time consuming to be involved in the project and the same number selected the response that they weren't sure what to do.

4.7 Teacher quantitative and qualitative data

Following the students' completion of the WIHIC and TROFLEI questionnaires and the compilation of the results in Excel (Microsoft 2010), a feedback session was arranged with each teacher to present the amalgamated results in a graphical form, along with annotated questionnaires where the difference between the class mean for the actual and preferred versions of the WIHIC and TROFLEI were presented. This method of feedback gave the teachers a graph of the average of their class' responses for each scale with the two lines representing the actual and preferred class means for each scale. They also received a graph which showed the class mean for each question so that they could quickly see where there was a marked difference between the actual and preferred responses of their class.

Complementing the graphs, annotated copies of the WIHIC and TROFLEI questionnaires were also given to the cooperating teachers so that they could see the average class response for each question. Differences between the Actual and Preferred scales (all of WIHIC and Computer Use in TROFLEI) which were 0.5 or greater were highlighted for individual questions. While the figure of 0.5 was, in a sense, an arbitrary figure, its choice was determined by the number of questions which had a difference of greater than this level. If a lower difference had been chosen, there would have been far too many questions for the teachers to contend with and it was believed that this would be detrimental to the feedback process.

Figure 4.2 Example of feedback graph to teacher



As the research project was conducted towards the end of the year in the classes, it was not feasible for the teachers to make significant changes to attempt enhancing their classroom learning environments in the light of the survey findings. However, the cooperating teachers took note of the student perceptions and did implement some changes to their classes in the following year. For example, Frank noted that there had been differences in the way that the boys in his class felt about the level of teacher support compared to the girls. The boys perceived that the teacher supported individual students in the class less than what the girls' perception was. A study by Jules and Kutnick (1997) conducted in the West Indies among over 1756 students, found that student gender played an important role in their perceptions of a good teacher. For example, female students identified more of what Jules and Kutnick (1997) termed 'good teacher concepts' than males, while males showed greater concerns with teacher control and use of punishment. It was only the 16-year-old males who felt that males were good teachers. In a recent longitudinal study concerning girls' and boys' perceptions of their mathematics teachers' beliefs and classroom learning environments, Lazarides and Watt (2015) report that girls perceived their teachers had lower ability expectations for their success in Mathematics than boys did, ultimately affecting the career intentions of girls. Lazarides and Watt (2015) hypothesised that boys and girls perceived their mathematics teachers' beliefs differently and this had an impact on their perceptions of the classroom learning environment.

An earlier unpublished pilot study conducted by the researcher noted a similar pattern to that of fellow teacher Frank noted earlier. In the pilot study, which also used the WIHIC questionnaire, the boys' perception was that the girls received greater teacher support than the boys in a classroom. When interviewed, the boys revealed that they felt they either didn't need as much help as the girls or that they wanted teacher support but didn't want to ask for it as such behaviour wouldn't look good in front of their classmates. The researcher adjusted his teaching style to offer support to the boys in a different way so that they would not be seen to have to ask for assistance as it was given in a much less obvious or obtrusive manner, increasing the boys' satisfaction that they were receiving the help they needed without embarrassment. Frank also adjusted his methods of offering support to the students in his class to provide less obvious support where it was needed.

In the individual interviews, the teachers were asked questions mainly concerned with the effectiveness of the writing component of the research. As so many students in each class had not been participants, it was difficult for them to gauge the impact of the research project on the classroom learning environment, something the student participants also noted. Two colleagues of the cooperating teachers, Simon and Graeme, were very interested in the project and added some of their insights to a number of the research areas.

The question asked of teachers was, "What impact do you think an audience (ie. people beyond the teacher and fellow students, people such as parents, grandparents, etc.) has on students' attitude to writing tasks?"

Every student is different. Some are very motivated themselves and just want to always do their best. Others just complete their written work and get it finished. They may have the desire to write or they may not care at all. One thing I can be sure about is that students perform better if they know the teacher is checking and marking their work. They try even harder if they know their parents are showing interest and seeing their assignments. Their attitude will change and they hopefully will want to edit their work and finish it. Sandra

Attitude to writing with family varies on the relationship. Busy parents seem to have a negative response from students as the task is geared to time and getting the task done and not quality. With fiction writing, students are geared to entertain the reader and not just themselves. The reader or audience are to be understood as receivers of the student's text, not just a reader of information. The audience are to be entertained or taught with descriptive sentences and characters are to share their emotions. Simon

Sandra noted that students perform better when they know their teacher is checking their work and that the students try even harder when their parents show interest in the work. She later made a further comment which was very insightful on how parents respond to their children's work.

The influence of parents is a major influence. It can be harmful if they respond badly to their writing and say it is not good enough but usually the parents' comments are positive and will motivate the student to achieve higher. Sandra

Here Sandra noted that, through responding negatively, having parents involved can have a detrimental effect on the teachers' intended goals of improving children's writing. However, Sandra further noted that usually parents commented positively with a corresponding positive motivational boost for the students.

Frank, Simon and Graeme were asked about the ways they get parents involved in their children's education and the impact it makes. The question was framed in the context of research into parent involvement, as mentioned in the literature review.

Lots of research says that if parents are involved in their kids' education that the educational outcomes are improved for those kids. Are there any ways you get parents involved? What sort of impact on the students do you think it makes?

Parental involvement in their children's learning is crucial. As their first educators, parents cannot just "palm" their children off to the school and "wash their hands" to further academic responsibility. The school exists to work in partnership with parents. Parents need to be actively involved in their children's learning for two main reasons; firstly because it adds value and meaning to their children's learning tasks (the task must be important if Mum and Dad are taking such a keen interest) and secondly because it enables the parents to build stronger relationships with their children as they take an interest in their academic journey. Parental involvement does not necessarily require the parent to be in the classroom during the day. Effective parental involvement can be achieved through reinforcing concepts taught at school, having a discussion with their child where the child verbalises concepts they have learned throughout the school day, extending their child's understanding of a particular concept by visiting the local library together, watching a video together or Googling extra information on the topic together. Keeping regular contact with the teacher with regards to their child's progress or needs, via e-mail, diary or face-to-face contact, is another effective way parents can be involved in their child's learning. Frank

Parents come in to help with listening to reading and assist with reading groups. When the parent is grouped with their own child, the child is in every case more motivated to achieve well. Generally I find that the parents who do get involved are parents of students who are general all round achievers. Graeme

Parents are informed by weekly email – containing spelling words, memory verse, times table practice and paragraph writing. The bulk of homework is completed and signed off by parents. Parents are invited to work with small groups in reading and mathematical activities in the classroom. Parents are informed of themes for the term and major assessment dates. Parent involvement is beneficial to the support and

extension students. The middle group students seem to work on a steady continuum of improvement with or without parent involvement. Simon

Each of these teachers noted the benefits of parental involvement, with Frank saying it was 'crucial' in student education. Frank and Simon stress teacher communication with parents as an important factor in having parents involved both inside and outside the classroom. Interestingly, Simon felt parent involvement particularly assisted students who needed support or extension while parental involvement made little difference to the so-called 'middle group'.

Following on from the question on parental involvement, the teachers were then asked about the impact of an audience on student performance in writing. They were asked, "What impact do you think an audience has on students' performance in writing tasks?"

If there is an audience for students when they write, their performance and work standard will be higher and they will do above what is required. It is a rare person who doesn't like an audience and especially for children; they thrive on approval and attention. Sandra

Having an audience (beyond teacher and fellow students), for writing, gives purpose. And purpose makes writing more meaningful. If the students feel that they are only writing in order to achieve a good grade, then the writing becomes a mere "mechanical" exercise. However, if they can see their writing has a purpose other than to be graded, seeing it as a means of communication or entertainment, then the task takes on new meaning. In such instances students can see the need for proof-reading and self-correcting spelling, punctuation and grammar. They have a better understanding that their "published" work needs to be error-free in order for their audience to enjoy it more. In my own classroom, a good example of this would be the students designing, drafting and writing picture books for their Year 1 buddies. The students understand that their finished work needs to be language appropriate, visually pleasing and

captivating as a narrative. It helps them to become better writers when they are aware that their audience is real. Frank

If the audience is seen as a receiver of information from the student then their performance changes as writing has a purpose. The students need to understand who that audience is. This is a major task that takes all year. Simon

Most of the writing in Year 4 is the students own struggle to meet the challenges of spelling and grammar conventions, however some students (about 25%) do attempt to use techniques to engage an audience. The method that I use the most is peer reading and listening sessions. Sometimes the whole class listens in too. This enables the low achieving writers to experience how powerful writing can be. With some particular students audience is crucial, but probably only about 20% for the reasons mentioned above. About half the students love sharing their created texts with the rest of the class, the other half are reluctant due to confidence reasons. Graeme

Both Frank and Sandra acknowledge that having an audience for student work has an impact on the students' attitude to the task and on their performance. Sandra noted that students work harder when they know the teacher is checking the work and that they work harder still if they know parents are taking an interest and seeing their work. Frank felt that the school teacher works together with parents in each student's academic journey and that parents can't just rely on the teacher to be solely responsible for student education. He is happy for regular contact with parents, initiated by teacher or parent via various means, including email, so that parents are involved more fully in their child's education.

Sandra felt that the students did more than what was required when they knew they had an audience while Frank felt that knowing there was an audience, the students saw the task as having meaning so they took greater care to ensure the work was free of errors, helping them to become better writers as there was a real audience for their

work. Simon too felt that a sense of audience was important for students so that their writing had a sense of purpose but he felt that this sort of understanding takes the year to develop in his classroom. Graeme, commenting from his experience with a Year 4 class felt that 75 – 80% of his students were concentrating on getting grammatical and spelling skills on paper so they didn't really concentrate on audience when they were writing. However, he did feel that audience was 'crucial' to about 20% of his students.

The researcher felt it important to frame the research on student development in writing by asking a broader question on the actual teaching programmes employed by the teachers. They were asked, "How do you structure your teaching programme to develop students' writing? (Eg what activities do you engage the students in, how do you try to lift their performance and attitude to writing?)"

Motivation is the most important part of teaching student's writing. It is so important to arouse their interest and get the students excited and want to write. It is important that they have heard something that will make them want to pick up their pen to write. So it is important that everything is ready so they can immediately start writing and not have to get a pen from their desk or find their writing book. If the students are told that their work is important, it is being marked and will be shown to their parents, this will definitely motivate them too. The choice of topic is also important. It needs to be relevant and of interest to the students. Video clips, etc. are invaluable. Using the interactive whiteboard screen to teach methods and to use programs such as "Targeting text" or "Create your own story" are motivating programs. There are many inspiring computer programs to use so we do not have to just listen to the teacher's voice to explain the writing task. I also allow the students to discuss their ideas with another student to compare ideas and make suggestions. It is good to read out examples of the students' work to the class so they can hear other student's work and also feel proud of their work. There is no need to over emphasise the grammar and punctuation during their writing as you don't want to stop their train of thought. When their writing is completed it is very important to edit their written work. Sandra

Students are coached into understanding that the writing strategy is the same for every learning area. This is to avoid confusion in the students as for example we move from English to History to Science. This reinforces a confident attitude in writing as they are well aware of expectations. Each writing activity is based on the audience not having the question or text to read from. Therefore students must provide full sentence answers that have the questions written into them. Students are coached that this is what happens to good writers in High School and University. Students enjoy the prestige and feeling of using strategies used by future grades at school. Students have the attitude of detectives and lawyers that seek out meanings and this provides a 'buy in' to motivate students when writing. With fiction students investigate author devices to add life to characters and to make meanings of emotions. Students are encouraged to entertain the audience with colour, emotions and descriptive text when writing. The audience is not a flat reader but are seen as a receiver of the students' information. Simon

Short paragraph writing sessions. This focusses on quality rather than quantity. Weekly paragraph for homework. This develops student's sentence skills and editing skills, and parents can get engaged in the process. I try to monitor regularly and give an indicator of expected 'grade' and what is needed to improve the 'grade'. I even ask the students to grade their own piece of writing, even if it isn't an assessment. This may seem high pressure tactics, but it does motivate all students to aim for higher standards. I also encourage peer monitoring and editing. Regular reading and listening sessions. Students read out their samples. I praise students and other students can feed off this positive energy. Graeme

The cooperating teachers and their colleagues are using a variety of approaches in their classrooms to encourage the development of writing. Sandra uses technology to engage or motivate her students while Simon encourages his class through considering their practices as ones used in high school or beyond. Simon is mindful of audience,

something that was also picked up by Graeme where his weekly set homework engaged parents in the tasks.

The cooperating teachers were asked what thing they might do to change or enhance their classroom learning environments, given the context of being presented with the learning environment survey results. Sandra and Frank both noted areas where they could begin to make changes to enhance the satisfaction of students in their classes. They implemented these changes and altered their teaching practices.

The question they were asked was, "What things might you want to try, adjust or modify to enhance the learning environment of your classroom?" This question was followed up with seeking their opinions on the differences in the students' actual and preferred perceptions of the classroom learning environment where they were asked, "How do you see the differences between the actual and preferred perceptions of the students?"

Students prefer to use the computer. They also prefer to have an easier way of doing things too and make everything they do enjoyable. It is good for teachers to try to help these perceptions but life is not like that and not always easy and fun so there needs to be a middle practical point. I have tried to include peer tutoring in my teaching style as the students said in the survey they like to help each other and learn from them. Also peer participation in all activities is an effective method. I also include a lot of group work. Using computers as much as possible is a priority. I try to get across the importance of writing and how you need the skill for future life, try to develop a love for writing and I now use the computers as much as possible. Sandra

I suppose there are some students who are more willing to share ideas during class discussion time than others. I do try to have a lot of discussion times but it's usually the same group of students who come forward with opinions whilst others prefer to sit quietly in the background. I have no issue with that as I respect that not all students enjoy being put on the spot

or being in the spotlight. I suppose the one thing I have changed in my administration of discussion times is that now I might, from time to time, call on a student who doesn't usually contribute to discussions, by name, to answer a simple question or give an opinion on a simple issue. I do this, not to embarrass the student, but to help them develop confidence in their abilities. Another thing I might do is to ask the quieter students to read aloud a class text we are reading together (eg. a class novel leading to activities such as writing book reviews etc.) - this way the students aren't feeling pressured to express an opinion on the spot but are rather "following a script". I also include a lot more group type activities these days. However, I find this more difficult to manage as inevitably some students work harder than others and marking becomes an issue. Generally, I tend to control the activities as I find time is short and the curriculum is large. Frank

I have begun to move away from saying "I'm available to help anyone who needs help" and then leaving it up to the students to come up. There are usually plenty of students who request help - but there are some who are very reluctant to ask. When there is a quiet moment in the activity I will call these students to my desk to check their progress. Generally though I will give priority to the students who request help. Frank

Kids are kids and I think they can't fully comprehend the enormity of the task the teacher faces in managing a classroom. In the end, in their minds, it becomes all about them and how much attention they are receiving. The fact remains that the teacher can only do his/her best when trying to meet each of his/her 32 students at their point of need. Frank

Frank and Sandra are both very experienced, dedicated teachers. Each of them has worked at the school for over 20 years and they are highly respected by the students, parents, staff and administration alike. This was the first time they had taken part in a survey like this and it is to their credit that they then acknowledged the feedback from the student surveys to consider aspects of the classroom learning environment they might address to enhance their already productive, cooperative, learning-conducive

environments. Sandra decided that she would introduce more peer tutoring, group work and allocation of time where students could use the school computers, laptops housed on trolleys that could be wheeled into the room. She included more time where the students could discuss their work with their classmates and used programmes available on the school computer network so that the students didn't just get teacher input but a variety of input from different sources. These changes were made in response to the student survey results. Likewise, Frank made some changes to his very productive class in consideration of how students expressed a desire for greater involvement. He introduced much more group work and developed strategies to include quieter students into class discussions, further enhancing the learning environment of his classroom by having the students involved to a greater extent.

4.8 Parent survey and interview data

All parents who took part in the research project were sent a researcher developed survey by email to complete at the end of the project. Of the 65 parents sent the survey, 14 (21.54% of the sample) responded. Every parent that responded agreed that having their child's work emailed was helpful, felt that the process was helpful to the parent and child and wanted to continue to be involved with their child's writing in this way. Table 4.9 summarises the parent responses to the survey questions.

The survey results demonstrate significant support for having a system to provide parents with access to their children's writing work so that they are more involved in their children's education as an audience for the work. Of the 14 respondents to the survey, ten selected responses of 'often' or 'almost always' on how often they saw their child's work since implementing the research project. This contrasted markedly with the prior to the project where only one person said they saw their child's work often, with five selecting 'sometimes', five more choosing 'seldom' and three selecting 'almost never'. This demonstrates a marked change in the before and after responses to viewing of student work. Ten of the 14 parents also said they would like to see their child's work 'almost always', a response which shows that parents are interested in receiving regular instalments of work from the classroom.

Table 4.9 Parent survey response summary

	Almost never 1	Seldom 2	Some- times 3	Often 4	Almost always 5	Average
Prior to this research, how often did you see your child's writing?	3	5	5	1	0	2.29
Prior to this research, how often would you help your child with her/his writing at home?	1	4	8	1	0	2.79
Since this research project, how often did you see your child's writing?	0	1	3	9	1	3.71
Since the research project, how often would you help your child with her/his writing at home?	0	2	7	5	0	3.21
How often would you like to see your child's school writing?	0	0	1	3	10	4.64
What benefits have you noticed since receiving your child's work by email? (Tick all that apply)						
Opportunity to interact with child with their learning.	10					
Greater involvement in child's learning.	7					
Provides the child with an authentic audience.	6					
Good to see child's work during Term, not just at end of semester.	12					
Greater awareness of child's strengths and weaknesses with writing	10					
What disadvantages have you noticed since receiving your child's work this way? (Tick all that apply)						
Not sure how to help.	3					
Difficult working with child.	1					
Technology problems.	0					
Time consuming.	1					
	Yes	No				
Has this process been helpful for you and your child?	14	0				
Would you like continued involvement in	14	0				
Do you feel it is helpful to have the work emailed?	14	0				

When offered suggestions of potential benefits and disadvantages of emailing student work home, the majority of responses were for the positives of the system. 12 of the 14 responses listed having access to student work during the school term and not just at the end of semester was a benefit of the system. Ten respondents selected that the opportunity to interact with their child and the child's learning was a benefit and an equal number also selected the response that the system brought a greater awareness of their child's strengths and weaknesses with writing. Only five responses were for disadvantages of the system with three of these being that the parents weren't sure how to help their children.

The survey also included a question on their child's performance and attitude with writing and if parents had any other comments. Several responses were received and are presented below.

Qn. What impact do you think having the student work emailed had on your child's attitude to writing and performance in writing?

Yes, it definitely did. When Darren knew I was onto him, he would perform better. For my daughter, I don't see her work terribly often. I give her help through assignments and things but there's not terribly many assignments that come home at Year 4 level. Evelyn

Positive feeling that mum was reading work. Warm and fuzzy feeling, son liked the work going home but wanted to make sure not too critical of work, particularly grammar. Role not to correct work but to provide the understanding that parent was interested in work. Chene

He was proud when I discussed it with him. Elsa

He has been more conscious and seems to put in more effort. Emile

She was excited about the fact that we would see her work and so she would put more effort / attention into the work so achieve her best work for us to see. Rachelle

She realises that her work is sent to her parents and then put more effort in her work. Carolyn

I am not sure it has changed her attitude at school when it comes to writing, but I do know it gave her confidence and her whole self a boost to think we were sitting down and taking the time to look at her individual pieces of work one at a time and the focus was on her which I think was a good thing. Peta

The fact that he knew I was getting a copy of it made him try a little harder and we were able to discuss a few issues, especially handwriting and letter composition. Faith

I don't think Jay is affected by us seeing his work often. Marilyn

Knowing that his parents was taking note of his work, was a pleasant surprise to him, and good motivation to improve effort. Laurel

The child should make more conscious efforts to perform better in his classroom tasks knowing that the parents are not happy with any substandard works they produce. They will also need to respond to their parents' questions regarding their classwork at home. Sabrina

From the above parent comments, it is clear that parents felt having student writing work emailed home so that they then became an audience for that work had an impact on the students, particularly in the affective domain. Some saw it as a motivator to greater effort, something the students also acknowledged as a response to the innovation. Others saw their children being pleased that their parents were taking an interest in their schoolwork with one parent saying her daughter was excited that her parents saw her work and so put in even greater effort, with greater effort also being stated by a number of other parents as a results of the project. Some parents acknowledged a benefit of having the work emailed home was that they could sit with their child and discuss the work with them, showing real interest in each piece of work and giving her child a greater sense of confidence and self-esteem. Other parents didn't notice a difference in performance or attitude while another parent noted that her son didn't want her to be too critical, particularly of his grammar, so she felt her role was not to correct the work but to show that she was interested in his schoolwork.

Parents were then given an open opportunity to express their perceptions of the research project by asking for any other comments.

Qn. Any other comments?

I enjoyed receiving my child's work during the term, because I could see her strengths and weaknesses. It was nice talking to her about the work because Adrienne can sometimes be very closed up about her day. I would really enjoy it if the teachers would send some work home to the parents.
Carolyn

It is time consuming but a great way to know what they are busy with as his comments when asking about school is always I can't remember or they did nothing, he is lazy to talk about school. Elsa

Opened up communication between us (parents) and child about her learning style. Rachelle

It was a great indicator of whether kids enjoyed the subject, learning opportunities centred around what kids were learning, see the teacher comments and whether the teacher thought they were doing OK. Enjoyed the interaction, opened up more opportunities for talking about school without being nosy, it gave talking points and gives an idea of where kids are at and where we can help. Chene

Great way to keep parents involved. Adrian

It was good to see his work that was unedited. Quite often the only work you see throughout the year is work that is in their portfolio. There was value in seeing work as it was in progress, so it could be discussed.
Christine

I think there were only positives. It did take up some time but when the email came through, if things at home were busy we came back to it at a later point when there was time to sit down and chat about it. I don't feel like it took a huge amount of time/effort and the time it did was all positive so thanks. Peta

Emailing saves a lot of paper for one and considering that my son is forgetful and doesn't take care of a lot of paperwork that comes from school this was a perfect solution. It also adds a bit more focus on the use of technology I guess. Faith

Understanding child's thought pattern better and the way he writes without me. Laurel

It is good to be able to be updated of my child's learning as frequently as possible. It is beneficial to help in correcting the bad habits at an early stage and facilitates learning. I find no disadvantages in this way of receiving my child's school progress. As both the child and the parents gain understanding of the child's learning and progress, this will help to improve and extend if necessary for the child's benefits. Through this way of frequent communications, parents are able to work with the teachers to help the child to progress in learning appropriately. Overall, a very worthy project. I have enjoyed getting updates about my child's work and to correct and input into the learning area. Besides, it is good to know what the child is learning throughout the year and not just being informed at the end of semester. It will give parents peace of mind by being informed throughout the school term. Sabrina

Parents spoke positively about the project when given an open-ended opportunity to add any comments they chose to. One of the major benefits some parents commented was that having the work emailed opened up communication channels with their children. Carolyn, Chene and Rachelle all mentioned this while Elsa thought it was a great way to understand what her son was doing at school since he didn't inform her of the work he had been completing at school. Two parents wrote that it was time-consuming but that the time spent was positive. Faith noted a benefit in that her son didn't take care of his schoolwork so having it emailed "was a perfect solution" and saved paper. Adrian thought it was a great way to keep parents involved in their children's education while Christine raised an important point in that she thought it

was good to see unedited work, rather than just the portfolio which came at the end of each semester, so she could discuss her son's work with him. Being kept regularly updated was seen as another aspect enjoyed by parents receiving the work this way. Sabrina commented on this at length when she said, "It is good to know what the child is learning throughout the year and not just being informed at the end of semester."

Eight parents (over 12% of the participants) were interviewed to elicit further information on their perceptions of the efficacy or otherwise of the emailing system for classwork. The questions started off with a general one on what the parents felt were the best ways to use technology in the classroom.

Qn. What are the best ways to use technology in the classroom?

I think technology in the classroom is important and I also think that teacher training to use the technology, especially the Interactive Whiteboards is really important as they add a whole new dimension to the classroom and the kids can interact with the technology with the teacher as the guide on the side. Evelyn

Individual devices used by teachers and pupils in enhancing their learning is the way to go. Adrian

I believe technology is a must have in today's classroom. It is a tool that teachers can use as well as the students. From a parent's point of view outside of the class room technology can be used to communicate to us more effectively, quickly and enable more info to be passed across. Peta

I think every child in the classroom should have a laptop or iPad on their desk by Year 7, if possible, because I think it's an added tool to learn, especially for visual learners, where things in computer programs catch the eye; that's going to assist the learning, and that way it makes projects so easy then, doesn't it, as all the projects are online and everyone is doing their work on the computer anyway. None of the projects are written

anymore so they're all going to be easy to upload so that it's easy for parents to see, it's all in the one spot and you don't have to find a million bits of paper. It's easier for the kids, especially the disorganised kids, to keep everything together. Take away all those things that are hard to manage and you can concentrate on learning, so your results must improve. Chene

For instructions, clips and illustrations as well as for programs that consolidate learning. Christine

Technology would best be used in the classroom to facilitate and advance learning through research, through use of internet technology. Also communications like live debates and discussions using video-conferencing to exchange ideas and interact with other student and teachers. Emile

For children today, new technology is an essential part of their lives and they have to learn to use it in the class. Carolyn

To teach, explain, demonstrate and illustrate complex concepts and ideas. It also helps children to remember the subject and concepts better. Sabrina

Of note here is that the parents felt that technology was a part of everyday life and therefore that students needed to use technology in the classroom and to learn technological skills at school. Technology would be used by teachers to enhance student learning through setting research tasks, organising instructions, presenting clips and providing illustrations which students remember more readily. Some parents felt that technology also provided for enhanced opportunities for communication with parents. The parents interviewed all had a very positive view of technology, some insisting that each student should be equipped with a laptop or tablet style device for their school experience.

Following on from the general question on technology use the next question was also technology related. This research project used email as the main method of communication with parents so parents were asked how they felt about using this method of communication with teachers and their perceptions on other electronic communication methods. In this particular primary school, the main method of communication was by hand written notes in the student diary, with parents and teachers responsible for checking the communication channel each day. Email is used to some extent but the administration mandated official method of communication is through the student diaries. Staff and parents are beginning to circumvent this method as email is more direct and doesn't require a child to bring the diary home each day.

Qn. What do you think of email communication with your child's teacher? What do you think of other forms of digital communication – for example blogs, wiki, secured website.

Email is a vital way of keeping in touch with the teacher. I think especially when you can have unit plans, test dates emailed to you, I think it's a vital part for the parent and the student. Like, particularly with my son he thinks, "If I don't bring the unit plan home, Mum won't know I need to study X, Y and Z. I can just email the teacher and get a prompt response. I would rather have more communication with the teacher this way.
Evelyn

Emailing is fine and obviously speedy, but just as happy to have work sent home via paper copies on weekends to look at or help with. Layne

Email is great. What the school has going at the moment with the student tasks where we can see their marks, if that could be stretched out and you could see the actual documents the kids are producing, like when Mack's work was emailed home, that would be better. Having the work available online to look at is an extra tool for parents and for kids the help themselves in their learning. Chene

I don't use things like blogs, I probably should but I don't at the moment. I find the school's new parent portal to be very good as I can go in and check my child's progress. Instead of just getting the semester report for each subject, I can see his progress as he goes along and if there's a problem you can make an appointment to see the teacher. Part of the problem with the system is that you have to go into it to find out information; if there was an alert to prompt you to go in to have a look, that would be good. Evelyn

Any form of controlled communication can assist the learning process. Adrian

I think email can be a quick and effective means of communication with the teacher. It is my preferred option as opposed to writing in the diary. I don't really think the other examples of blogs and wikis would suit myself as I don't use them or view them so I don't really have any opinions on them at this stage. Peta

Emails are good because the expectations of what they are asking or informing are clear but it can be a bit impersonal. I would personally prefer an email but if student was able to publish to a blog that would be OK. Christine

Communications through email would be good for general information with my child's teacher. It would also save time when passing important and urgent messages back and forth. Also, I feel that blogs, wiki and other discussion forums are an advantage as they offer an opportunity to ask questions, make suggestions and exchange views about the child's learning and development. Emile

Communicating with email is great. I am not too up to date with blogs or wiki but if the teacher uses that form of communication I will learn to use it. Carolyn

Email is very useful as it gives both the parents and teachers the convenience and flexibility of time to communicate. I think a secured website will even offer a more detailed form of communication. Sabrina

Parents were very positive when it came to discussing email communications with teachers with acknowledgement that it was a speedy form of communication, convenient, flexible and able to save time. A number were also interested in other forms of communication utilising ICT such as blogs and wikis and the newly implemented school portal. This portal allows access to course overviews, test dates and student results. In the primary school, this is limited to English and Mathematics courses while in the secondary part of the school, each subject has an online presence available for parents to see the grades their children were receiving in each of the subjects they were enrolled in. From the parent interviews, parents clearly expressed that they wanted access to more information about their children's education than the school was providing. The next question brought the focus towards student writing.

Qn. How valuable do you think it is for your child to have an audience beyond the teacher for their efforts in writing at school?

In primary school, I think that would be very valuable. Seeing the writing in draft form is very valuable as I could say to Darren, I could go through his work and say, "You need to do this differently," so it would be good to receive it by email in the drafting process. Before, I wanted to be involved but I couldn't access his writing in the drafting stage and it would have been valuable if I could have seen things in draft process and the preparatory drafting stage and to actually give him a bit of a pointer. Also, if my kids knew that I was going to see it, they would put in a greater effort with their work. Evelyn

Yes - I think it is valuable but this can be done through technology as well if things are shared. Adrian

I believe if they know they have an audience beyond their teacher they would probably put a lot more effort into that work so it would be of value. But in saying that it might not be like that for every child. Of my three children I know it would affect the way two of them performed and they would put more effort in, but the third would not really be affected and the quality they produce the same whether they have an audience or not. Peta

For many writing tasks it is a good motivator for the student to know others will be reading. Christine

I think it is extremely important for my child to have an audience beyond the teacher for their efforts in writing at school. In order to improve, the more effort and encouragement, the better for the child. I feel my child takes his school work more seriously if he sees that I am interested in what he is working on. Emile

If Adrienne knows she has an audience beyond the teacher, I am sure that she is going to put more effort in. Carolyn

It helps my child to make extra effort to perform better in class knowing that we will be monitoring his work. Sabrina

This question directly related to the crux of the research in that ICT was providing the means for parents to be an audience for their children's work, enabling the opportunity to discuss the work and potentially to collaborate with their children, while the work was in the process of drafting. Each of the parents interviewed expressed that having an audience beyond the teacher makes an impact on children. Emile felt that by him showing interest in his son's work then his son took the work more seriously while having the work available also meant that Emile could offer encouragement for his son's efforts. Christine, Carolyn and Peta saw the benefit in terms of motivation and extra effort as their children knew others would be reading their work while Sabrina also noted extra effort being put in as her son knew his work would be monitored. Peta

noted that having parents as an audience would influence two of her children but the third wouldn't be affected. This was because she knew that Olga always did her best and was achieving at a very high standard. Of note here for teachers is that these parents are noticing extra effort being put in when the parents are viewing the work while the same isn't being said of the teachers viewing and monitoring the work.

One of the central themes of the current research was to consider the effect of having parents as an audience for their children's writing. The researcher asked parents about their perceptions on whether increased involvement would help student performance.

Qn. Do you think more regular viewing by parents of their child's work and communication with the teacher would help their performance at school? Explain why or why not.

Yes, more parent involvement as part of the team along with the teacher can only help. Adrian

I do believe more regular viewing of the child's work by the parent could help their performance as we would have more understanding of our child's growth and performance and understand where our child is at and whether they need extra help from us a parent. As a parent I sometimes view work and don't really know whether to be proud and pleased, or not, as there is nothing to compare it against like other work of their own or how they are performing relative to the rest of the children. I am not saying we need to see all the other children's work or results, but having a marker or average to work against would sometimes be beneficial. With Olga I am aware that she achieves quite well in the classroom and that is mainly due to the fact that over the years her teachers have to my face told me and commented. However, with my younger two I see their work, their reports but don't really know how they are doing and whether there is room for improvement to help their performance. I am not sure if this is because they are in the lower levels of the schooling system still. Peta

Yes because the student would see that the parent is interested as well as it being a motivating factor in the case of a child who sometimes underperforms. For many writing tasks it is a good motivator for the student to know others will be reading. Christine

I feel that regular viewing by parents of their child's work and more communication with the teacher would help improve performance. This is because parents can identify the areas of weakness and work together with the teacher in a teamwork effort to help the child improve in their school work. Also, teachers can give useful feedback and suggest areas where and how parents can help the child to improve on their performance. Emile

Yes, it will help. Parents are sometimes in the dark with what their children's shortcomings are, and communicating with the teacher will help them solving some problems. Carolyn

Yes, I think it will be helpful because they will be proud to share their work with the parents if they are done well. On the other hand, they will also be afraid to tell the parents if they have been misbehaved or have not been focused in class which will help the child try to do better at school. Sabrina

From the sample of parents interviewed, all felt that regular viewing of their children's work and communication with the teacher would improve their children's achievement at school. Adrian makes a critical point when he talks about a "team" involved in his child's education. Frank, one of the cooperating teachers, also mentioned teamwork between parents and teachers as important, feeling that sometimes parents absolved themselves of any responsibility for their child's education and considered it entirely the teacher's responsibility. Emile also mentioned "teamwork" so that teachers and parents could work cooperatively to address areas students needed to work on to improve their performance at school. Christine mentioned that regular viewing and communication with the teacher is a motivator for the student as it shows the parent is interested in their school work and the student knows that someone would be reading their work. Carolyn felt that at times she was "in the dark" when it came to any

problems her daughter was experiencing with her work so communicating with the teacher would help address any issues. Peta agreed more regular viewing of her daughter's work would help her performance as she would have a greater understanding of how she was achieving at school. However, Peta also made an important point for teachers to be mindful of in that she wasn't always aware of the quality of work expected and that it would be good to have an indication of what constituted average or certain levels of work.

The parents were then asked about the frequency of communication with teachers with some suggestions given.

Qn. What do you think is the best fit for you for communications with your child's teachers? When needed? Every assignment? Each week? Major tests? End of term? End of semester? Work put on secured website?

I would be more of the opinion to have communication more often. In the high school we have the website but if there was something major coming up it would be good to have an alert to remind us of that tests were coming up. For example, Darren goes away to play competitive sport and has missed a couple of assignments. I'd ask him if he had something coming up and he'd say he didn't but then he missed some and then I get a call from the teacher to say he's missed them and I've asked them to send me the schedule but the teachers say he should have that but Darren isn't going to show me that as it might prevent him from going off to play sport. I personally, would like to have more information. Evelyn

Email or website. Adrian

Personally, I would probably like it if each child had some, not all, only important work, tests, etcetera, of their work put on a secured website that we could access as and when we wanted. I feel I often see work way after it was done, so the child has lost a bit of interest in it and not that interested

in it anymore, therefore I kind of lose interest too. Whereas if we got to view it more instantaneously it would be more beneficial. Peta

I would like to see a weekly or fortnightly update along with any work that is completed on computer. Christine

Best fit, work put on secured website and when needed. Emile

Work put on secured website. Carolyn

I would like to see my child's work as often as possible, such as having his works put on secured website and have the flexibility to view at any convenient time. Sabrina

Parents expressed a desire to have their children's work available to them to view at a convenient time for them, with most suggesting that the work go on a secured website on a regular basis. Peta expressed that there is often a long delay between the work being completed and when it becomes available for parents to see, meaning that the child and the parent both lose interest in the work. Consequently, the input a parent could add as an audience for the work has also been reduced markedly, missing many of the positives mentioned by parents and students of having the work available. As Peta says, "If we got to view it (the work) more instantaneously it would be more beneficial."

Having asked parents about their thoughts on technology, involvement and communication with teachers, the researcher then asked about their thoughts on systems schools could provide to address some of the issues raised.

Qn. What systems could the school implement to enhance your satisfaction regarding your involvement in your child's education?

I found that a lot of times when there were excursions, it seemed that there were parents 'in the know' who got to go. By the time the letter came

home, those in the know had already signed up so there seemed to be a core group of parents who went every time with this particular class. There should have been more sharing around. Advertise things more equitably – say something like, this is what we have coming up and we're looking for volunteers, please email back. Evelyn

Interaction through electronic media. Adrian

Secured website showing the work. Also, more access to the classroom from the parents point of view to perhaps come in and view work on display more regularly rather than just once a year at open evenings. I know with in the lower school year, Years 1 and 2, I was able to go in and help on rosters, go in the classroom on a more regular basis which allowed one to view the work on display and the kids enjoy you having a quick look. I am also aware that probably any further systems implemented could mean more pressure on the teachers to do work outside the routine classroom time, so this could take their time away from their normal duties. Peta

A system where parents could log on to see the child's data. Christine

Systems - regular email communications and a secured website that is regularly updated. Emile

Sending some of their work during the semester so that parents can see if the child has problems in certain areas. Carolyn

The secured website with the display of my child's work and the teachers' comments will be helpful as I will be able to discuss with my child about his learning and discuss with teachers when needs arise. Sabrina

Parents here are demonstrating, not just a willingness but a desire for more electronic means of communication with parents. Evelyn expressed a feeling of being left out of

the loop at times so she couldn't attend her children's excursions so she felt that an open system which advertised volunteering opportunities equitably by email would enhance systems and make them more equitable. Adrian, a parent with managerial responsibilities in another school system, considered electronic communication systems as being the way forward for schools. Peta desired work to be put on a secured server so that parents could access it at any time, while still desiring to see her children's work in the actual classroom more often than the once a year open evening. She realised that having student work available through electronic means could create a greater load on teachers.

A factor which Sabrina highlighted was the ability to see the children's actual work with teacher comments. Schools, particularly secondary schools, provide systems for parents to access their children's results electronically during the semester. However, Sabrina points out that it's not just the results that matter but it's seeing the work and the teacher's comments which are important. Carolyn also mentioned being able to see some of her children's work during the semester would enhance her satisfaction with the school while Emile made the important note that seeing work on a secured website would enhance his satisfaction but the website would need to be updated regularly.

4.9 Chapter summary

This chapter presented the quantitative and qualitative results collated in this research and analyses of these results. It presented the validity and reliability data for the learning environment instruments used in the research. As this research was constructed to use a mixed methods approach, the chapter then presented the extensive qualitative data collected from students, parents and teachers. The qualitative data was used to provide further insight into the data obtained through use of the learning environment questionnaires.

The next chapter will present the discussion on the findings from this research.

Chapter 5

Discussion

5.1 Introduction

The previous chapter presented the results and the analyses of the results from the research project. The two learning environment questionnaires used, the WIHIC and TROFLEI, had the results tabulated in Excel (Microsoft, 2010) and then analysed in SPSS (IBM, 2010). The data was subjected to factor analysis to determine if questions could be sufficiently grouped into the appropriate scales to determine if they measured a similar construct. This analysis resulted in the removal of a number of scales and questions until a satisfactory selection of questions remained.

Following the factor analysis, the reliability of the questions was analysed using the Cronbach alpha coefficient. While most scales presented satisfactory reliability there were some anomalous results, particularly when the class means were used as the unit of analysis. These anomalous results, when compared to other research using both questionnaires, could most likely be attributed to the small sample size of this particular research project.

Extensive data from students and parents in the form of surveys, email responses and interviews, along with feedback sessions and interviews with teachers were also presented. The variety of sources for data was utilised so that triangulation of data could be obtained to validate the research results.

This chapter presents a discussion of the results. It is divided into several sections, arranged according to the five research questions.

- 5.2 Classroom learning environment and use of ICT
- 5.3 Student attitude and achievement
- 5.4 Validity and reliability of the WIHIC learning environment questionnaire
- 5.5 Validity and reliability of the TROFLEI learning environment questionnaire
- 5.6 Teacher perceptions of actual and preferred classroom learning environments

This study used a combination of methods to accumulate data. These methods included utilisation of the well-known and highly-regarded WIHIC and TROFLEI learning environment questionnaires, researcher designed student and parent surveys, interviews with students, teachers and parents, email correspondence with parents, ad hoc conversations with students, parents and teachers and feedback sessions with teachers. It was hoped that by combining these methods of data acquisition from a number of different perspectives that the data would present a richer understanding of the topic than could be gleaned if only the questionnaires had been used. The use of a variety of ways to gain information from the students was also useful as some expressed concern that their teacher would see their responses to the surveys. These students were assured that the teachers would only view a summary of the responses and that no names would be attached to any of the accumulated data. Having the students able to submit anonymous responses, if they wanted to, assisted them expressing what they desired. Their concerns were noted and taken seriously.

5.2 Classroom learning environment and the use of ICT

The first research question considered whether there were associations between classroom learning environment and the use of ICT, when ICT provided the students with authentic experiences of interaction, collaboration and audience. The quantitative, and particularly the qualitative results, indicate that students, parents and teachers acknowledge some impact on the classroom learning environment of having the students' parents being provided with student writing through the medium of ICT while the writing was in the process of being drafted.

At the particular school where the research took place, mandated practice was that Year 1 and 2 student work was compiled into a portfolio and sent home to parents each term of the school year, meaning parents viewed it four times per year. For the remainder of the Year levels, including the Year 5 and 6 students who participated in the study, the work was sent home at the end of each semester, meaning work was seen each six months, accompanied by the school report which was also on a semester basis. As a portfolio, the writing work usually consisted of about three or four samples of 'published' work, meaning that the students had drafted, revised and edited, then had

their work revised and edited by the teacher before it was written out again as the 'neat copy' or 'published copy' that the parents viewed in the display folder. Teachers often stapled the draft copies of the work to the back of the published version in the portfolio but this necessitated removing the work from the display folder to view the draft, something that did not always happen and was far too late for any constructive assistance by parents with their children's work.

This present study sent home student work that was in the production process between first draft and final 'published' piece of work. Parents were able to interact with their child concerning their actual writing progress, not just with the final pieces of work which had usually been subject to significant input, revision, and editing by teachers.

The whole cohort of 65 students completed the eight scales of Actual and Preferred questions from the WIHIC and TROFLEI. In each of these eight scales the group mean indicated that the preferred classroom learning environment was more positive than the actual classroom. Table 4.5 shows these results. The difference in scale means ranged from 0.08 for Task Orientation scale through to 1.27 for the Computer Use scale in the TROFLEI. It is therefore evident that the students preferred a classroom where there was greater use of computers. The scales for Actual and Preferred Computer Use also had the second and third highest standard deviations, indicating a wider range of responses to all but one of the other scales in the WIHIC or TROFLEI.

The scale with the greatest standard deviation was also computer related, the Attitude to Computer Use scale in the TROFLEI, where the standard deviation was 1.63. This indicates that there was a wide range of responses to the questions in the scale showing that some students enjoy working with computers but some do not enjoy it as much. Educators need to take this into account, especially as schools move towards 1:1 notebook or tablet programmes where every student has their own computing device. From this study, it is clear that some students are not enthralled with the technology, though the majority desire to work more with computers. Sandra, one of the cooperating teachers, considered the results of the questionnaires and changed her

method of working in her classroom to incorporate more time spent using computers, particularly for writing tasks.

The second highest differential in the Actual versus Preferred responses was in the Student Cohesiveness scale, where the difference on a whole cohort basis was 0.61. This scale considers friendships and working relationships of students in each class. The disparity between Actual and Preferred classroom environments here indicates that while, on the whole, the students feel that their classrooms are more positively skewed on a social cohesion basis, they would actually like their classes to be even more friendly and helpful. It is particularly interesting here to note that the girls scored the classroom environment more highly than the boys (4.08 for the girls, 3.61 for the boys) yet they still preferred the classroom to be even more cohesive as the girls' mean for the preferred learning environment for the Student Cohesiveness scale was 4.29. While the students might desire a more cohesive classroom, one of the teachers commented that students didn't fully understand the huge task it is for teachers to manage a classroom, feeling that the students only thought about themselves and how much attention they were receiving.

A factor evident from the learning environment surveys was that the small sample size influenced the results. It is difficult to draw conclusions from the quantitative data to determine the effect of the research project on the learning environment of each class. A distinct difficulty for the teachers and the researcher was that the number of students participating in the study was a maximum of just over 50% of the class and a minimum of just over 25% in another class. A greater proportion of students participating would have meant that the influence of the study could have been determined more accurately. As it was, the fact that a maximum of just over half the class participating, limited the influence that the study could have on the learning environment of the whole class.

Despite this limitation, student interview data revealed that some students felt the research study did in fact impact the learning environment, mainly in the sense of individual attainment and attitude. One student felt very positively about the research, asserting that it made the students 'smarter' while another from the same class felt that

the class was 'more attentive' and another member of the same class felt that everyone in the class 'started doing better in writing'. Selena noted that in her class 'some people perform better' while Cade thought that having work emailed 'makes people in the class make sure they do their best'. However, the majority of responses from the students suggested that they hadn't noticed any change in the classroom learning environment through participating in the research. One student mentioned that her classroom was 'the same' while another mentioned that the research project 'does not really affect the classroom'. As mentioned above, the small participation rate for each class would be a determining factor here.

Parents noted that they had no real way of telling if there was any impact on the classroom environment. When asked what impact sending home student work by email had on the classroom learning environment, Laurel stated, "I'm not sure but I hope positive." However, Sabrina was more positive when she said, "A slight stimulation to achieve better performance."

One scale on the TROFLEI that caused some issues is the Attitude to Subject scale. There are three negatively worded questions in this scale. For example, 'Lessons in this subject are a waste of time' where students are expected to hopefully record a lower (3, 2 or 1) response to indicate a positive classroom. It is possible that these three questions caused some confusion because of the negative wording and therefore opposite response to indicate a positive. The three negative questions were coded in the statistical analysis in the reverse manner so that a 1 became a 5 and a 2 became a 4. The class mean for Attitude to Subject was 2.90, indicating that the average attitude to the writing classes was less positive. Apart from Actual Computer Use, this was the lowest mean score and was disappointing for the cooperating teachers who put a great deal of effort into providing stimulating and engaging lessons. However, as noted, this result could have been influenced by the negatively worded questions.

There is some qualitative support then for the assertion that the learning environment was influenced by parents having their child's work emailed home. There is quantitative support to assert that students desire to work more on computers and

would prefer an even more cohesive classroom. However, the major impact of the research study was on a more individual basis, as will be developed later.

Related to the learning environment in the sense of parent / teacher communications, the researcher asked parents what they felt about using ICT as a means of communication with teachers. Overwhelmingly, parents spoke favourably about communication using ICT, particularly email. While the official school communication tool was the school provided diary where notes were handwritten by students, parents and teachers, increasingly parents and teachers were using email. Some parents mentioned they actually preferred email to the diaries with Peta saying it was a quick and effective means of communication, Carolyn saying email was “great” and Sabrina saying it was “very useful” because of the convenience and flexibility it offered to parents and teachers. Christine liked emails as well but felt they could be impersonal while other parents felt any electronic communication was good. Layne was happy to receive emails but was just as happy with the handwritten diaries.

A number of parents spoke about newer forms of keeping parents informed about what was happening in classrooms. They liked having subject outlines available on a parent portal along with student results. However, a number felt that just having the results was not really useful and that they would like to see the completed classroom work displayed with the results. Evelyn felt that it was just another thing that you had to login into the parent portal to find information, rather than being sent a prompt to let her know that there was new information available on the portal regarding her children’s progress. When asked about blogs and wikis, most parents hadn’t really used them but mentioned they would be willing to try to come to terms with these forms of electronic communications and presentation of student work.

While there was limited support in this study for an impact on the learning environment of the classrooms, it could be expected that as more students participated in an initiative such as this, there would be a greater impact on the classroom. This is evident in the responses of many students who considered that they performed better in their writing for reasons such as parental encouragement, parental assistance with tasks, student awareness that parents were interested in their work or awareness that parents

were monitoring their work. Students noted that their attitude to the tasks was also impacted and that they put in greater effort knowing that their parents were an audience.

Related to the notion of parents being an audience for student work is the availability of being able to view actual student work and not just grades awarded for the work. Many schools are implementing web-based systems to provide greater accountability for student grades, providing access to parents at any time. However, in conversations and interviews with parents, many expressed that they would like to see more than grades. They considered that it would be helpful to see entire tests or assignments so that they could encourage and assist their children in their endeavours rather than only being able to see the grades and comments.

Some parents noted that they saw education as a partnership between themselves and teachers. For example, Adrian, one of the parents, noted that he saw education as a partnership with the teacher. One of the teachers, Frank, saw his role as supporting parents with their children's education, feeling that education was largely the parents' responsibility which teachers supported. However, this research highlighted that for some parents, they simply entrust their children's education to the school and don't appear to want to get too involved. This area could do with further research to consider how parents want or don't want to be involved with their children in education.

5.3 Student achievement and attitude in writing when parents are an audience

The second research question addressed the major innovation of the current study as it sought to determine if there was an impact on students' attitudes and achievement in writing through having their parents as an audience for their work. When the opinions of students, parents and teachers were canvassed, the overwhelming response was that it made a difference to both the performance and the attitude of students.

In this research, there was no standardised, external measure to determine the impact on student achievement through having parents as an audience for the children's work. Due to the nature of the research, it was always going to be difficult to provide

quantitative verification or invalidation of this part of the research question. A standard measure such as the annual NAPLAN writing assessment would be something that potentially could be used, provided that all variables were controlled so that two different classes, one where work was being emailed and the other where the teacher used traditional teaching methods, were compared in terms of their performance on the NAPLAN writing assessment. This approach was not used in this study as four of the classes taking part were from Year 6, a year that NAPLAN does not test. The Year 5 class that took part in the study completed work after the NAPLAN assessment and so could not be used either. However, this is a potential area for further research.

Given the lack of a standardised external method of assessing the students' performance in writing, the researcher relied upon qualitative data, drawn from the cooperating teachers, parents and students, to determine if there was any impact on student achievement. The data suggests having an authentic audience has an impact. For example, Sandra, one of the cooperating teachers, commented that when there was an audience for the student writing, the students' "performance and work standard will be higher and they will do above what is required." Another of the cooperating teachers, Frank, noted a difference when the students knew they were writing with an audience in mind. He said it gave the students a sense of "purpose" for their writing, meaning that the writing was "more meaningful". Frank quoted the example of a narrative project where his students wrote books for their buddy class of Year 1 students where, because the students were writing with a real audience in mind, "the students understood that their finished work (needed) to be language appropriate, visually pleasing and captivating as a narrative." In these instances, Frank was commenting on the children writing explicitly for an audience, in this case the students' buddy class members in Year 1 at the school.

Students noted that their writing achievement improved when the parents were an audience for their work. A number of students commented that their writing had improved (Cade, Ray, Rhett) or was better (Marcus, Olga, Trent) while others were more specific and gave examples of performance improvements including better grammar (Jamison) and writing longer accounts (Jerry, Lee). Miriam gave reasons for

her writing improving, saying she could think about the next project and so write better. Jamison felt he was able to improve because he could reflect on his work a few days later, find his faults and learn from them. Students also acknowledged the impact their parents had in the project and how this improved their performance. For example, Miriam commented that her mother could help her do better with her work while Ray said his parents tell him how to improve, which he then felt made his achievement in writing better.

Parents too noted some improvements in writing performance through the project, though most commented mainly on attitudinal changes. Rachelle noticed that her daughter was excited that her mother was seeing her work and therefore put in more effort to “achieve her best work”. Sabrina felt that the project facilitated learning and gave her the opportunity to correct any bad habits she noted in her son’s writing.

Parents mentioned that they liked seeing their children’s work while it was in the drafting stages of production. Christine mentioned that it was good to see her son’s unedited work as often all she saw was the work in her son’s portfolio, work that had been subject to extensive teacher revision and editing. She saw value in seeing and discussing unedited work. Evelyn stated something similar, saying it was valuable to see work in draft form. She had wanted to be involved in her son’s education but couldn’t access his work in the drafting stages where she felt she could have given him some pointers. Peta too noted that it was more difficult to view her daughter’s work as she went into Years 5 and 6. She mentioned how she volunteered in the younger age classroom (Years 1 and 2) where she could take a “quick look” at her child’s work in that class while she was doing her volunteering hours but that this was not possible in the upper years of primary school. Hence, each of these parents appreciated having their children’s work emailed as it allowed them to view the educational progress of their children without having to request an interview or try to extract information from their children who didn’t volunteer information. Carolyn expressed this explicitly when she mentioned how her daughter was “closed up” about her day but would talk with her mother about her work when her mother received it via email, allowing her mother to see her strengths and weaknesses.

When we consider attitude towards writing the majority of students indicated that having parents as an audience for their work had an effect. They noted this effect in both a positive and negative manner in the sense that some felt they were being monitored and so put in more effort while others wanted to please their parents and so put in more effort. From both standpoints, the outcome was greater effort being put into the writing task. With comments such as “It (having work emailed) has encouraged me to do my best to make my parents proud” from Cade and “It makes me want to do my very best” from Shakira, we realise that the students notice that they expend greater effort knowing their parents will see their writing very soon after it has been worked on in the classroom.

A number of students were asked about who they felt they were writing for when they composed work in the classroom. There was a variety of responses but four of the six students who answered included the teacher, either as the only person the children were writing for, or they added themselves into the picture to say they were writing for themselves and the teacher. Jonathan noted when asked about his attitude to writing that “It makes me feel better because someone, other than my teacher, will see my work.” This sense of audience beyond the teacher seems to be an avenue for greater satisfaction with the writing task.

However, as mentioned earlier, approximately a third of children responded that they didn’t realise their parents were receiving their work as it hadn’t been discussed with them. This is despite the fact that the students had been told by their classroom teachers about the project and their parents had consented to the research. For unknown reasons 20 students hadn’t had their work discussed with their parents. From this we realise that parents are often very busy people who for many valid reasons don’t commit further time to their children’s education. Whilst perhaps disappointing for teachers, this is the reality of trying to increase parental involvement in education – parents will choose to be involved or not depending on their circumstances.

5.4 Validity and reliability of the WIHIC learning environment questionnaire

The current study set out to determine the effect of using a programme to provide parents the opportunity to be further involved in their child's education through becoming an audience for their writing work. Due to the nature of the study, with its demands on the researcher who worked full-time at the school throughout the study and individually scanned all student work and corresponded with parents, it was always envisaged that it would be a small sample with a maximum of around 90 student participants from three classes in a year. In the end the sample consisted of 65 students over two years from five classes. For these reasons, it was expected that the validity and reliability of the WIHIC (and TROFLEI) learning environment surveys would be compromised as the sample size was low. However, despite this limitation, it was still evident that the WIHIC was found to be a valid and reliable instrument when used to assess the classroom learning environment of upper primary (Years 5 and 6) students in a coeducational, private, independent school in Western Australia.

As with other studies, Pickett and Fraser (2009) for example, scales and questions were removed to ensure satisfactory factor analysis. Once this factor analysis had been carried out, the internal consistency reliability factor (Cronbach alpha) was calculated. These results are reported in Table 4.4. The reliability coefficients for the WIHIC Actual and Preferred scales ranged from 0.81 to 0.95 using the individual as the unit of analysis while using the class mean as the unit of analysis, the reliability coefficients ranged from 0.79 to 0.98 with an anomalous negative coefficient of -0.11 in the Cooperation Actual scale, most probably due to the small sample size. Cho and Kim (2015) mentioned that many textbooks state that the Cronbach alpha score can't be negative. However Cho and Kim (2015, p. 212) contended that in some situations it is possible to have a negative coefficient, as in the present study, in cases such as if researchers don't score negatively worded questions in the reverse manner or if "an item has a negative discrimination in a multiple-choice achievement test." The scale in question here (Cooperation Actual) does not have any negatively worded questions and the Cronbach alpha coefficient for the Cooperation Preferred scale was 0.94 using a similarly worded question. This suggests that some unknown factors influenced this particular result.

Using the individual as the unit of analysis the highest alpha reliability (0.95) was in the Task Orientation Preferred scale while the lowest alpha reliability (0.81) using the individual as the unit of analysis was in the Task Orientation Actual scale. Apart from the Cooperation Actual scale when using the class mean as the unit of analysis, all scales remaining after factor analysis demonstrated high reliability coefficients. Generally, above 0.70 is considered to be satisfactory or better reliability though Cho and Kim (2015) question this assumption which was based on the work of Nunnally (1967, 1978, in Cho & Kim, 2015). Nunnally (1967, 1974, in Cho & Kim, 2015) first postulated that an alpha coefficient of 0.5 or 0.6 was sufficient for exploratory research but it was later raised to 0.7 in the second edition of his work. Cho and Kim (2015) argued against using an alpha coefficient score of 0.7 as a cutoff but rather to see it as a guideline. They argued that where the importance of decisions to be made from consideration of test scores increases so should the standard of reliability. However Lance, Butts and Michels (2006, in Cho & Kim, 2015, p. 218) found that this guideline was rarely followed and that most empirical studies still use 0.7 as a “universal standard of reliability regardless of the stage or purpose of the research.”

The η^2 statistic is a measure of the ability of each scale to distinguish between the perceptions of students in different class groups. In this study, there were five class groups, ranging in size from nine to 18 participants. The η^2 statistic is the ratio of the ‘between’ to ‘total’ sums of squares and measures the amount of variance due to class membership. The η^2 values ranged between 0.02 and 0.14 for the WIHIC Actual and Preferred questionnaires and were statistically significant ($p < 0.01$) for seven scales and statistically significant ($p < 0.05$) for four scales. These values indicate that the WIHIC was capable of differentiating significantly between classes.

5.5 Validity and reliability of the TROFLEI learning environment questionnaire

Along with the WIHIC questionnaire, several scales of the TROFLEI were utilised to collect data, particularly to do with computer use and attitudes to computer use. As explained in the introduction to the WIHIC discussion in Section 5.4, it was expected that the validity and reliability of the TROFLEI survey could be compromised by the sample size. However, despite this limitation, it was still evident that the TROFLEI

was found to be a valid and reliable instrument when used to assess the classroom learning environment of upper primary (Years 5 and 6) students in a coeducational, private, independent school in Western Australia.

Like the WIHIC, the data from the TROFLEI section of the questionnaires was coded into Excel 2010 (Microsoft) then transferred to SPSS (IBM) and subjected to factor analysis. This analysis led to the removal of the Academic Efficacy scale from the five TROFLEI scales utilised in the questionnaire as it did not load appropriately.

Once the factor analysis had been carried out, the internal consistency reliability factor (Cronbach alpha) was calculated. These results are reported in Table 4.5. The reliability coefficients for the TROFLEI scales ranged from 0.75 to 0.90 using the individual as the unit of analysis while using the class mean as the unit of analysis, the reliability coefficients ranged from 0.73 to 0.94. Using the individual as the unit of analysis the highest alpha reliability (0.90) was in the Attitude to Subject scale while the lowest alpha reliability (0.75) using the individual as the unit of analysis was in the Computer Use Actual scale. When the class mean was utilised as the unit of analysis, the alpha reliability coefficient was expected to be higher. This was true for three of the four scales with only the Computer Use Preferred scale exhibiting an Alpha Reliability coefficient lower for the class mean than for the individual as the unit of analysis. This unexpected result could again most likely be attributed to the small sample size and the disparity in class sizes completing the questionnaires. All scales remaining after factor analysis demonstrated high reliability coefficients.

Following factor analysis, the η^2 statistic was calculated to determine the amount of variance due to class membership. The η^2 values ranged between 0.03 and 0.15 for the TROFLEI questionnaire and were statistically significant ($p < 0.01$) for the four scales after one was removed during factor analysis. These values indicate that the TROFLEI was capable of differentiating significantly between classes,

5.6 Teacher perceptions of actual and preferred classroom learning environments

The final research question in the present study concerned whether teachers perceived a difference in the actual and preferred perceptions of the classroom learning environment. The cooperating teachers in this study were provided with the data for their classes in a feedback session that included discussion of the aims of the project, compiled results of the survey data, graphs of the class averages for Actual and Preferred forms of the WIHIC and TROFLEI and accompanying individual question responses with differences noted for questions with a difference of 0.5 or greater. The main concentration of the feedback sessions was to present the aggregated data at the scale level with the individual question responses being mentioned only briefly and for further exploration if the teachers chose to consider the results more deeply. Two of the cooperating teachers then agreed to implement changes in their classrooms in response to the survey results.

In Sandra's and Frank's classrooms, the students expressed a desire for greater access to computing. The teachers considered the students' responses and concluded that they could implement some changes. Both teachers altered their classroom practice to incorporate more time in the school's computer lab, then when laptop computer trolleys were housed in their building, they booked out the trolleys on a regular basis for the students to work on in all subjects, including writing. As Sandra then said, "Using computers as much as possible is a priority."

Sandra also noted that the students expressed their preferred classroom learning environment to be one where there were further opportunities for interaction between the students. In response to this Sandra expanded her usage of peer tutoring so that students could assist their classmates with work and she also allocated a greater amount of time to group work so that students discussed ideas more and were further involved in class lessons.

Frank and Sandra both noted the Student Cohesiveness scores but then considered that, while the students desired a more cohesive classroom, their classrooms were already

working well. They felt that the students were expressing something unrealistic in a classroom setting where, as Frank put it, "... I find time is short and the curriculum is large" indicating that while desirable to have a more cohesive classroom environment where there was more interaction and group work, this then has an impact on the amount of the curriculum that can be covered in the classroom.

Overall, the teachers acknowledged the difference between the students' actual and preferred perceptions of their classroom learning environments and were willing to implement changes in response. They have continued to maintain the changes to their classroom management and practices.

5.7 Chapter summary

This chapter presented the discussion of the results from the study. The results pertaining to each of the five research questions were discussed and implications from these results noted.

In the chapter it was shown that students, parents and teachers note that there is an impact on student attitude and achievement in writing development, when parents are involved as an authentic audience for that work. Discussion of the results demonstrated that there was limited impact on the classroom learning environment through the study's innovation. However, the discussion presented that students, parents and teachers noted that student attitude and achievement were significantly and positively impacted by participation in the study's innovation of emailing student writing work during the drafting process.

Validation data was discussed for the WIHIC Actual and Preferred questionnaires along with the scales utilised from the TROFLEI questionnaire. This data suggested that generally the WIHIC and TROFLEI were valid and reliable instruments when used with an upper-primary cohort of students in an independent, Western Australian primary school context.

Finally, the chapter discussed teacher perceptions on the data collated from student perceptions of the classroom learning environment. It presented the positive changes teachers made to their classroom operating procedures resulting from participation in the study.

The next chapter presents the conclusions from the study. It also presents the study's limitations and suggests avenues for further research.

Chapter 6

Conclusions

6.1 Introduction

The previous chapter presented the discussion of the results of this study. It presented a detailed examination of results obtained from quantitative data obtained from the WIHIC and TROFLEI learning environment questionnaires and qualitative data from students, parents and teachers using surveys, interviews and correspondence.

This chapter draws the thesis to its conclusion and presents the major findings of the research. These findings are presented in the order of the research questions. The chapter also presents the limitations to the research and suggests some avenues for future research.

There were a number of findings from this study that relate to the unique combination of the three main emphases of this research. These emphases were parent involvement as an audience for their children's writing work, utilisation of ICT and impact on classroom learning environment, student attitudes and student performance of having parents involved as an audience.

6.2 Major findings

6.2.1 Research question 1

Are there associations between classroom learning environment and the use of ICT which provides students with authentic experiences of interaction, collaboration and audience?

This study produced limited evidence of an impact on the actual classroom learning environment through participation in the study. As mentioned already, the maximum number of participating students from each class was just over half the cohort. This factor may have influenced the recognition of teachers and students noticing any

significant impact on the classroom learning environment. While students, parents and teachers noted the impact on individual student attitudes and achievement, there was limited evidence of significant changes in the classroom learning environment itself. Perhaps with a higher participation rate and with a longer timeframe in which to conduct the research, a greater impact on the classroom learning environment could have been identified.

With respect to use of ICT there has been limited evidence of the educational impact of incorporating ICT in educational programmes (Cuban, 2014; Nichol & Watson, 2003). Olmstead (2013) observed the importance of parental involvement on student achievement so set up research to determine whether technology, including ICT, could be used to assist parents becoming more involved. Email was found to be the preferred method of communication between parents and teachers (Olmstead, 2013). This study then is important as it used ICT as a means to communicate with parents, first conveying their children's work to them for access via email and then to communicate with parents about the work and to conduct surveys of parental opinions on the efficacy of the initiative, again via email. The parents who responded to the surveys and interviews were overwhelmingly in favour of a system such as this one to have them more involved in their children's education and wanted to see the school continue the facility. It seems evident then from this study that parents respond favourably to using ICT as a means to be more involved in their children's education.

Opposed to the research on the limited impact of ICT on educational outcomes are numerous positive research articles that the use of ICT in the classroom can have a significant impact on the learning environment (Jeroski, 2003; Somekh, et al., 2007; White, 2006; Zucker, 2008). However, Hattie (2012, 2009) in his meta-analyses of over 900 studies, determines that ICT has less effect on learning outcomes than many other teaching innovations, including parental involvement. Research question 2 addressed this area.

6.2.2 Research question 2

What associations are there between student attitudes and achievement in writing when their parents participate in the writing process as an active audience during their children's work?

Particularly from the qualitative data collected in this study, it is evident that students put in greater effort with their writing when they know their parents are involved as an audience for their work. Parents can potentially collaborate with the children on projects and provide their children with encouragement and assistance while also monitoring their work. The students, teachers and parents also believe that students perform at a higher level knowing their parents are involved and will be an audience for their work.

Parent involvement in education has a positive impact on educational outcomes (Hornby, 2011; Jeynes, 2007). The present study found that the parents who were interviewed or responded to surveys, overwhelmingly supported being further involved in their children's education through being an audience for the writing work the children were completing at school. They found it helpful to have an avenue where a window into what was being done at school could be viewed at home in the process of drafting to completion, rather than only as a completed product or "published copy" in the end of semester portfolio or at the annual open night.

While recent initiatives in the school where the research took place to provide student results through an Internet portal were seen as helpful by the parents, they still expressed a desire to see the actual product the children were working on, not just the result. Schools might well consider providing the opportunity for parents to interact with their children's work while it is in process and if this is not considered practicable due to the extra time commitment on teaching staff, then schools could provide copies of work samples on their internet accessible portals along with results. Parents that desire to be further involved appreciate the provision of work this way. Increasingly, as schools move towards a 1:1 laptop or electronic device environment, students could be responsible for keeping their parents informed and involved of their progress

through regular emails home with photos of their work. This would reduce the burden experienced in this research of the researcher scanning and emailing each piece of work.

However, in stating the above about parents seeking to see their children's work, it has to be noted that many parents declined the opportunity to be involved in the research. This was a significant proportion, from 50% to almost 75% of parents per class who declined permission or failed to respond to repeated notes and emails about being involved. Some felt they were too busy and did not want to be involved as they felt they could not do the project justice. Others failed to respond for unknown reasons.

In considering the large proportion of parents who did not get involved, as was their right, it could be that they consider that they are entrusting the teachers to provide the education for their children and so don't need to be involved. Parents and teachers noted this as a very real scenario in the school. It is also likely to occur in other educational institutions. The evidence from this study is that when the opportunity is provided for parents to become an audience for their children's work, it is appreciated by the parents, involves them to a greater extent and has an impact on their children. If schools provide the opportunity to be involved this way, parents can take up or decline the opportunity. However, if parents are not provided with the avenue for accessing their children's work, then the potential benefits of greater parental involvement would not be realised with those who choose to be involved.

This study finds then that parents being an audience for their primary-aged children's school writing work has a positive impact on children's attitude and achievement in writing. This replicates findings of positive impacts on writing (Jeroski, 2003) and on education in general (Epstein, 1995, 2011; Hornby, 2011; Jeynes, 2007), through parental involvement.

6.2.3 Research question 3

Is the WIHIC (What Is Happening In This Class?) a valid and reliable instrument when used with the primary age children in this study?

The WIHIC questionnaire has a long history of use in educational institutions, including primary schools, to analyse classroom learning environments (Fraser, 2012b). It has been validated in studies in Australia and overseas and been translated into a variety of languages and found to be a valid and reliable instrument.

This study replicated to a more limited extent the validity and reliability of the WIHIC when used with a primary-aged sample of students in a private Western Australian independent school. As in previous studies (Koren, 2013; Peer, 2011), which had to remove scales and questions to achieve satisfactory factor analysis results and improve the internal consistency and reliability of the instrument, the present study also removed scales and questions, albeit to a greater extent, to achieve satisfactory factor loadings. Other studies have demonstrated that the WIHIC is valid and reliable when utilised with primary-aged students (Adamski et al., 2013; Allan & Fraser, 2007; Peer, 2011; Pickett & Fraser, 2009). The present study adds to this body of literature with a further study conducted in a primary school. Even though the study was of necessity conducted with a small sample size, it is evident that the WIHIC is a valid and reliable instrument when used in this context, albeit to a more limited extent.

6.2.4 Research question 4

Is the TROFLEI (Technology Rich, Outcomes Focussed, Learning Environment Inventory) a valid and reliable instrument when used with the primary age children in this study?

Several scales of the TROFLEI questionnaire were used to procure additional data for the study, particularly to do with student perceptions of ICT in the classroom. The TROFLEI is a survey more intended towards a secondary audience as it includes scales

such as the Young Adult Ethos scale which was not included in this study as it wasn't relevant to the primary-aged sample. However, the survey has been used with primary aged students, as in the Benson (2012) study in New Zealand.

Benson (2012) used a modified version of the TROFLEI with a sample of 200 Year 5 and Year 6 primary students in New Zealand. One of her modifications to the questionnaire was to split the Actual and Preferred questionnaires. Another modification she made was to reduce the 5 point Likert scale to a 4 point scale to ensure students had to make a decision on each question rather than use the neutral middle response. She found the TROFLEI, in its modified state, to be valid and reliable when used with primary students in New Zealand.

In this study, the TROFLEI was also found to be valid and reliable, though a number of questions and a complete scale were removed to ensure satisfactory factor analysis and reliability. Several negatively worded questions could have influenced the results. Should the study be replicated it would be appropriate to either reword these questions or remove them to prevent a similar issue with the data.

6.2.5 Research question 5

Do teachers perceive a difference between actual and preferred perceptions of their classroom learning environments?

65 students completed the WIHIC questionnaire and selected TROFLEI scales. The data collated from these questionnaires was then compiled and averages plotted for each class. Teachers in this research were presented with the compiled results of the actual and preferred data from the WIHIC and TROFLEI questionnaires in a formal feedback session. The results were presented in the form of graphs for scales and questions, along with an annotated version of the questionnaires which showed the difference between actual and preferred student responses on individual questions. In this way teachers could view overall results for scales and if desired could investigate student perceptions of individual questions.

The teachers readily noted areas highlighted by the learning environment surveys. Two of the cooperating teachers implemented changes to their teaching practice following feedback from the surveys. Changes instigated included allocating more time using computers, adjusting methods of presenting assessment feedback to students and introducing a greater emphasis on group work. The teachers considered that these changes to their classroom practice resulted in an enhanced learning environment in the areas they decided to address. These change implementations indicate that teachers do perceive a difference between the actual and preferred student perceptions of the learning environment. These results add to the body of literature (Bell & Aldridge, 2014; Fraser, 2012a; Sinclair & Fraser, 2002) on teachers implementing positive changes to their classroom learning environments in response to survey results.

6.3 Limitations

This research contended with a number of limitations and therefore needs to be taken in that context.

The research was conducted in a co-educational, Western Australian, independent private school. This means that the research findings need to be treated with some caution if applied to a different context such as single gender schools, government schools and schools in other Australian states or internationally.

The study necessarily dealt with a small sample size due to the complexity of organising the emailing of student work to parents as the researcher was solely responsible for scanning, individually attaching scanned files to emails and corresponding with parents while working full-time in the school where the research was taking place. This feature of the research is part of its uniqueness in that parents were provided with scans of student work at various stages in the process from conception of an idea to presentation of a final product. It was a special element of the research where the researcher was embedded in the school where the research was taking place and involved too as a teacher of students taking part in the research. This presented unique opportunities for further input and discussions with participants

about the efficacy of the research which would not have been possible had the study been conducted in other schools. It would also have been difficult to scan and email student work from other schools and maintain communications with a greater number of participants. With a necessarily small sample, findings could be difficult to extrapolate beyond the sample used, within a similar school context or beyond to other educational institutions.

6.4 Recommendations for future research

As has been mentioned a number of times throughout this research, the sample size was constrained for a number of reasons, particularly to do with the nature of the project with its innovative use of ICT to email student work to parents so that parents became an audience for their children's work. Future research could take this factor into consideration and utilise a similar process or more current avenues for dissemination of student work, such as secured portals. Individual teachers could be responsible for ensuring student work, including draft copies, was uploaded in a timely manner and email or text message alerts were sent to parents to prompt them to view the work. With appropriate instruction and teacher monitoring, students could be responsible for uploading and prompting parents to view the work, taking the load off classroom teachers and researchers. If the research load was relieved for teachers through these suggestions, more could be encouraged to participate to ensure then that there was a greater sample of participants in future research.

The current research used ICT as a means to convey the student writing to the parents in the manner of scanned pdf copies of the work. With the increasing use of 1:1 laptop programmes, it would be useful to research whether greater access to computing has an impact of student achievement and attitude with respect to writing and whether it has an impact on the learning environment of the classroom.

The WIHIC and TROFLEI questionnaires have been widely used and validated in a number of different environments. In this research, the questionnaires were validated to a certain extent within an upper primary context. A context for further research is

presented where these instruments could be validated by using much larger sample sizes within primary schools.

The current research was conducted in a coeducational, independent primary school. A suggestion for further research is that future studies could concentrate on other primary educational contexts such as government schools and single gender schools to determine if the research findings remain valid in those contexts.

As detailed in Chapter 2, much research has concluded that parental involvement in schools has a positive impact on student educational outcomes. Future studies could be conducted to determine the impact of parental involvement on educational achievement, attitudes to learning and classroom learning environment.

It was mentioned earlier in this chapter that having a standardised method to quantitatively measure the impact on student achievement would be a benefit. Further research could investigate using NAPLAN writing achievement data as a means to ascertain if there was an impact of student performance. Should all external factors be controlled between two classes, one could be involved in facilitating parents being an audience for their children's work while another class could be a control class which did not use the facility, with their NAPLAN results potentially showing any impact.

A final suggestion for future research comes from the benefits noted in the longitudinal research projects conducted by Bell and Aldridge (2014). In their study, the research informed individual teachers of student perceptions of the learning environment. Teachers were supported by the school through professional development and collegial discussion to implement changes in the learning environments. The questionnaires were administered over a period of three years. Replicating the present study over a period of three years would be beneficial to ascertain whether parents made a real difference to their children's learning outcomes through being an authentic audience for the work.

6.5 Final remarks

This study was conducted over a two year period where ICT access and usage in primary schools has been increasing dramatically. It was also conducted during the period that tablet computers such as the iPad were increasingly being added to the arsenal of technology, including software, being integrated into the schooling context. However, with the emphasis on provision of technology and the curriculum changes in the Australian context that demand use of technology, we can't lose sight of the fact that getting parents involved in their own children's education potentially has a much greater impact on student achievement. Hornby (2011), drawing on Hattie's (2009) research, reported that the average effect size of parental involvement in schools ranged between 0.38 and 0.74. On the other hand, the highest effect size of a technological innovation was calculated at 0.41, with an average effect size of 0.31 for innovations to do with ICT, less than the average effect size of 0.4 for all educational innovations.

It appears evident then that schools could investigate combining the current emphasis on provision and usage of ICT with enabling parents to become further involved in their children's education. Having parents become an audience for their children's draft and completed writing work through using ICT, especially email, is one way to encourage greater parental involvement, potentially leading to enhanced classroom learning environments and a positive impact on student attitudes and achievement in the classroom.

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Appendix 1 – Letter to parents

Dear Year 6 Parents

Attached you will find a note explaining some research I have approval to run with (Class Teacher's Name deleted) Year 6 class, should you give permission for your child to participate. In essence, it involves the students completing a questionnaire and survey and having some of their classroom writing work emailed to parents to view and discuss. Parents will also be asked to complete a survey. The questionnaire and surveys should take less than half an hour to complete.

I'd also like to interview some parents and students on their perceptions of the research project. Participation in all the research is entirely voluntary. You and your child could also take part in the research without being involved in the interview component.

A meeting has been arranged for each afternoon next week at 3.30pm, in the primary staff room for you to ask any questions you might have about the research.

It would be great if you could allow your child to participate in the research and for you to be involved as well.

Please feel free to email me at (email address deleted) if you have any queries. Could you please fill in the note below to acknowledge receiving this letter and then if the attached permission slip could be returned by Friday next week indicating granting or declining permission, that would be much appreciated.

Kind regards

Allan Ribbons

Appendix 2 – Information sheet provided to parents



Curtin University of Technology School of Science and Maths Education

Parent Participant Information Sheet

My name is Allan Ribbons. I am currently completing a piece of research for my Masters of Science Education at Curtin University of Technology.

Purpose of Research

I am investigating student attitude and achievement in classrooms where parents provide an authentic audience for student writing utilising ICT.

Your Role

I am interested in finding out how students, parents and staff perceive the classroom learning environment before, during and after implementing a project where their writing is made available to parents through the use of ICT, giving the students a further avenue for an authentic audience for their work.

Some parents and students will be asked questions in interviews about their responses to questionnaires and surveys, and about their perceptions of the project to make student writing available to parents.

The interview process will take approximately 15 minutes.

Consent to Participate

Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your rights or my responsibilities. When you have signed the consent form I will assume that you have agreed to participate and allow me to use your data in this research.

Confidentiality

The information you provide will be kept separate from your personal details, and only myself and my supervisor will have access to this. The interview transcripts will not have your name or any other identifying information on it and in adherence to university policy, the interview tapes and transcribed information will be kept in a locked cabinet for at least five years, before a decision is made as to whether it should be destroyed.

Further Information

This research has been reviewed and given approval by Curtin University of Technology Human Research Ethics Committee (Approval Number SMEC-42-10) If you would like further information about the study, please feel free to contact me on (phone number deleted) or by email at (Email address deleted).. Alternatively, you can contact my supervisor Dr Tony Rickards on (Contact details deleted).

**Thank you very much for your involvement in this research.
Your participation is greatly appreciated.**

Appendix 3 – Consent Form



CONSENT FORM

- I understand the purpose and procedures of the study.
 - I have been provided with the participation information sheet.
 - I understand that the procedure itself may not benefit me.
 - I understand that my involvement is voluntary and I can withdraw at any time without problem.
 - I understand that no personal identifying information like my name and address will be used in any published materials.
 - I understand that all information will be securely stored for at least 5 years before a decision is made as to whether it should be destroyed.
 - I have been given the opportunity to ask questions about this research.
 - I agree to participate in the study outlined to me.
-

Student Name: _____

Student Class: _____

Parent Name: _____

Parent Signature: _____

Date: _____

Email address: _____

Appendix 4 – Example of general email note to parents accompanying student work sample

Dear Parents

Attached is another piece of writing from your child. The Year 6 class has been studying disasters. This writing assignment involved them planning a recount of the September 11 Twin Towers tragedy in New York. There is a planning sheet and then the recount on the next page. Some of the recounts have not been fully completed.

Hope you enjoy their work and again, if you're able, could you send a quick reply acknowledging receipt and if you've been able to discuss it with your child.

One of the focus points of my research is that the students know they have an audience beyond the teacher with their parents providing that audience. Feel free to pass on their work to anyone who might be interested in seeing what they are writing.

Thanks again for your participation in the research and your support. It is greatly appreciated.

Kind regards

Allan

Appendix 5 – Interview permission form

Dear Parents

As you are aware, I have been conducting research with the primary students concerning their writing work and the Learning Environment of their classrooms. I appreciate the thought and effort the students have put into completing the questionnaires.

I now need to obtain some more in depth comments from students arising from their participation in the research. To do this I need to interview the students. The interviews will be conducted in an open area.

Consequently, I would much appreciate your permission so that I can conduct these interviews and complete this research. Could you please sign the permission slip below to indicate your consent for your child to participate in this way. The interview should last no longer than about 10 - 15 minutes and I would like to encourage you to also be present if you are able.

Please note that you are under no obligation to consent to this interview and you can withdraw your consent at any time. No questions will be asked. If you would like to contact someone from Curtin University to discuss the research or to make a complaint, you are also free to contact Curtin University's designated people to receive formal complaints. Their contact details are:

- Professor Linda Kristjanson, Deputy Vice-Chancellor (Research and Development) L.Kristjanson@curtin.edu.au
- Professor Graeme Wright, Dean, Graduate Studies - G.L.Wright@curtin.edu.au

If you have any questions regarding this matter please don't hesitate to phone the office on (phone number deleted) and I will return your call, or email me at (email address deleted).

Kind regards

Allan Ribbons
ICT Teacher

Name deleted
Principal

.....

I give / do not give permission for Mr Allan Ribbons to conduct an interview in an open area of the school with my child _____ to do with his Learning Environment research. I understand that I am very welcome to attend the interview.

Signature

Appendix 6 – WIHIC Actual questionnaire

What Is Happening In This Class?

Personal Form (Actual)

Directions

This questionnaire contains statements about practices which could take place in this class. You will be asked how often each practice takes place.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what this class is like for you.

Draw a circle around

1	if the practice takes place	Almost Never
2	if the practice takes place	Seldom
3	if the practice takes place	Sometimes
4	if the practice takes place	Often
5	if the practice takes place	Almost Always

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

Practice Example

Suppose that you were given the statement: "I choose my partners for group discussion." You would need to decide whether you think **you** choose your partners 'Almost Never', 'Seldom', 'Sometimes', 'Often' or 'Almost Always'. For example, if you selected 'Often', you would circle the number 4 on your questionnaire.

Your Name:

Male ρ **Female** ρ

Teacher's Name:

School:

Grade:



STUDENT COHESIVENESS		Almost Never	Seldom	Some-time	Often	Almost Always
1.	I make friendships among students in this class.	1	2	3	4	5
2.	I know other students in this class.	1	2	3	4	5
3.	I am friendly to members of this class.	1	2	3	4	5
4.	Members of the class are my friends.	1	2	3	4	5
5.	I work well with other class members.	1	2	3	4	5
6.	I help other class members who are having trouble with their work.	1	2	3	4	5
7.	Students in this class like me.	1	2	3	4	5
8.	In this class, I get help from other students.	1	2	3	4	5
TEACHER SUPPORT		Almost Never	Seldom	Some-time	Often	Almost Always
9.	The teacher takes a personal interest in me.	1	2	3	4	5
10.	The teacher goes out of his/her way to help me.	1	2	3	4	5
11.	The teacher considers my feelings.	1	2	3	4	5
12.	The teacher helps me when I have trouble with the work.	1	2	3	4	5
13.	The teacher talks with me.	1	2	3	4	5
14.	The teacher is interested in my problems.	1	2	3	4	5
15.	The teacher moves about the class to talk with me.	1	2	3	4	5
16.	The teacher's questions help me to understand.	1	2	3	4	5
INVOLVEMENT		Almost Never	Seldom	Some-time	Often	Almost Always
17.	I discuss ideas in class.	1	2	3	4	5
18.	I give my opinions during class discussions.	1	2	3	4	5
19.	The teacher asks me questions.	1	2	3	4	5
20.	My ideas and suggestions are used during classroom discussions.	1	2	3	4	5
21.	I ask the teacher questions.	1	2	3	4	5
22.	I explain my ideas to other students.	1	2	3	4	5
23.	Students discuss with me how to go about solving problems.	1	2	3	4	5
24.	I am asked to explain how I solve problems.	1	2	3	4	5

INVESTIGATION		Almost Never	Seldom	Some-time	Often	Almost Always
25.	I carry out investigations to test my ideas.	1	2	3	4	5
26.	I am asked to think about the evidence for statements.	1	2	3	4	5
27.	I carry out investigations to answer questions coming from discussions.	1	2	3	4	5
28.	I explain the meaning of statements, diagrams and graphs.	1	2	3	4	5
29.	I carry out investigations to answer questions which puzzle me.	1	2	3	4	5
30.	I carry out investigations to answer the teacher's questions.	1	2	3	4	5
31.	I find out answers to questions by doing investigations.	1	2	3	4	5
32.	I solve problems by using information obtained from my own investigations.	1	2	3	4	5
TASK ORIENTATION		Almost Never	Seldom	Some-time	Often	Almost Always
33.	Getting a certain amount of work done is important to me.	1	2	3	4	5
34.	I do as much as I set out to do.	1	2	3	4	5
35.	I know the goals for this class.	1	2	3	4	5
36.	I am ready to start this class on time.	1	2	3	4	5
37.	I know what I am trying to accomplish in this class.	1	2	3	4	5
38.	I pay attention during this class.	1	2	3	4	5
39.	I try to understand the work in this class.	1	2	3	4	5
40.	I know how much work I have to do.	1	2	3	4	5

COOPERATION		Almost Never	Seldom	Some-time	Often	Almost Always
41.	I cooperate with other students when doing assignment work.	1	2	3	4	5
42.	I share my books and resources with other students when doing assignments.	1	2	3	4	5
43.	When I work in groups in this class, there is teamwork.	1	2	3	4	5
44.	I work with other students on projects in this class.	1	2	3	4	5
45.	I learn from other students in this class.	1	2	3	4	5
46.	I work with other students in this class.	1	2	3	4	5
47.	I cooperate with other students on class activities.	1	2	3	4	5
48.	Students work with me to achieve class goals.	1	2	3	4	5

EQUITY		Almost Never	Seldom	Some-time	Often	Almost Always
49.	The teacher gives as much attention to my questions as to other students' questions.	1	2	3	4	5
50.	I get the same amount of help from the teacher as do other students.	1	2	3	4	5
51.	I have the same amount of say in this class as other students.	1	2	3	4	5
52.	I am treated the same as other students in this class.	1	2	3	4	5
53.	I receive the same encouragement from the teacher as other students do.	1	2	3	4	5
54.	I get the same opportunity to contribute to class discussions as other students.	1	2	3	4	5
55.	My work receives as much praise as other students' work.	1	2	3	4	5
56.	I get the same opportunity to answer questions as other students.	1	2	3	4	5

Appendix 7 – WIHIC Preferred Questionnaire

What Is Happening In This Class?

Personal Form (Preferred)

Directions

This questionnaire contains statements about practices which could take place in this class. You will be asked **how often** you would **prefer** each practice to take place.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what your preferred class would be like for you.

Draw a circle around

- | | | |
|---|------------------------------------------------|-------------------------|
| 1 | if you would prefer the practice to take place | Almost Never |
| 2 | if you would prefer the practice to take place | Seldom |
| 3 | if you would prefer the practice to take place | Sometimes |
| 4 | if you would prefer the practice to take place | Often |
| 5 | if you would prefer the practice to take place | Almost Always |

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

Practice Example

Suppose that you were given the statements: "I would choose my partners for group discussion." You would need to decide whether you think **you** would **prefer** to choose your partners 'Almost Never', 'Seldom', 'Sometimes', 'Often' or 'Almost Always'. For example, if you selected 'Often', you would circle the number 4 on your questionnaire.

Your Name:

Male

Female

Teacher's Name:

School:

Grade:

STUDENT COHESIVENESS		Almost Never	Seldom	Some-time:	Often	Almost Always
1.	I would make friendships among students in the class.	1	2	3	4	5
2.	I would know other students in the class.	1	2	3	4	5
3.	I would be friendly to members of the class.	1	2	3	4	5
4.	Members of the class would be my friends.	1	2	3	4	5
5.	I would work well with other class members.	1	2	3	4	5
6.	I would help other class members who were having trouble with their work.	1	2	3	4	5
7.	Students in the class would like me.	1	2	3	4	5
8.	In the class, I would get help from other students.	1	2	3	4	5
TEACHER SUPPORT		Almost Never	Seldom	Some-time:	Often	Almost Always
9.	The teacher would take a personal interest in me.	1	2	3	4	5
10.	The teacher would go out of his/her way to help me.	1	2	3	4	5
11.	The teacher would consider my feelings.	1	2	3	4	5
12.	The teacher would help me when I had trouble with the work.	1	2	3	4	5
13.	The teacher would talk with me.	1	2	3	4	5
14.	The teacher would be interested in my problems.	1	2	3	4	5
15.	The teacher would move about the class to talk with me.	1	2	3	4	5
16.	The teacher's questions would help me to understand.	1	2	3	4	5
INVOLVEMENT		Almost Never	Seldom	Some-time:	Often	Almost Always
17.	I would discuss ideas in class.	1	2	3	4	5
18.	I would give my opinions during class discussions.	1	2	3	4	5
19.	The teacher would ask me questions.	1	2	3	4	5
20.	My ideas and suggestions would be used during classroom discussions.	1	2	3	4	5
21.	I would ask the teacher questions.	1	2	3	4	5
22.	I would explain my ideas to other students.	1	2	3	4	5
23.	Students would discuss with me how to go about solving problems.	1	2	3	4	5
24.	I would be asked to explain how I solve problems.	1	2	3	4	5

INVESTIGATION		Almost Never	Seldom	Some-time:	Often	Almost Always
25.	I would carry out investigations to test my ideas.	1	2	3	4	5
26.	I would be asked to think about the evidence for statements.	1	2	3	4	5
27.	I would carry out investigations to answer questions coming from discussions.	1	2	3	4	5
28.	I would explain the meaning of statements, diagrams and graphs.	1	2	3	4	5
29.	I would carry out investigations to answer questions which puzzled me.	1	2	3	4	5
30.	I would carry out investigations to answer the teacher's questions.	1	2	3	4	5
31.	I would find out answers to questions by doing investigations.	1	2	3	4	5
32.	I would solve problems by using information obtained from my own investigations.	1	2	3	4	5
TASK ORIENTATION		Almost Never	Seldom	Some-time:	Often	Almost Always
33.	Getting a certain amount of work done would be important to me.	1	2	3	4	5
34.	I would do as much as I set out to do.	1	2	3	4	5
35.	I would know the goals for this class.	1	2	3	4	5
36.	I would be ready to start this class on time.	1	2	3	4	5
37.	I would know what I was trying to accomplish in the class.	1	2	3	4	5
38.	I would pay attention during the class.	1	2	3	4	5
39.	I would try to understand the work in the class.	1	2	3	4	5
40.	I would know how much work I had to do.	1	2	3	4	5

COOPERATION		Almost Never	Seldom	Some-time	Often	Almost Always
41.	I would cooperate with other students when doing assignment work.	1	2	3	4	5
42.	I would share my books and resources with other students when doing assignments.	1	2	3	4	5
43.	When I work in groups in the class, there would be teamwork.	1	2	3	4	5
44.	I would work with other students on projects in the class.	1	2	3	4	5
45.	I would learn from other students in the class.	1	2	3	4	5
46.	I would work with other students in the class.	1	2	3	4	5
47.	I would cooperate with other students on class activities.	1	2	3	4	5
48.	Students would work with me to achieve class goals.	1	2	3	4	5

EQUITY		Almost Never	Seldom	Some-time	Often	Almost Always
49.	The teacher would give as much attention to my questions as to other students' questions.	1	2	3	4	5
50.	I would get the same amount of help from the teacher as do other students.	1	2	3	4	5
51.	I would have the same amount of say in the class as other students.	1	2	3	4	5
52.	I would be treated the same as other students in the class.	1	2	3	4	5
53.	I would receive the same encouragement from the teacher as other students did.	1	2	3	4	5
54.	I would get the same opportunity to contribute to class discussions as other students.	1	2	3	4	5
55.	My work would receive as much praise as other students' work.	1	2	3	4	5
56.	I would get the same opportunity to answer questions as other students.	1	2	3	4	5

Appendix 8 – TROFLEI scales used

<i>Computer Usage</i>	Almost Never	Seldom	Some times	Often	Almost Always	Almost Never	Seldom	Some times	Often	Almost Always
65. I use the computer to type my assignments.	1	2	3	4	5	1	2	3	4	5
66. I use the computer to email assignments to my teacher.	1	2	3	4	5	1	2	3	4	5
67. I use the computer to ask the teacher questions.	1	2	3	4	5	1	2	3	4	5
68. I use the computer to find out information about the course.	1	2	3	4	5	1	2	3	4	5
69. I use the computer to read lesson notes prepared by the teacher.	1	2	3	4	5	1	2	3	4	5
71. I use the computer to find out information about how my work will be assessed.	1	2	3	4	5	1	2	3	4	5
72. I use the computer to take part in online discussions with other students.	1	2	3	4	5	1	2	3	4	5
73. I use the computer to obtain information from the Internet.	1	2	3	4	5	1	2	3	4	5

Attitude and Efficacy Questionnaire

<i>Attitude to Subject</i>	Almost Never	Seldom	Some times	Often	Almost Always
1. I look forward to lessons in this subject.	1	2	3	4	5
2. Lessons in this subject are fun.	1	2	3	4	5
3. I dislike lessons in this subject.	1	2	3	4	5
4. Lessons in this subject bore me.	1	2	3	4	5
5. This subject is one of the most interesting school subjects.	1	2	3	4	5
6. I enjoy lessons in this subject.	1	2	3	4	5
7. Lessons in this subject are a waste of time.	1	2	3	4	5
8. These lessons make me interested in this subject.	1	2	3	4	5
<i>Attitude to Computer Use</i>	Almost Never	Seldom	Some times	Often	Almost Always
9. I'm good with computers.	1	2	3	4	5
10. I like working with computers.	1	2	3	4	5
11. Working with computers makes me nervous.	1	2	3	4	5
12. I am comfortable trying new software on the computer.	1	2	3	4	5
13. Working with computers is stimulating.	1	2	3	4	5
14. I get a sinking feeling when I think of using a computer.	1	2	3	4	5
15. I do as little work as possible using a computer.	1	2	3	4	5
16. I feel comfortable using a computer.	1	2	3	4	5
<i>Academic Efficacy</i>	Almost Never	Seldom	Some times	Often	Almost Always
17. I find it easy to get good grades in this subject.	1	2	3	4	5
18. I am good at this subject.	1	2	3	4	5
19. My friends ask me for help in this subject.	1	2	3	4	5
20. I find this subject easy.	1	2	3	4	5
21. I outdo most of my classmates in this subject.	1	2	3	4	5
22. I have to work hard to pass this subject.	1	2	3	4	5
23. I am an intelligent student.	1	2	3	4	5
24. I help my friends with their homework in this subject.	1	2	3	4	5

Appendix 9 – Student survey



"There aren't any icons to click. It's a chalk board."

Student Survey

Name _____

Class _____

School Name _____ **Research Project – Allan Ribbons**

Thank you for taking part in this research project. This is a brief questionnaire I'd very much appreciate you completing. Please remember that your answers are confidential. No identifying material is kept with the responses and your classroom teachers do not see what you say. Thanks again for all your help.

	1 Almost never	2 Seldom	3 Sometimes	4 Often	5 Almost always
1. Prior to this research, how often did your parents see you writing?					
2. Prior to this research, how often would your parents help you with your writing at home?					
3. Since this research project, how often did your parents see your writing?					
4. Since the research project, how often would your parents help you with your writing at home?					
5. How often would you like your parents to see the writing you do at school?					

What benefits have you noticed since your parents started receiving your writing by email? (Tick all that apply)

6. My parents are more involved with my writing now.
7. My parents talk to me about my learning more.
8. It helps me to know that someone else will see my work, not just the teacher.
9. My parents give me an audience for my writing.
10. It's good for my parents to see my work during Term, not just at end of semester.
11. My parents are now more aware of my strengths and weaknesses with writing.
12. Other _____
13. Other _____
14. Other _____
15. Any further comment _____

What disadvantages have you noticed since your parents started receiving your work this way? (Tick all that apply)

- 16. It was time consuming
- 17. My parents were not sure how to help me
- 18. My parents found it difficult working with me
- 19. My parents had trouble with the technology like the computer
- 20. My parents weren't sure what to do
- 21. I wasn't sure what to do
- 22. My parents didn't talk to me about my work
- 23. I was a bit embarrassed having them see my work
- 24. Other _____



- 25. Any further comment _____
- 26. Has this process been helpful for you and your parents? Yes / No (Circle response)
- 27. Would you like your parents to continue being involved in this way? Yes / No (Circle response)
- 28. Do you feel it is helpful it to have the work emailed? Yes / No (Circle response)
- 29. How do you think having your work emailed has affected your **attitude** to writing? ____

- 30. How do you think having your work emailed has affected your **performance** in writing?

- 31. How do you think having your work emailed affected your **classroom**? _____

- 32. Any other comments you would like to make about this project.

- 33. Who do you think is the best writer in your class?

- 34. Why do you think they are the best?

Thanks for much for participating in this way. Your valuable time committed to it is much appreciated. Mr Ribbons ☺

Appendix 10 – Parent Survey

Parent Survey Research Project – Allan Ribbons		Name _____ (Optional but appreciated)			
<p>Thank you for taking part in this research project. This is a brief survey I'd very much appreciate you completing to provide me with further data for the research. Please remember that your answers are confidential. No identifying material is kept with the responses and the classroom teachers do not see your responses. They will only see a generalised analysis of the combined responses which does not identify any people completing the survey in any way. Please feel free to contact me via email if you have any queries. You may either print this document and post to me at the school address (deleted), complete it on your computer and email it back to me or print it, complete it by hand and scan it then email it. Thanks again for all your help.</p>					
	Almost never	Seldom	Sometimes	Often	Almost always
Prior to this research, how often did you see your child's writing?					
Prior to this research, how often would you help your child with her/his writing at home?					
Since this research project, how often did you see your child's writing?					
Since the research project, how often would you help your child with her/his writing at home?					
How often would you like to see your child's school writing?					

What benefits have you noticed since receiving your child's writing via email? (Tick all that apply)

- Greater involvement in child's learning.
- Opportunity to interact with child with their learning.
- Provides the child with an authentic audience.
- Good to see child's work during Term, not just at end of semester.
- Greater awareness of child's strengths and weaknesses with writing
- Other _____
- Any further comment.

(More questions next page)

Go Ahead... Leave Feedback!


What disadvantages have you noticed since receiving your child's work this way? (Tick all that apply)

- Time consuming
- Not sure how to help.
- Difficult working with child
- Technology problems
- Other



Any further comment _____

Has this process been helpful for you and your child? Yes / No (Circle response)

Would you like continued involvement in your child's writing in this way? Yes / No (Circle response)

Do you feel it is helpful it to have the work emailed? Yes / No (Circle response)

What impact do you think having the student work emailed had on your child's attitude to writing and performance in writing? _____

What impact do you think having the student work emailed had on your child's cross setting classroom learning environment? _____

Any other comments you would like to make about this project. _____

Thank you so much for participating in this way. Your valuable time committed to it is much appreciated.

Regards

Allan Ribbons

Appendix 11- Parent and Student Interview Questions

Questions for parents:

- What do you think are the best ways to use technology in the classroom?
- What do you think of email communications with your child's teacher? What do you think of other forms of digital communication – for example blogs, wiki, secured website.
- How valuable do you think it is for your child to have an audience beyond the teacher for their efforts in writing at school.
- Do you think more regular viewing by parents of their child's work and communication with the teacher would help their performance at school? Explain why or why not.
- What do you think is the best fit for you for communications with your child's teachers? When needed? Every assignment? Each week? Major tests? End of term? End of semester? Work put on secured website?
- What systems could the school implement to enhance your satisfaction regarding your involvement in your child's education?

Questions for students:

- When you do your writing at school, who do you feel you are writing for? Examples might include yourself, teacher, class mates, parents, principal, don't really think about it.
- If you knew that your parents were going see your work straight away (be an audience), do you think it would make a difference to your efforts and how well you do with the task? For example you might try harder, feel like it's more worthwhile, feel proud of your work because you can show what you've been doing or not really change how you work.
- How do you feel about having your parents discuss your work with you? For example you might find it really helpful to have one to one attention, you might be proud of your efforts, you might feel embarrassed if you hadn't done as well as you could.
- Do you think having other people, besides your teacher and class mates, to discuss your work with would make a difference to how you work?
- What do you think are the best ways to use technology in the classroom? What would you like to do with the technology we have? (Well, apart from play games, what would you like to do?)

Appendix 12 - Sample Section of Teacher Feedback Document

STUDENT COHESIVENESS		Almost Never	Seldom	Some-time:	Often	Almost Always
1.	I would make friendships among students in the class.	1	2	3	4	5
2.	I would know other students in the class.	1	2	3	4	5
3.	I would be friendly to members of the class.	1	2	3	4	5
4.	Members of the class would be my friends.	1	2	3	4	5
5.	I would work well with other class members.	1	2	3	4	5
.62	6. I would help other class members who were having trouble with their work.	1	2	3	4	5
7.	Students in the class would like me.	1	2	3	4	5
.51	8. In the class, I would get help from other students.	1	2	3	4	5
TEACHER SUPPORT		Almost Never	Seldom	Some-time:	Often	Almost Always
9.	The teacher would take a personal interest in me.	1	2	3	4	5
10.	The teacher would go out of his/her way to help me.	1	2	3	4	5
11.	The teacher would consider my feelings.	1	2	3	4	5
12.	The teacher would help me when I had trouble with the work.	1	2	3	4	5
13.	The teacher would talk with me.	1	2	3	4	5
14.	The teacher would be interested in my problems.	1	2	3	4	5
15.	The teacher would move about the class to talk with me.	1	2	3	4	5
.53	16. The teacher's questions would help me to understand.	1	2	3	4	5
INVOLVEMENT		Almost Never	Seldom	Some-time:	Often	Almost Always
17.	I would discuss ideas in class.	1	2	3	4	5
.98	18. I would give my opinions during class discussions.	1	2	3	4	5
19.	The teacher would ask me questions.	1	2	3	4	5
.96	20. My ideas and suggestions would be used during classroom discussions.	1	2	3	4	5
21.	I would ask the teacher questions.	1	2	3	4	5
22.	I would explain my ideas to other students.	1	2	3	4	5
23.	Students would discuss with me how to go about solving problems.	1	2	3	4	5
24.	I would be asked to explain how I solve problems.	1	2	3	4	5

Appendix 13 - Teacher Interview Questions

What impact do you think an audience (ie people beyond the teacher and fellow students, people such as parents, grandparents, etc) has on students' attitude to writing tasks?

What impact do you think an audience has on students' performance in writing tasks?

Very broadly, how do you structure your teaching programme to develop students' writing? (Eg what activities do you engage the students in, how do you try to lift their performance and attitude to writing?)

Given the results of the student survey where variations between actual and preferred responses of greater than 0.5 were highlighted, what things might you want to try, adjust or modify to enhance the learning environment of your classroom? What things would you keep the same?

How do you see the differences between the actual and preferred perceptions of the students? How valid do you think they are? Have you changed your teaching methods with your class and therefore might have addressed some of the differences in the preferred to actual responses?

Any other comments on learning environment?

Any other comments on the impact of an audience beyond the teacher and fellow students?

Any comments on the logistics of organising a way for people beyond the classroom becoming an audience for the students' work?