Integrated Project-Based Curriculum: A case study in a Victorian School.

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Submitted in total fulfilment of the requirements of the degree of Masters in Education.

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JULY, 2015

ABSTRACT

Leaders of research in the field of effective education have recognised that in the late twentieth century traditional styles of teaching were no longer sustaining student interest, nor helping students achieve their fullest potential. Sir Ken Robinson, a leading commentator, has spoken about the problems with the current Western educational system that was designed during the Industrial Revolution to accommodate the needs of that time. Education reform has been broadly researched and discussed and a wide range of strategies and theories have been developed, including integrated Project-Based Curriculum.

This study investigates the development of an integrated Project-Based Curriculum program, what this type of program involves, the implementation of the program and an analysis of qualitative and quantitative data collected throughout the program highlighting its potential benefits. Making use of a mixed method approach, this project examined the outcomes of an integrated Project-Based Curriculum program case study consisting of six teachers and fifty Year 7 students. The context of the study involves a private Christian school located in a suburban outer fringe area of Melbourne, Victoria, Australia. The study investigated the overarching question of whether integrated Project-Based Curriculum programs are constructive and beneficial to today's schools.

The research showed three key findings: that integrated Project-Based Curriculum programs are set up to allow students to make choices in their own education, which creates an appreciation of each discipline and a connection to the 'real world'; that integrated Project-Based Curriculum involves a great deal of group work which develops a number of 'life-long' 21st century work related skills, including collaboration, communication and creative and critical thinking; and most significantly, that integrated Project-Based Curriculum programs engage students to self-learn and come to class with a greater prior knowledge, enabling teachers to teach a more in-depth content that creates a deeper learning.

ACKNOWLEDGEMENTS

I would firstly like to acknowledge and thank my supervisor Dr Annette Foley for all her support, advice and guidance.

Acknowledgement must also be extended to Dr Peter Waterhouse, Mrs Amanda Gelsi, Dr Kate Brass and Mr Ken Wade for their feedback and guidance.

I'd like to lastly thank my main supporters throughout this journey, Mirella, Peter, Craig, my daughter Elizabeth and my wife Carla.

STATEMENT OF AUTHORSHIP

Except where explicit reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma. No other person's work has been relied upon or used without due acknowledgment in the main text and bibliography of the thesis.



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ACRONYMS

ACARA – Australian Curriculum, Assessment and Reporting Authority

CSF – Curriculum and Standards Framework

CSF II – Curriculum and Standards Framework Two

DVD – Digital Versatile Disc

ICT – Information and Communication Technology

MCEETYA – Ministerial Council on Education, Employment, Training and Youth Affairs

TED – Technology, Entertainment, Design

VCAA – Victorian Curriculum and Assessment Authority

VCE – Victorian Certificate of Education

VELS – Victorian Essential Learning Standards

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CHAPTER 1: PRESENTING THE PROLOGUE

Since the Industrial Revolution education institutions have been equipping young people, according to Sir Ken Robinson (2011), with knowledge that resembles a "factory floor" (p.53). In Sir Ken Robinson's seminar during a Technology, Entertainment, Design (TED) Conference, he puts forward the argument previously documented in his research, that the educational system today was "…developed primarily to meet the needs of the Industrial Revolution and, in many ways, mirror the principals of industrial production. They emphasize linearity, conformity and standardization. One of the reasons they are not working now is that real life is organic, adaptable and diverse" (Robinson, 2011, p.8). Whilst this approach to education was commendable during the Industrial Revolution following a dearth of public education, in today's world this model of education is out-dated and no longer works. Sir Ken Robinson goes on to quote Abraham Lincoln who said that:

> … [t]he dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty and we must rise with the occasion. As our case is new, so we must think anew and act anew. We must disenthrall ourselves, and then we shall save our country. (2011, p.7)

1.1 Rationale

In a time of constant change, where businesses thrive or fail on their ability to adapt to the continual change of global needs, it seems education has remained unaware or ignorant to it all, and because of this:

> …[M]any educators foresee rather drastic disruptions in the teaching/learning process, brought about by the ever-changing technologies, the increasing demands of struggling students, and various changes now underway in education such as increased emphasis on differentiated instruction and the response-to-intervention initiative. (Bender, 2012, "Introduction," para. 2)

At the end of 2014 the Australian Government's Department of Education and Training created a Teacher Education Ministerial Advisory Group who developed the *Action Now: Classroom Ready Teachers* report. The government responded to this report by addressing five themes:

- stronger quality assurance of teacher education courses
- rigorous selection for entry to teacher education courses
- improved and structured practical experience for teacher education students
- robust assessment of graduates to ensure classroom readiness
- national research and workforce planning capabilities.

This research project focuses primarily on the fifth theme that the government has set out to address. This theme was further explained in the report:

> The Advisory Group noted a lack of reliable research relating to initial teacher education and teaching practices in general. This has led to claims that many of the teaching practices currently used in schools are not informed by evidence (Department of Education and Training, 2015, p.9).

A number of different teaching and learning pedagogies have recently been implemented within Victorian schools. One such technique is integrated Project-Based Curriculum programs. Project-Based Learning is another popular term for what is being addressed in this study as Project-Based Curriculum. Due to the fact that the case study is based on a single curriculum program, the term Project-Based Curriculum has been used from here on in. For Bender (2012), Project-Based Curriculum is "an instructional model based on having students confront real-world issues and problems that they find meaningful, determine how to address them, and then act in a collaborative fashion to create problem solutions" ("Introduction," para. 3). Whilst Project-Based Curriculum is not new, Bender suggests "…it has recently received increased emphasis as educators and business leaders look for ways to move education forward and develop students' skills in the 21st century [through the use of] technologies, problem solving and collaboration" ("Introduction," para. 4).

This study firstly reviews and discusses the meaning/s of integrated Project-Based Curriculum and what constitutes a well-designed integrated Project-Based Curriculum program. It then explores the implementation and delivery of such a program and critically analyses the benefits and problems that arose during the delivery of a program in the project research. The primary aim of the research was to investigate integrated Project-Based Curriculum and inform teaching practices based on the evidence found, thus supporting the fifth theme the government has set out to address, building capability for evidence-based practice.

The primary research question of the study was: 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?'

1.2 Context of the Study

The context in which my study is situated is the Victorian schooling system. The school in which the research was conducted was located west of Melbourne. It was a non-denominational, co-educational Christian school that catered for students from Prep to Year 12. In its 25th year of service, the school had an open-enrolment policy and encouraged all families who were comfortable with the Christian philosophy to enrol.

At the time of the case study, the Australian Curriculum was yet to be implemented. Like all other Victorian schools of the time, the school was adhering to the Victorian Essential Learning Standards (VELS).

1.3 Methodology

A mixed method approach was adopted for the research project. The research was based around a single case study. The case study was conducted at the Victorian independent school outlined above, using two secondary classes. An integrated Project-Based Curriculum program was implemented in one of these classes. These two classes were then monitored over a three-week period. The project made use of both qualitative data and quantitative data. Collecting data this way enabled what Greene (2007, p.20) describes as "multiple ways of seeing and hearing". Qualitative data took the form of teacher interviews, student focus groups and natural classroom observations. Quantitative data was in the form of the collection of academic results generated from the research project, and a comparison to past academic results collected by the college.

1.4 Situating the Researcher

I began my teaching career as a junior secondary maths and science teacher at an independent Christian school in a medium-low socioeconomic area[*]. Like all beginning teachers, my aim was to cover the curriculum to the best of my abilities and so adopted the 'chalk and talk'[†] approach and slowly but surely made my way through the allocated textbook. This approach was satisfying most of the requirements of my position but was not inspiring the next generation of mathematicians or scientists. Students were not lining up at the door as soon as the bell signalled the end of recess. They were not busting to get in to start their next maths or science lesson. Whilst I felt that I was fulfilling my contracted job requirement and ensuring government obligations were met, I was not fulfilling my own expectations and reasons for entering the teaching profession. I was not inspiring or igniting new passions for the disciplines I was in charge of.

Six months into the year I was asked to be involved in an integrated Project-Based Curriculum program. The integrated program theme was 'Gold' and the subject I was teaching was mathematics, more specifically the notion of density. At first I was concerned as to how I was going to teach my required maths content through someone else's chosen theme. I had the weekend to worry about that and decided to attend a friend's movie night. All my concerns were resolved in the first ten minutes of the night's proceedings. To accommodate that chosen theme, I decided to base the unit around a gold statue that I had

[*] The socioeconomics of an area refers to its citizen's access to material and social resources, as well as their ability to participate in society. A medium-low socioeconomic area would suggest that its citizens would have a lower than average access to material and social resources and a lower participation rate in society.

[†] 'Chalk and talk' is a popular term for a formal method of teaching, in which the focal points are the blackboard and the teacher's voice. I would read from the textbook, write notes and questions on the board and have students copy the notes and answer the questions in their workbooks.

watched during that night's Indiana Jones movie.[*] The very next class I showed the start of the movie without any warning to the students or explanation why. As I had the previous week, they watched as Indiana Jones removed the small gold statue from its stand and replaced it with a bag of sand, which triggered a trap that consisted of a very large boulder Indiana had to run from. After the clip was finished, I simply asked the class the question, "Why did the bag of sand not work?" The students were all engaged and ready to work to find out the answer to my question. Over the course of the following few weeks, discussions around density seemed more relevant and interesting.

Reflecting at the conclusion of the program, I observed that students were more engaged in the entirety of the work that was being presented and noticed that some of the students who usually struggled academically experienced some academic success. I was not sure whether it was because of the program or not. When discussing the reasons for implementing such a program with my colleagues, the common response was that it was "something different to do". It was difficult for these teachers to confidently suggest that there were any definite benefits. It was felt that there were benefits and that the students were more engaged, but they could not be sure. I decided then to find out what the researchers had to say about integrated Project-Based Curriculum but discovered that this topic was not well researched compared to other educational programs. Believing that this program did have some benefits, I embarked on my own research project. In delving into practitioner research my attitudes towards it were closely aligned with Anderson, Herr and Nihlen (2007): 'As educators, we commonly want to study our own practices with an eye toward improving them. This means that we are adding the hat of the researcher to our regular roles as educators, which involves a more systematic study of our practices' ("Chapter 5," para. 48).

The aim of this research was therefore to further develop the understanding of integrated Project-Based Curriculum programs and identify if there are benefits that can be used to inform educators about this engaging pedagogy.

1.5 Thesis structure

The following is a brief overview of the thesis chapters:

Chapter 1: Presenting the Prologue

At this point I have outlined a rationale for the study and introduced the research methodology and the researcher. I now turn to the other chapters in the thesis and outline their content.

Chapter 2: Probing Past Papers

[*] The movie *Raiders of the Lost Ark* (1981) begins with the protagonist switching a sacred gold statue with a bag of sand of a similar size. Due to the difference in density and therefore weight the switch fails and activates a trap. The mistake made regarding the density of both materials is then used to further discussions around the topic of density.

This chapter explores the history of education worldwide and then narrows its focus to the local setting to report on the implementation and evolution of curriculum in the state of Victoria over the last 20 years. The literature review defines Project-Based curriculum and then reviews a range of literature that is relevant to the study, and analyses contemporary views and understandings of integrated Project-Based Curriculum programs.

Chapter 3: Mixed Method Methodology

The Methodology chapter details the case study approach used in the research, and justifies why it was adopted and implemented for this study. The chapter also explains the use of mixed methods in the research project. The chapter will then discuss my reflexive position as researcher within the research. Finally, the chapter will outline the reliability and validity of the data collected, and any limitations experienced with a mixed method case study approach.

Chapter 4: Factors, Feelings and Focus Groups

The chapter begins by analysing the qualitative data collected through pre-case study interviews of teachers. It continues with the analysis of the case study's natural classroom observations and the student focus groups that were recorded at various stages of the program. The chapter reports on the identification of five themes, then concludes with the post-case study interviews of teachers, examining their opinions of the implementation of the program and perceived benefits and problems.

Chapter 5: The Academic Shift

This chapter continues the data analysis by exploring the quantitative data generated by the integrated Project-Based Curriculum program and compares the data with previous quantitative results recorded in school records. The quantitative results reported in the chapter were based on two school classes which varied in average academic levels.

Chapter 6: Choice Cultivates Creativity, Critical Thinking and Collaboration

This chapter makes the case for the benefits of integrated Project-Based Curriculum programs. It explores the qualitative and quantitative findings from the study and compares them with the findings in the literature review. The chapter continues with four cases supporting the benefits of integrated Project-Based Curriculum. The four cases involve a discussion of the benefits identified in the data that indicate that these programs allow students to make choices in their own education, which creates an appreciation of each discipline and a connection to the 'real world'. These programs involve a great deal of group work that develops a number of work-related skills, including teamwork, communication and problem-solving skills. These programs engage students to self-learn and come to class with a

greater knowledge, enabling the teacher to teach the content in depth, thus creating a deeper learning.

Chapter 7: Researcher's Recommendations

This chapter returns to the overarching question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' It uses the qualitiative and quantitative data collected to answer the question. Finally, the chapter suggests how integrated Project-Based Curriculum programs should be implemented and delivered in the future.

1.6 The integrated Project-Based Curriculum

Data was collected on the five disciplines that Year 7 students were enrolled in. Additionally there were different electives for each class that also took part in the integrated Project-Based Curriculum. Below is a summary of the curriculum and the artefacts that each discipline produced during the program. A more detailed description can be found in Appendix One.

The project in this program involved a final oral presentation on an invention of the student's choosing and its inventor. Students were aware that they were required to answer the following essential question: 'How were lives changed by machines that were created by men and women with God-given gifts and talents?'

SCIENCE: Science was the lead discipline in this program. The final oral presentation was presented and assessed during the final science class. Students could use any and all artefacts produced in the other disciplines as part of their final oral presentation. The science topic taught in conjunction with the program was 'Heat and Heat Transferral'; more specifically, what machines were invented with the theories surrounding heat transferral? At the end of the program there was a final test on heat transferral. The artefact that was produced during this discipline was the final oral presentation.

MATHS: The topic taught in conjuction with the program was 'Statistics and Averages', specifically production rates before and after the invention of some machines. There was no artefact produced at the end of the program but students sat a final test.

ENGLISH: The topic taught in conjuction with the program was 'Children's Storybooks'. During the program students took part in a field trip to Dromkeen, a museum of past children's books. The artefact produced was a children's storybook on the student's chosen invention or inventor.

BIBLE: The topic taught was the idea that creativity and ability to problem solve are gifts from God. Students explored the lives of inventors who were also Christians. There was no artefact produced at the end of the program.

ART: The topic taught in conjunction with the program was ‘3D Drawings’. The artefact that was produced was a 3D drawing of student’s chosen invention.

INFORMATION TECHNOLOGY: The topic taught in conjuction with the program was the computer software ‘PowerPoint’. The artefact produced during the program was a PowerPoint presentation for the final oral presentation on the student’s chosen invention and inventor.

MUSIC (elective): The topic taught was ‘Writing Song Lyrics’. The artefact produced was a performed parody of a modern song with the theme of the student’s invention or inventor.

DESIGN AND TECH (elective): The topic taught was: ‘Model Building’. The artefact produced was a model of the student’s invention built out of wood.

CHAPTER 2: PROBING PAST PAPERS

2.1 Introduction

This chapter will review a range of literature that is relevant to the study, to identify and understand the context in which the study is situated and to review the associated commentary relating to the topic. The literature review will begin with a brief history of the introduction and the implementation of the Victorian government funded education system, exploring a number of issues that commentators have identified relating to the effectiveness and successes of teaching and learning strategies. The review will then explore the curriculum policy context in which the study is situated, incorporating a concise history of curriculum policy in Victoria starting with the Curriculum and Standards Framework (CSF), progressing through the Curriculum and Standards Framework II (CSFII) and the Victorian Essential Learning Standards (VELS) and ending with the current Australian National Curriculum. Finally, the literature review will define what an integrated Project-Based Curriculum program is and review key Project-Based Curriculum research and commentary to identify the perceived benefits and problems associated with the implementation of such a program in a secondary school setting.

2.2 Introduction and issues with the current Government Funded Education

Robinson (2011, p.53) described pre-government funded education as "…societies dominated by the interests of the old aristocracies and the churches; which presided over largely illiterate, usually poor rural populations". Education was the responsibility of the family unit – where parents would teach their children the family trade and other requirements necessary to function in society. Therefore, a generation would not be afforded the opportunity to better the families' education due to the fact that they were only taught the previous generation's knowledge.

The Industrial Revolution, which began in Great Britain during the late 1700s and spread across Western Europe and North America over a few decades, was the driving force of change in Western labour and many Western social improvements. Gutek (1995) proposes that the factory system of mass production initially caused widespread use of child labour, which correspondingly caused greater rates of illiteracy. Nonetheless, through the initiative of certain reform-minded political leaders in Britain, Europe and America who focused on the industrial poor, bills were passed in parliament abandoning the use of children as factory operatives and accordingly allowing more time for formal education:

> As a result, the school system increasingly replaced informal educational arrangements that once prevailed on the farm, in the mill and factory, and at home. As children between the ages of ten and sixteen were gradually emancipated from factory work, this period of youth, or adolescence, was increasingly used for education beyond the elementary stage. (Gutek, 1995, p.347)

The idea of government funded education also played a key role in Australia during federation:

> When the Australian public primary schooling system and, later, the secondary schooling system were being created (around federation in 1901), the argument about the formation of a free and equal citizenry was influential. Conceptions of access and equity, in which the social space is characterised by equality of respect and a shared right of self-determination, continue to be significant. (Marginson, 1993, p.18)

Robinson (2011, p.53) acknowledges that the "rise of industrialism generated enormous new streams of wealth and entirely new social force: the wealthy and aspiring middle class". The resultant new middle class viewed education as essential for continued social improvement and economic growth. The Industrial Revolution also provided the funds to pay for and resource the education facilities that the middle class now required. The Industrial Revolution not only funded the education system, but the education system's structures were designed around the skill sets required by the industrial sector.

Robinson describes how the education system that was created during the industrial revolution, and that is still used today, had a concomitance in function to the factories that this system was produced by:

> Like factories, schools are special facilities with clear boundaries that separate them from the outside world. They have set hours of operation and prescribed rules of conduct. They are based on the principles of standardization and conformity. Students within the academic system are taught broadly the same material and they are assessed against common scales of achievement, with relatively few opportunities for choice or deviation. Typically, they move through the system in age groups: all the five-year-olds together, all the six-year-olds together and so on, as if the most important thing that children have in common is their date of manufacture. In high schools, the day is organised into standard units of time and the transitions are marked by the ringing of bells and buzzers. Teaching is based on division of labour. Like an assembly line, student's progress from room to room to be taught by different teachers specialising in different disciplines. (p.56)

Jukes, McCain and Crockett (2010) agrees with Robinson's assembly line analogy; he writes that secondary schools:

> … were modelled after the assembly line and teachers specialized in only one subject, teaching it repeatedly throughout the day. Teachers abandon the holistic approach in which they had taught many subjects to a wide range of ages. They began teaching a single subject to students who were all the same age. Schools were organized into departments to further the specialisation of teachers. Teachers were given classrooms in which they would teach for short periods of time, usually an hour. A bell would ring and the students would move from one specialist to another. The basic layout of today's high school, with its hallways, classrooms and departments, was created before the Great Depression. ("Chapter 2," para. 24)

Jukes et al. (2010) describes that currently "no generation in history has ever been so thoroughly prepared for the Industrial Age". ("Chapter 9," para. 53)

Robinson also describes the system is similar in terms of linearity:

> Education systems also operate on the manufacturing principle of linearity; in that there are distinct sequential stages to the process. Each stage is meant to build logically on the one that precedes it; overall outcomes can be predicted with reasonable reliability. The idea is that if students progress in the prescribed way through the system, and especially if they complete college, they will emerge at the far end educated and prepared for whatever the world throws at them. (2011, p.57)

For Robinson the education system today can be compared to a gas tank model where students fill up during their educational years with a supply of knowledge that should see them through the rest of their life's journey. However, "…most people leave school with half a tank; it's basic grade and there are too few gas stations if they run out *en route*" (p.58).

Jukes (2010) believes that the old three Rs of education - reading, writing and arithmetic - is not enough anymore and that students need to be educated to become productive members of society "…learning to work, working to learn, dealing with the multiple career changes they will experience in their lives; being able to apply 21st century skills – critical thinking, problem solving, creativity, working in teams, learning in teams" ("Chapter 9," para. 15).

Mitra agrees with this notion of teaching outdated skills; he suggests that:

> …at the supermarket, you can't tell if the cashier knows arithmetic or not. Your groceries are scanned electronically and prices tallied automatically. Yet the cashier probably still performs his work capably. Arithmetic is an outdated life skill, like swordplay or horse riding. Four hundred years ago, those were vital life skills; today they are relics of a bygone world and primarily enjoyed sports. (Mitra, 2012, "Introduction," para. 2)

Where Mitra differs from Jukes et al. is in the skills he believes children require. Mitra argues that the new primary curriculum needs to teach only three skills: reading comprehension, information search and analysis and a rational system of belief. For Mitra,

> Children who have these skills scarcely need schools as we define them today. They need a learning environment and a source of rich, big questions. Computers can give out answers, but they cannot, as of yet, make questions. Hence, the teacher's role becomes bigger and stranger than ever before: she must ask her 'learners' about things she does not know herself. Then she can stand back and watch as learning emerges. (Mitra, 2012, "2062: Learning and babble," para. 36)

Another area of concern for Robinson involves what he calls the hierarchy of discipline. He argues that the purpose behind hierarchy of subjects in school is associated with schools being put under pressure to prioritise their subjects so that they are in line with government economic priorities. Consequently, science and technology are funded more substantially than the arts and humanities. For Robinson, "[I]n almost all industrial systems there is the same hierarchy of disciplines in high schools and increasingly in elementary schools too. At the top are mathematics, languages and sciences; some way down are the humanities – history, geography and social studies – and physical education; at the bottom are the arts" (2011, p.59). He argues that the problem with the discipline hierarchy can even occur within individual disciplines, reporting that in the discipline of the arts, music and visual attain a higher status than theatre and dance. He concludes by asserting that:

> There isn't a school system in the world that teaches dance every day as a compulsory discipline in the way that mathematics is taught. The hierarchy shows itself in the amounts of time that are given to different disciplines; whether they are compulsory or optional and for who; whether they are in the mainstream curriculum or after school; whether they are included in standardised tests and how much they feature in political polemics about raising standards. (2011, p.59)

Robinson describes a childhood memory of his, when he was faced with the dilemma of having to choose between the disciplines of Art or German due to a clash in the school timetable. When he sought a teacher's counsel, the advice he received was to do German as "it would be more useful" (2011, p.61). He concluded that it seemed that:

> …curricula of most school systems seem to divide into two broad groups: the useful disciplines and the useless ones. Languages, mathematics, science, and technology are useful; history, geography, art, music and drama are not. When funding is tight or reform movements focus on raising standards, arts programs are usually cut. (2011, p.60)

Robinson believes that because of this hierarchy:

> …many intelligent people have passed through the whole of their education feeling they aren't (intelligent) and many academically able people who've been feted by the system have never discovered their other abilities. Almost all of them have no real sense of their true creative potential. The waste of creative talent is a growing calamity. (2011, p.66)

Hence this study was framed with the conviction that there must be a better way to structure curriculum so that young people today, who arguably learn differently from the traditional style of teaching, do not complete their secondary schooling with the feeling of inadequacy. Could integrated Project-Based Curriculum be that structure?

2.3 History of Victorian curriculum policy

Over a relatively short period of time, curriculum in Victoria has received a number of updates and reforms. In trying to keep up with what Jukes et al. (2010) describes as necessary 21st century skills of "critical thinking, problem solving, creativity, working in teams, learning in teams" ("Chapter 9," para. 15), the policy documents that mandate curriculum in Victoria have been replaced four times within the last twenty year period. The following is a brief history of those changes.

In 1960, a 180-page report was produced entitled 'Report of the Committee on State Education in Victoria' under the guidance of Alan Ramsay. This report introduced the beginnings of the Dual System, the setup of the Board of Education 'Common Schools Act of 1862'and the appointment of the first Director of Education, and included other commitments to school purposes and teacher training and recruitment.

In 1985 a two-volume report entitled 'Ministerial Review of Post Compulsory Schooling', better known as the Blackburn Report, was presented to the state government with 45 recommendations, the major recommendation being that a single two-year certificate marking the completion of secondary schooling named the Victorian Certificate of Education (VCE) be introduced (Blackburn, 1985).

In 1995, the Curriculum and Standards Framework (CSF) was published. These standards stated what students from Prep to Year 10 were expected to know and be able to achieve in eight key areas: The Arts, English, Health and Physical Education, Languages other than English, Mathematics, Science, Studies of Social Environment, and Technology. In 1997, Education Victoria conducted a quality review of the program and in 1998 produced a Quality Assurance for Victorian Schools report. In response to this report, an update of the Curriculum and Standards Framework was published in 2000, which was commonly known as the CSFII. This was designed to clarify expectations and benchmark students nationally and internationally to ensure Victoria paralleled expectations of like countries.

In 2003, the Minister for Education and Training released the Blueprint for Government Schools. This document addressed three issues that needed attention:

1. The concentration of poor outcomes in some schools and some regions
2. High variations of outcomes between classes within schools, which highlighted the importance of the teaching-learning relationship
3. Variations in outcomes between schools with similar student populations.

From this the Government identified three priority areas for reform:

1. Recognising and Responding to Diverse Student Needs
2. Building the Skills of the Education Workforce to Enhance the Teaching-Learning Relationship
3. Continuously Improving Schools.

In 2004, the Victorian Curriculum Assessment Authority (VCAA) organised a series of statewide forums to establish key elements of the proposed approach and to seek feedback. After meeting with over 800 curriculum leaders and thirty principals and key stakeholders, the key elements of the Victorian Essential Learning Standards (VELS) were established, which were:

- Learning for all: the belief that all students can learn given sufficient time and support, and that good schools and good teaching make a positive difference
- Pursuit of excellence: seeking to accomplish something noteworthy and admirable, individually and collectively, and perform at their best
- Engagement and effort: acknowledging that student ability is only one factor in achievement and if students work hard and make an effort they improve
- Respect for evidence: seeking understanding through structured inquiry and the application of evidence to test and question beliefs
- Openness of mind: being willing to consider a range of different views and consider different ways in which evidence is perceived and solutions can be reached.

This produced three VELS strands which were:

- Physical, Personal and Social Learning: encompassing areas such as health and physical education and civics and citizenship.
- Discipline-based Learning: covering disciplines such as the arts, economics, English, mathematics, geography and history
- Interdisciplinary Learning: covering communication and information technology. (Victorian Curriculum and Assessment Authority, 2009, para 2)

In 2008, the Commonwealth Government announced that a national curriculum was needed and set up the Australian Curriculum Assessment and Reporting Authority (ACARA). In setting up a national curriculum for all year levels from Foundation to Year 12, ACARA was guided by the Melbourne Declaration on Educational Goals for Young Australians document which was agreed to by all Australian Educational Ministers. This document established two goals:

> Goal 1: Australian schooling promotes equity and excellence
> Goal 2: All young Australians become successful learners, confident and creative individuals and active and informed citizens.

In the document there was also a commitment to several actions:

- Developing stronger partnerships
- Supporting quality teaching and school leadership
- Strengthening early childhood education
- Enhancing middle year development
- Supporting senior years of schooling and youth transitions
- Promoting world-class curriculum and assessment
- Improving educational outcomes for indigenous youth and disadvantaged young Australians, especially those from low socioeconomic backgrounds
- Strengthening accountability and transparency (MCEETYA, 2008, p.2).

This document led to the creation of the Australian Curriculum. The design of the Australian Curriculum has three dimensions – discipline-based learning areas, general capabilities as essential twenty-first century skills and contemporary cross-curriculum priorities.

The discipline-based learning areas included in the Australian Curriculum are:

- English
- Mathematics
- Science
- Humanities and Social Science (History, Geography, Civics and Citizenship and Economics and Business.)
- The Arts (Dance, Drama, Media Arts, Music and Visual Arts)
- Languages
- Health and Physical Education
- Technologies (Digital Technologies and Design and Technologies)

The General Capabilities as essential twenty-first century skills that are included in the Australian Curriculum are:

- Literacy
- Numeracy
- Information and communication technology (ICT) capability
- Critical and creative thinking
- Personal and social capability
- Ethical understanding
- Intercultural understanding.

To better understand the world, the following contemporary cross-curriculum priorities have been included in the Australian Curriculum:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability.

It is interesting to note that 'Critical and creative thinking' is mandated to be a necessary 21st century skill to be taught in schools across Australia along with 'Literacy' and 'Numeracy'. This is in line with the commentary of Jukes at al. about the old 'three Rs' not being enough.

The Australian Curriculum for Years 7-10 English, Mathematics, Science and History was implemented in 2013, Geography was implemented in 2014 and the Arts, Languages, Health and Physical Science and Technologies were implemented in 2015. The aim is to have the senior disciplines (VCE) implemented by 2016.

2.4 Project-Based Curriculum

In reviewing the changes of curriculum policy in Victoria it is apparent that what started off as teaching eight key areas under the original CSF, is now more complex under the new Australian Curriculum, where it is expected that eight discipline-based learning areas are taught along with seven general capabilities essential for twenty-first century learners, and finally three cross-curriculum priorities. This complexity, along with the increasing rates of student dropouts, "poor VCE results and low school completion" (Kosky ,2003, p.9), requires schools to develop new strategies and pedagogies to engage learners. Project-Based Curriculum is one program that is currently being used in today's schools.

When the term Project-Based Curriculum is used, it often refers to the grouping of student teams to solve a problem or to research an inquiry they are interested in. That is why "…it has been referred to also as problem-based learning and inquiry-based learning" (Allan, 2007, p.80). Bender (2012) describes Project-Based Curriculum as an "…instructional model based on having students confront real-world issues and problems that they find meaningful, determine how to address them, and then act in a collaborative fashion to create problem solutions" ("Introduction," para. 1).

Tootell and McGeorge (1998) informs us that the principles of Project-Based Curriculum can be traced back to the early teachings of Socrates; however, the learning approach developed by the McMasters medical school in the late 1960s was a model that is the benchmark by even today's most current Project-Based Curriculum programs. The McMaster Problem Based Learning model features the following:

- Learning is student centred
- Learning occurs in small groups

- Teachers are facilitators or guides
- Problems form the organizing focus and stimulus for learning
- Problems are a vehicle for the development of clinical problem solving skills
- New information is acquired through self-directed learning (p.2).

Blumenfeld et al. (1991) describe Project-Based Curriculum as a "…comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems" (p.369). The authors continue to say that during a Project-Based Curriculum the facilitator, or teacher, is required to create "…questions or a problem that serves to organise and drive activities: and these activities result in a series of artefacts, or products, that culminate in a final product that addresses the driving question" (p.372). In integrated Project-Based Curriculum this problem or inquiry is created by a teacher (in one discipline) and used by other teachers (in alternate disciplines), each attempting to solve the same problem from a different angle, the outcome being that one problem or inquiry is taught across the entire year level but from different perspectives. Whilst learning key concepts in each discipline area is important, it is not the only focus in this style of learning. Bach (2008), for example, goes as far as to say that "…the point is not necessarily to find the 'right' answers but for classmates to work together with their various knowledge, resources, and experiences to create these 'solutions'" (p.4).

For Thomas (2000), "…the original problem-based learning model was developed for the use of medical students in Canada" (p.5). The model was created to help medical interns work in teams to generate skills to solve poorly defined medical problems. This model has since been used in business, architecture, law and graduate education schools, and "…more recently, the 'Problem-Based learning' model has been extended to mathematics, science, and social studies classes at the elementary and secondary level" (p.6).

A number of commentators over the last twenty years (Allan, 2007; Bach, 2008; Bender, 2012; Blumenfeld et al., 1991; Graaf & Kolmos, 2003; Savage, 2010; Thomas, 2000; Tootell & McGeorge, 1998), have argued that there are a number of perceived benefits when delivering a well-implemented Project-Based Curriculum program. These benefits include those that teachers set out to achieve, such as a deeper learning and a more engaged classroom, but also benefits that are by-products of the program, such as enhanced student 'life-long' skills or forming stronger teacher-student relationships and even parent-student relationships. Tootell and McGeorge (1998) outline four important benefits that have been highlighted from the initial medical studies of Project-Based Curriculum programs. The four benefits are:

- Structuring knowledge for use in clinical contexts
- Developing of an effective clinical reasoning process
- Developing effective self-directed learning skills
- Increased motivation for learning. (p.6)

Whilst these benefits contain formal medical language, they can be simply modified to suit the objectives of most Project-Based Curriculum programs.

The first benefit according to Tootell and McGeorge (1998, p. 7) is that a more structured process of attaining knowledge results in a deeper learning. They suggest the "development of practice of exchanging information on the relative value of various sources of information; new learning is shared by presenting it to others, and by interrogating others, and the practice of application of new knowledge to the original or new problems" lead to a greater structured knowledge. This is supported by reports that "proponents of Project-Based learning claim that as the students investigate and seek resolutions to problems, they acquire an understanding of key principles and concepts" (Blumenfeld et al., 1991, p.372). This suggests that as the students research their own inquiries, their interest in the topic and the discussion they have as a group around those interests will help them learn the content at a deeper level and remember concepts that they might not have remembered if the content had been delivered to them in a traditional 'chalk and talk' setting. Students will essentially experience a deeper learning.

Johnston (2000) specifies that the difference between deeper learning and surface learning is that in deeper learning students become "personally involved in the task and seek to obtain some underlying meaning. In addition they aim to understand relationships between the immediate task and other tasks or contexts. Such students are likely to read extensively around a given topic, to discuss the topic and ultimately to achieve higher grades in assessment tasks than students who use a surface approach" (p.3).

Johnston then summarises the differences in the following table:

DEEP APPROACH	SURFACE APPROACH
The intention is to understand. The student maintains the structure of the task	The student is only to complete the task; the student distorts the structure of the task
Focus on 'what is signified' (the arguments, the concepts for solving the problem)	Focus on the 'signs' (the words of the text, the application of formula needed to solve the problem)
Relate previous knowledge to new knowledge	Associate facts and concepts unreflectively
Relate knowledge from other subject/course	Memorise information for assessment only
Relate theoretical ideas to everyday experience	Treat the task as an external imposition
Relate and distinguishes evidence and argument	Fail to distinguish principles from examples
Organise structure and content into a coherent whole	Focus on unrelated parts of the task
Internal emphasis	External emphasis

Table 2.1 Different approaches to learning

Under this interpretation we can surmise that a deeper learning has been achieved if the student has read further into the topic than necessary, initiates conversations around the topic outside of class, links other knowledge from different disciplines, relates prior knowledge and their everyday experiences and achieves better results on final assessments.

Bender lists six favourable researched outcomes in terms of knowledge. They are:

1. Project-Based Learning (PBL) meets an often-stated goal of educators by stressing deeper understanding. Research has shown that PBL results in higher levels of conceptual processing, higher understanding of principles, deeper reflection and increased critical thinking.

2. PBL results in enhanced retention of information because students are processing information in a distinctly different manner than is typically involved in rote learning.

3. PBL results in increased use of effective problem-solving strategies and has been shown to be effective in a wide variety of core academic areas including mathematics, science, economics and history.

4. PBL fosters the types of problem-solving skills and deep conceptual skills that are required in the modern work environment of the 21st century.

5. PBL typically involves extensive use of instructional technology by the students and thus fosters expertise in the types of technology used in the 21st century.

6. PBL is particularly effective with lower-achieving students, making this an excellent option for differentiating instructions for struggling students. (2012, "Chapter 2," para. 16).

Bender asserts that because of these identified outcomes Project-Based Learning was identified in "one meta-analysis [which] synthesized a large body of research and indicated that students may improve as much as 30 percent in their understanding of concepts as a result of project-based learning (2012, "Chapter 2," para. 11). Thomas supports this in his earlier research by arguing that "nine out of ten schools that implemented Expeditionary Learning in 1993 demonstrated significant improvement in students' test scores on standardized tests of academic achievement" (Thomas, 2000, p.9).

The second benefit identified was the development of effective reasoning. Tootell and McGeorge (1998,) suggest that as students "[c]larify terms and concepts not readily comprehensible, define the problem and analyse the problem" (p.6) as a team, they enhance their reasoning process and problem-solving skills. Allan (2007) supports this argument and suggests that through Project-Based Curriculum programs students not only develop enhanced problem-solving-skill but also their communication skills and team work skills (p.81). Students acquire skills during the inquiry topic that they can use in other inquiry topics and in other different life problems. Leung (2008) goes further to argue that the Project-Based Curriculum environment actually "enhances the learning atmosphere in

schools" (p.90) that can help in other discipline learning and the development of generic skills. Leung also suggests that these programs improve student-teacher relationships. This is due to the fact that the teacher's role is now to assist the students in helping them to research and achieve their desired goals rather than to dictate to the students what they need to know and how they will be assessed. Blumenfeld et al. supports this notion by pointing out that "the master-apprentice relationship is used as an analogy for the teaching-learning situation" of today (1991, p.393).

Students will try different avenues to locate information for their inquiry. Whilst some might seek teacher's guidance, others may seek the advice of parents in this situation and their relationships are strengthened. For Leung (2008), the program caters to students' needs and gives the student an all-round development (p.90). Savage (2010) states it promotes students' cognitive, personal and social development in an integrated way (p.42). Students are able to draw on similarities in and between individual disciplines and make these links explicit in various ways. This provides active and experiential learning for students.

The third benefit involves the development of self-directed learning skills. Tootell and McGeorge (1998) suggest that allowing students to formulate learning objectives and encourage students to "identify what is not yet understood or known and to see ignorance as a challenge to further learning rather than as a cause of shame" (p.7) enhances the development of students' self-directed 'life-long' learning skills. By enabling students to identify and then learn concepts that are not yet understood, students create a 'real world' link with the program. This is supported by Richmond, Banjeree and White's (2008) research; the authors report that through their research "students uniformly felt that they gained a great deal of real-world experience" (p.511). Students will decide on inquiries about unknown concepts or issues that interest them, and usually they will choose issues that they face in the 'real world' or that the 'real world' is facing. By doing so, they see the benefits of learning such material and how it might help them currently and into their future, and therefore, are more dedicated to learning what is required.

Finally, increased motivation was identified as a key benefit. Tootell and McGeorge (1998, p.6) suggest that attempting to tackle realistic problems in students' chosen fields increased their motivation for learning. This is further support by Allan (2007) who reported on a program she delivered and found that "…students were totally engaged and enthralled by the research and learning process" (p.87). Students enjoy being in charge of their learning and researching inquiries that they are interested in and have chosen themselves. A sense of ownership of the education is developed in the students. A deeper learning and a more engaging content is what all teachers should aim for when they are developing their teaching programs. Bender (2012) also found that Project-Based Curriculum was "more relevant to students and increases students' motivation and interest in completing the work that is required" ("Chapter 2," para. 15).

There are also some perceived benefits for teachers. Savage (2010) describes the development of meaningful co-operation and collaboration between staff leading to the dual benefits of curriculum and professional development (p.42). Teachers then take the

opportunity to evaluate and reflect on their teaching; this gives them the opportunity to become imaginative and innovative in their curriculum planning. As a group, teachers will facilitate a shared vision amongst themselves and their managers through meaningful collaborations at all levels of curriculum design.

There are associated problems with Project-Based Curriculum programs. When developing an integrated Project-Based Curriculum program it is important that these problems are considered so that they can be successfully avoided. The five main problems, identified throughout this research from various sources, are: resistance from teachers and students, group work dynamics, fair and equitable assessment, allocation of resources and loss of class structure.

We will now look at these challenges and their sources in more detail: the first is that change produces resistance. Changing current curriculum to Project-Based Curriculum will naturally produce some resistance because of a number of factors. These factors range from teachers not wanting to invest in the effort to implement these programs, to teachers who do not have the skills to implement these programs. Resistance might even be found amongst the students, who may not have the skills to participate in these programs. Due to the nature of Project-Based Curriculum students will be expected to actively search for the information they need to complete their chosen project, instead of relying on the teacher to provide it. Some students might not have the skills or abilities to do this, and will need to be taught this first or have a program designed so that they are coached through a series of scaffolded projects increasing in varies degrees of difficulty and decreasing in teacher intervention.

The nature of the program and the need to form inquiry questions that are both open ended so that students have a certain amount of control, and narrow so that there is a clear direction in place for all students, means that a certain amount of preparation is required to set up and implement a successful Project-Based Curriculum. Richmond et al.'s (2008) research clearly shows that such a project, particularly if it is over a number of disciplines, "increased faculty time and effort" (p.512). The difficulty is that if the teacher was teaching their topic separate from the Project-Based Curriculum then they could prepare in their own time as little or as efficiently as they wanted, without the need to meet up or converse with their peers. However, in an integrated Project-Based Curriculum program each individual teacher will be required to:

- Meet initially as a group to develop strategies as to how each discipline is going to deliver the content;
- Meet during the program to assist each other where needed and to ensure all disciplines have remained on track and delivered the required program.
- Meet at the conclusion to discuss, reflect and assess how they felt the program ran and what changes could be made for future programs.

Asking a teacher to agree to spend more time preparing the same topic is a difficult task (Richmond et al., 2008, p.512).

A larger problem is associated with teachers' reluctance to change their established mindset, particularly in the case where teachers are happy with their own style of teaching. For these cases it "requires substantial changes in teachers' thinking about and dispositions toward classroom structures, activities, and tasks" (Blumenfeld et al., 1991, p.373). Such teachers might need more than 'better results' to abandon what they have previously been successfully doing for the duration of their long careers to adopt a new, radical and somewhat unfamiliar way of teaching.

Once teachers have agreed take part in the program, the challenges do not stop there. The next challenge to overcome is the lack of teacher experience or expertise in delivering such a program, remembering that "a crucial issue is how to ensure that the project questions are educationally rich enough that in seeking answers students must gain understanding of significant discipline matter concepts" (Blumenfeld et al., 1991, p.376). Teachers need to be trained in what makes a good inquiry question, a question that will allow students to delve deep into a topic that they have had some contribution to. Allan (2007) also states that another challenge for the inexperienced teacher is to "link the project with the curriculum and more importantly to find ways to link learning with the experience of doing" (p.89). This is often the hardest thing to merge, the inquiry that has been chosen and the curriculum that is mandated to be taught. If the question is chosen well, sometimes the inquiry will fall nicely into the curriculum and the teacher doesn't have a problem. However, what is more likely is that the curriculum that needs to be taught differs significantly from the selected inquiry. Individual teachers handle this in different ways. Some will spend a great deal of their own time researching ways they can link both issues, and will not stop until they are satisfied with what they have come up with. Others will adopt a 'close enough is near enough' attitude - the old adage that 'near enough is good enough'. The problem with the latter is that students may become aware of such an attitude; if they believe that the teacher is teaching the same past topics simply repackaged under a different name, students will see the whole program as a gimmick and will be less inclined to take it seriously. Allan (2007) states that Project-Based Curriculum "challenges the tension between formal theoretical knowledge and constructed practice knowledge that plays out in attempts to turn ideal into practice" (p.90).

The final challenge is associated with resistance from the students themselves. Blumenfeld et al. (1991) states that "students often are resistant to tasks that involve high-level cognitive processing and try to simplify the demands of the situation through negotiation" (p.374). Whilst teachers can offer a program that could see a student delve deeply and learn significantly, some students will instead do the bare minimum, if allowed, and will do just enough to complete and answer the given question. Another challenge that students face involves whether they are capable of self-managing their own program and research. Blumenfeld et al. (1991) suggests that "students need to have sufficient knowledge of the content and specific skills to explore information pertinent to the problem" (p.378). Graaf and Kolmos (2003) further support the argument by Blumenfeld et al. that Project-Based Curriculum requires students use high-level cognitive processing by suggesting that students are "expected to reach a level of analytically complex comprehension through the problem-based work that would not be possible in conventional classes" (p.660). Without assistance,

students cannot be expected to go from one learning style which is effectively information dumping from the teacher, to a program where they are let loose into the research world with just a question in hand and not much else. Marsh (2004) describes three levels in which students can be categorised:

> Those at the level of guided study need considerable assistance; those at co-operative planning level can direct their own activities but need assistance from time to time; those at an individual pursuit level can already define topic – they can make decisions, locate resources and keep deadlines. (p.187)

Whichever level, students need constant monitoring and occasional support throughout the program as to how to answer their question and how to research their inquiry.

Blumenfeld et al. (1991) puts forward the strong argument that "all challenges that have been discussed for both teachers and students cannot be overcome without the right amount of support: Without adequate attention to ways of supporting teachers and students, these innovative educational approaches will not be widely adopted" (p.373).

Although there are a number of benefits documented with collaborative learning, there are also a number of problems that need to be considered. Frey, Fisher and Everlove (2009) assert that, "Most students (and many teachers) have never experienced genuine collaborative learning. For the majority of us, our experience of academic group work consists of being thrown together into a group and then expected to create a product, learn a skill, or accomplish a task without additional support from the instructor" ("Introduction," para. 13). Due to the inexperience of the participants and the high expectation of the instructor for students to work together efficiently without support, problems do occur. Frey et al. (2009) reports on a maths teacher's frustration with her experience with group work:

> Where I had imagined cooperative dialogue, there was bickering and arguing over materials. Where I had envisioned smiles, many students wore sullen looks. A few wore triumphant smiles as they managed to take over the work or materials. Where I had hoped for thoughtful curiosity, there were pleading looks saying, 'What do I do?' I was so disappointed by these results and my inability to change things in a way that would get my students working productively. ("Introduction," para. 21)

Marsh (2004) identifies four problems associated with group work that can be overcome. These problems are: No-one says anything, uneven participation, victimisation of a student and discussion becomes biased (p.183). The first problem that Marsh identifies is the situation where the group meets together and 'no-one' says anything. In this situation, not one student will step up to lead the discussion of the group and assist in mediation of the conversation. Without this assistance in the communication of the group, work is slow and progress can stall. It is important that the group have at least one member who has the courage and is willing to voice their opinions first, which will in turn encourage others to do the same. This leading student might also need to question others' opinions; however, if the group does not have this leadership it will likely fail.

The most common problem with group work is when a group may start out with "good intentions, but often ends with one or two students taking over and doing the lion's share of the work while the rest play minor roles. The working bees (diligent students) often feel put upon, taken advantage of, or shackled by their peers" (Frey et al., 2009, "Introduction," para. 13). These students who take over might do so naturally, or they might do so due the lack of efforts of their group partners. Frey et al. refers to a case in which a boy named Doug purposely chose groups to participate in where he knew the work ethic of his partners was high, meaning that he would not have to contribute much. He was described as a hitchhiker, and the end result was him receiving an A result, but retaining very little knowledge about his part of the presentation, due to the fact that another student wrote it for him. Frey, Fisher and Everlove (2009) concludes, "Whether students experience group work as a worker bee, gopher, or hitchhiker, the end results are generally the same – lots of frustration and too little real learning" ("Introduction," para. 13).

Marsh identifies the next problem being the victimisation of a student. Depending on how the groups are chosen, some students might find themselves in groups where they will receive very little collegial support and instead experience different forms of bullying. It may take the form of direct bullying, in terms of name calling and physical abuse, in which case the teacher can easily intervene; however, the bullying might be more subtle. It may involve the entire group ignoring or sidelining a single member. Frey et al. (2009) expresses the view that sidelined members can often "feel inadequate, unable to keep up, or that they have nothing valuable to contribute" ("Introduction," para. 13). This could lead to student depression if it is not discovered and managed.

In direct contrast to the first problem where no one steps up to lead, the last problem is where one or two members of the group become more vocal than the rest. Whilst a discussion is had and work is achieved, the decision-making process of the group may become biased towards those more vocal members. Quieter members might not contribute their opinions due to fear of rejection from the more vocal members or a reluctance to slow down the group's pace. This again leads to unequal amounts of participation and frustration of group members.

Frey et al. describe a system to slowly introduce group work to students so that some of these potential problems are avoided. The authors call it the gradual release of responsibility model. The frameworks consists of the following components in this order:

1. Focus lesson. The teacher establishes the lesson's purpose and models his or her own thinking for students to illustrate how to approach the new learning

2. Guided instruction. The teacher strategically uses assessment-informed prompts, cues and questions to guide students to increasingly complex thinking and facilitate students' increased responsibility for task completion.

3. Collaborative learning. The teacher designs and supervises tasks that enable students to consolidate their thinking and understanding – and that require students to generate individual products that can provide formative assessment information.

4. Independent tasks. The teacher designs and supervises tasks that require students to apply information they have been taught to create new and authentic products. This phase of the instructional framework is ideal for the 'spiral review' that so many educators know their students need and is a way to build students' confidence by allowing them to demonstrate their expanding competence. ("Introduction," para. 22)

The decision on how to assess both Project-Based Curriculum's artefacts and group work is another problem that can hinder a successful integrated Project-Based Curriculum program. Allan (2007) confirms this by saying that, "…problems include difficulty with assessment, team building and in the engineering sector, resource allocation" (p.81). Assessment can be difficult due to the focus of the inquiry. How do you assess communication? How do you assess thinking and problem solving? How do you assess and compare projects that are differently researched and answered? This makes a generalised rubric assessment tool almost impossible to create. There are also issues with assigning a single grade for more than one student in a group. Can teachers safely assume that during group work all members do an equal amount of the work and do they all receive the same understanding?

Whilst all these questions are difficult to resolve, Frey et al. (2009) have helped address some of these issues by creating guidelines for ensuring accountability in all forms of group work - Project-Based or not:

1. Design tasks that emphasize larger learning goals (How to make healthy food choices) rather than discrete knowledge (What the food pyramid looks like). This makes the division of labour into assembly-line production unlikely.

2. Give students experience with small tasks before asking them to tackle longer projects. An incremental start helps them build the stamina required to sustain work extending over several days or weeks and gives individuals the practice needed to be successful in the group.

3. Establish timelines for both individual and group completion of each phase of the assignment.

4. Create interim steps for discussing individual and group progress and providing feedback.

5. Ask students to evaluate themselves and their group's efforts. We have groups complete their evaluation on one form so that all members see each other's words. It's amazing how honest they are about what they did and did not do.

6. Factor in both individual and group evaluations when grading the assignment. This means that each member receives two grades for the assignment – an individual grade and a group grade. ("Chapter 4," para. 5)

Guidelines five and six ensure that the teacher does not have to assume that during group work that all members do an equal amount of work. Frey et al. advise that if teachers fail to

follow these guidelines to prepare and design group work appropriately, they will experience the aforementioned problems. Frey et al. (2009) reports on a case where a teacher:

> failed implementation of cooperative learning groups which resulted in failure to check for understanding or link instruction with performance. Because the group work had not been designed to yield information about individual student performance, the teacher was left to assume that every member of the group understood the content equally well. ("Introduction," para. 16)

Resources are another area that can be challenging, particularly if the program incorporates multiple disciplines. If the same theme is being taught in every discipline a class takes, participating teachers might opt to want to use a particular DVD or textbook that covers the theme. Aside from the fact that the resource in question may not be able to be in different places at once, there is a risk that if the same resource is being used in every discipline, those students are not seeing the problem from different points of view or angles. This would limit the program and would cause it to be less engaging.

One of the first challenges any beginning teacher tackles is the "…chaotic nature of interactions in all classrooms and the difficulties of learning in a crowd. To offset these problems various structures and routines are developed and maintained by classroom teachers" (Marsh, 2004, p.104). These routines produce a positive classroom environment. Students know exactly what is going to happen at any point of the lesson and in most circumstances conform to that routine. It might be a simple lesson plan that begins with checking the previous day's homework, running through the theory or the lesson's activity and then ending with some follow-up questions on what they have learnt. This structure is delivered in time intervals decided by the teacher. Project-Based Curriculum removes this structure, substituting it with another that does not provide for the teacher's control over the speed of the lesson. Project-Based Curriculum allows students to become more independent and self-directed learners. Marsh describes this form of learning as ideal when the students are "doing activities that are worthwhile and meaningful to them" or "disciplining themselves to do the work" (p.187). However, if these two criteria are not met, the teacher can expect to face enhanced discipline issues as students become unfocused and move off task.

2.5 How to implement Project-Based Curriculum

To avoid the challenges discussed in the previous section, it is important that any implementation of a Program-Based Curriculum is done thoughtfully and with solid preparation. Frasier (2008) outlines three definite prerequisites to overcome challenges and implement a successful program. These prerequisites are time, a curriculum map and resources (p.3).

Schools need to be able to support the teachers involved in any Project-Based Curriculum by allocating them enough time to prepare for these programs. Blumenfeld et al. (1991) states that during preparation time, teachers need to ensure that they have designed a program that they can "(a) create opportunities for learning by providing access to information; (b) support

learning by scaffolding instruction and modelling and guiding students to make tasks more manageable; (c) encourage students to use learning and metacognitive processes" (p.381). Teachers then need time during the program to ascertain that everything is going to plan and provide skills to students so they are able to complete the task. Teachers need to continue to "…create an environment conducive to constructive inquiry and manage the classroom to ensure that work is accomplished in an orderly and efficient fashion" (p.381). Finally, teachers need time at the end to "(d) assess progress, diagnose problems, provide feedback, and evaluate overall results" (p.381).

For Blumenfeld et al. (1991), to create a successful integrated Project-Based Curriculum program, the set problem "…should be designed to be interesting and meaningful to learners and promote a deep level understanding of the content" (p.372). A curriculum map needs to include this interesting design. However, Frasier (2008) believes it should include three more additional elements:
"1/ Identify an Essential Question for Enduring Understanding: What is our focus and why does this matter?" (p.3). This is the question that needs to be developed by the teachers as a starting point for student inquiry. The question must be narrow enough to make sure the mandated curriculum is taught but open enough for students to feel like they are making decisions and 'owning' their education.
"2/ Identify a Culminating Project & Assessment: Where do we want to go with this & and how will we know we've arrived?" (p.3). Once the question has been developed and the students have chosen their pathways, decisions need to be made as to what artefacts are going to be produced and what students are expected to achieve. An important question is, where do students stop? Students need a clear aim so they know when they have finished and don't end up continuing working and possibly not answering the question they first set out with.
"3/ Create a Backwards Plan (Instructional Sequence): How can students be helped to get there?" (p.3). Students involved in such a program for the first time might not have the necessary skills to self-manage their own education and research into the inquiry. It is important that the teachers have a developed plan as to how they are going to assist these students to attain the appropriate skills in research, teamwork and communication so the students can successfully achieve their goals and complete the tasks they have set out to do.

Schools are required to provide each teacher with a number of different resources so that teachers are able to help students see the problem from different points of view. There is a requirement that there be enough resources so that students' tasks can be varied, the artefacts the students produce can be different and that they have a choice in what they can achieve. Blumenfeld et al. (1991) suggests that it is required that there be enough different resources available to the students so they are able to: "(a) select project questions, activities, and artefacts, (b) determine how to approach the problem, what steps to follow, what resources to use, and how to allocate responsibility and (c) choose the artefacts to construct and how to construct them" (p.376). Without varied resources students will get one view and one way to solve the problem, which limits their choice and their decision-making ability. This will then limit their perceived 'ownership' of the project and the benefits this creates.

2.6 Summary

The literature review has revealed considerable problems with the current educational system due to it being modelled during the Industrial Revolution for the requirements and priorities of that period. It has highlighted issues of discipline hierarchy, which stifle the creative potential of students. It has determined that as 21st century skills are more than literacy and numeracy, it is necessary to be teaching students thinking skills and creativity. The review has also revealed the complexities in the current curriculum, which is mandated for all Victorian teachers. This gives reasons for today's teachers to seek out contemporary and innovative teaching techniques and strategies to engage today's learners. One of these contemporary and, as the review has highlighted, prominent options involves integrated Project-Based Curriculum.

The review defined Project-Based Curriculum as an "instructional model based on having students confront real-world issues and problems that they find meaningful, determine how to address them, and then act in a collaborative fashion to create problem solutions" (Bender, 2012, "Introduction," para. 1). Benefits were identified, such as a deeper learning, enhanced problem-solving skills, enhanced self-directed 'life-long' learning skills and engagement and increased motivation to learn. These benefits align with the necessary 21st century skills students require to be prepared for their lives after formal education.

Along with these benefits, some problems with Project-Based Curriculum were identified and explored. However, with appropriate implementation of an integrated Project-Based Curriculum model these problems can be overcome. Three necessities to overcome these problems were identified. The first was the allocation of enough time for the preparation, duration and reflection of Project-Based Curriculum. Having enough time to prepare will result in teachers being less inclined to resist, and will provide teachers with the ability to prepare programs where students are managed and supported appropriately in the unstructured program. This support in turn can reduce the likelihood of student resistance. The second necessity identified in the review was creating a well-developed curriculum map by all teachers in the program. Along with careful group monitoring by the teacher, a strong curriculum map has the potential to eliminate many group work issues, as it gives all students a clear direction, minimising lack of direction or the feeling that a few members are left to carry the load. A well thought-out curriculum map should also include how and what shape assessment should take, ensuring that it is fair and equitable. The final necessity identified as having the capacity to directly resolve an identified problem is allocating, dividing and investing in enough resources for all teachers involved in the program. Given the current climate in decreasing educational funding, there will be a certain amount of pressure on schools to be able to staff and resource these programs. Integrated Project-Based Curriculum might be more difficult to implement in low-funded educational institutes not because of any problems with the program but because of financial constraints.

CHAPTER 3: MIXED METHOD METHODOLOGY

3.1 Overview

In this chapter I discuss the methodological framework used in the study. This study made use of a mixed method case study approach to answer the question 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' This chapter will put forward the case for adopting a mixed method case study approach and will also explain how the method was implemented in the project. The chapter will also outline the reliability and validity of the data collected, and any limitations experienced with a mixed method case study approach.

3.2 Research design

The research was based around a single case study. The case study was conducted at a Victorian independent school using two secondary Year 7 classes. Year 7 was selected due to the researcher's pre-existing knowledge and involvement as a teacher with this year level. One of these classes was chosen to be the test subject, leaving the other class as the control subject. The test subject was taught using the integrated Project-Based Curriculum program, whilst the control subject was taught using the standard and normal curriculum. Creswell (2013, p.53) suggests that some variables such as "…demographic or personal variables (e.g. age or gender) need to be controlled so that the true influences of the independent variable on the dependent can be determined". In this case study the study is controlling the students' academic abilities so that the only independent variable was the pedagogy in which the dependent, student success, could be measured. These two classes were monitored over a three week period, in which both qualitative and quantitative data were collected.

3.2.1. Mixed methods

Using a mixed method approach in this research enabled the collection of data via both qualitative and quantitative methods. Denzin and Lincoln (2005) states that mixed methods "…divides inquiry into dichotomous categories: exploration versus confirmation. Qualitative work is assigned to the first category, quantitative research the second (p.9)". As Denzin and Lincoln (2005) suggested, a qualitative approach first explored teacher's opinions on Project-Based Curriculum, what they believed were good programs and any perceived negatives of such programs. The research then explored students' behaviours, opinions and attitudes towards the integrated Project-Based Curriculum program through a qualitative approach.

Quantitative analysis was adopted to compare past and present students' results in order to determine whether the integrated Project-Based Curriculum program was successful in

helping students attain higher academic achievements, and thereby complement the idea that a deeper learning had occurred. Spillane, Pareja, Dorner, Barnes, May, Huff and Camburn, (2010, p.6) agree that mixed method studies "…combine qualitative and quantitative research methods so they work in tandem to answer the key research questions in a single study". They further support this method in this particular research of education pedagogy by adding, "Mixed method designs are increasingly popular in education and other applied fields" (Spillane et al., 2010, p.6).

Yin (2009, p.174) also supports this argument by suggesting that a mixed method approach could be used as a way of considering whether converging evidence (triangulation) might be obtained. Hammond (2005, p.244) extends this argument by suggesting that if different methods are used to investigate the same issue, "…then it may be presumed that the findings from the two projects must ultimately be reconcilable". Where it does not reconcile, creative and stimulated thinking is required to resolve the apparent contradiction. Hammond calls this initiation, and this leads to a more stringent triangulation. Hammond's main argument is that "triangulation brings results from different data collection methods together to test their validity, and the validity of the interpretations based on these results". In this study the qualitative data on student achievement was collected first through focus groups and interviews. Then it was confirmed by the quantitative data collected through raw results generated from the case study.

Hammond states that other advantages for the use of mixed methods include: "triangulation corroborates or challenges the validity of interpretations; complementarity enhances understanding; expansion leads to new research agendas; and development or research design and implementation" (p.245). Hammond has detailed all of these ideas in the following diagram:

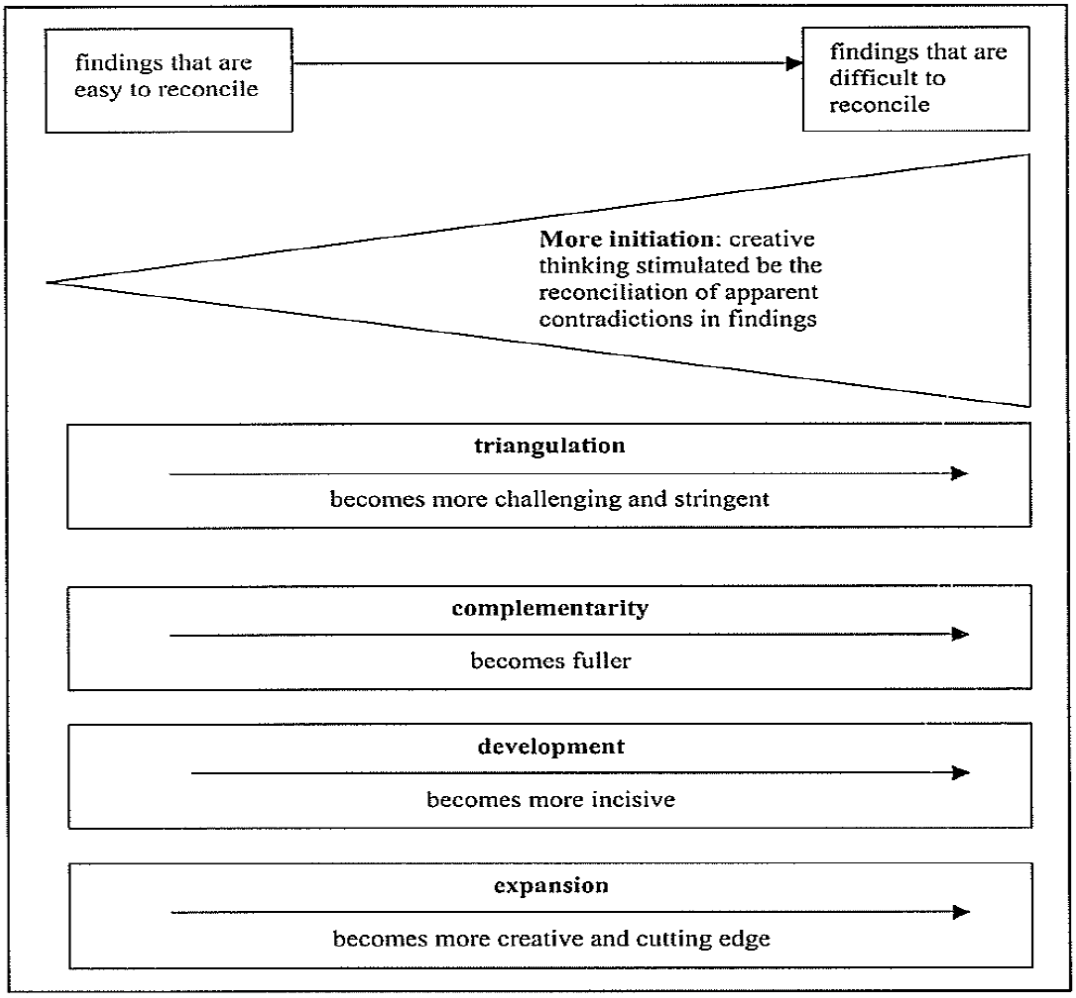


Figure 3.1 Hammond's diagram of the ease with which Findings are Reconciled and Five Purposes of Mixed Methods Research

Creswell (2013, p.16) describes the mixed method approach as an exploratory sequential, that is, that the "...researcher first begins with the qualitative research phase and explores the views of participants"; this was achieved through the pre teacher interviews prior to commencement of the program. Creswell goes on to state that "[T]he data are then analysed, and the information used to build into a second, quantitative phase. The qualitative phase may be used to build an instrument that best fits the sample under study". For the purpose of this study, the pre teacher interviews were analysed and used to create the integrated Project-Based Curriculum instrument.

3.2.2. Justification for a qualitative approach

Denzin and Lincoln (2005, p.10) stress that qualitative research reports back on the "…socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry". For Denzin and Lincoln, qualitative researchers seek answers to questions that stress 'how' social experiences are created. If the research question only reviewed the students' results before and after the

integrated Project-Based Curriculum program was implemented, the information that would be attained would focus solely on the academic achievements gained by student participants in a program. All other possible benefits that the program might have offered the student, the school and the wider community would have been lost. Qualitative research provides not only a result perspective, but also provides a social perspective, such as *Do students engage better with each other in this sort of program?*, or a citizenship perspective, such as *Do students become engaged with the project that they are studying so that they might further it outside of school for the benefit of society?* The qualitative dimension explores other perspectives and meanings that may not have initially been considered in the quantitative data analysis.

In addition, it can also be argued that a qualitative approach gains a richer description and a deeper understanding of the questions asked. Denzin and Lincoln (2005, p.12) describe qualitative researchers as those who "…believe that rich descriptions of the social world are valuable...using ethnographical prose, historical narratives, first person accounts, still photographs, life histories, fictionalised 'facts', and biographical and autobiographical materials". These elements result in a deep and rich personal knowledge account of another's individual or social point of view. In this research, first person accounts of students involved in the program produced an insight into the program's benefits and flaws that would not have been evident through quantitative data alone. These accounts, rich in content and expressed from the cultural viewpoint of a teenager, would have been difficult (if not impossible) to attain from quantitative data alone.

The qualitative data analysed in this case study was mainly sourced from one-on-one interviews or focus group meetings. Along with these meetings, observation-based research was also implemented. Denzin and Lincoln (2005) describe three main ways in which observation-based research is conducted; for this case study, the third observation-based research technique was used. This involved "(c) unobtrusive (nonreactive) observation[s], conducted with people who [were] unaware of being studied" (p.732). The purpose of these unobtrusive observations was to continue to collect rich qualitative data throughout the case study. Denzin and Lincoln (2005) report that "even studies that rely mainly on interviewing as a data collection technique employ observational methods to note body language and other gestural cues that lend meaning to the words of the persons being interviewed" (p,729).

3.2.3. Justification for a quantitative approach

The purpose of this study is to examine any benefits attained through the implementation of an integrated Project-Based Curriculum program in a secondary school setting. Academic success would be considered one of those benefits. Creswell (2013, p.4) suggests that qualitative researchers "…who engage in this form of inquiry have assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalize and replicate findings". Analysing student achievement results before the integrated Project-Based Curriculum program and comparing them with the results students achieved during the program aligns itself well with testing theories deductively. This would produce reliable and valid data showing whether a better

academic achievement was attained by the students involved in the program. Using raw numerical data involves very little interpretation and therefore also protects against bias, and if repeated, should generate similar findings.

Yin (2009, p.132) also supports this by suggesting that in a case study, data can be subjected to statistical analyses to produce a strong quantitative analytical argument. The previous section explored how qualitative research is important in answering many aspects of the question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' in terms of engaging students. However, academic achievement would be considered another benefit and using a quantitative approach to understand students' achievements would provide a simple yet reliable and valid confirmation as to whether Project-Based Curriculum did indeed benefit the students academically.

3.2.4. Justification for using a case study approach

Stake (1995, p.xi) claims that "a case study is expected to catch the complexity of a single case. A single leaf, even a single toothpick, has unique complexities – but rarely will we care enough to submit it to a case study". So the question that needs to be asked is, does this study have the correct complexities to justify a case study research approach? Yin reports that there are three conditions that would justify using a case study research approach. "These are:
(a) the type of research question posed;
(b) the extent of control the researcher has over actual behavioural events and;
(c) the degree of focus on contemporary as opposed to historical events" (Yin, 2009, p. 8).

To answer the overarching question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' all three of Yin's conditions are met in the research and therefore justifies a case study approach.

Yin states that "…how and why questions are more explanatory and likely to lead to the use of case studies, histories and experiments as the preferred research method" (2009, p. 9). Whilst the phrases *how* and *why* were physically lacking in the overarching research question, the how is implied. To properly answer the research question, the research needs to show how integrated Project-Based Curriculum programs benefit students. The end result of this research project need not only be a confirmation or a rejection of the research question, but a detailed explanation of how Project-Based Curriculum is constructive and beneficial, or how it is not. The research project should also conclude with suggestions as to how, if successful, to implement such programs in the future in other educational facilities. This shows that the first of Yin's conditions has been met.

Yin also states that "…the case study is preferred in the examining of contemporary events, but when the relevant behaviours cannot be manipulated" (2009, p.11). Having subjects that could not be manipulated is the second of Yin's conditions. The focus of this research project was the studying and learning of teenagers. Anecdotally, most people would argue that there are very few effective methods to manipulate teenagers to go home, complete homework

tasks and then want to extend their knowledge and further study the topics that were covered that day. Effective methodology depended on whether the students were engaged in what they were studying, so that a desire to learn intrinsically was established. The result of having case study subjects whose behaviours were very difficult, if not impossible to motivate, means that Yin's second condition has also been met.

Finally, the degree of focus on the contemporary as opposed to the historical events is contrasted. Whilst integrated Project-Based Curriculum is not a new way of teaching, it does appear as a priority in the Australian Curriculum which involves a cross-curriculum approach. All Victorian teachers are now expected to incorporate this style of teaching into their classroom practice.

With the study based on how contemporary integrated Project-Based Curriculum programs are beneficial and the inability of the researcher to manipulate behaviour events, it can be argued that Yin's three conditions have been met, justifying a case study approach for this research, along with the mixed method approach. Stake (1995 p.xi) supports this choice by stating that "…case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances". This research project revolves around a single case study that has had all of its activities analysed in order that the complexities may be discussed and argued.

3.2.5. Researcher role

The researcher was employed by the school as a Secondary Teacher, teaching lower-level Science, senior-level Physics and secondary Drama. He was in charge of designing and implementing the integrated Project–Based Curriculum into the Year 7 program. The program incorporated a number of individual subjects including Science, Mathematics, Information Technology, Art, English, Design and Technology and Bible studies. The topic that was taught across the integrated study was Machines and their Inventors, with the essential questions being, 'How were lives changed by machines that were created by men and women with God-given gifts and talents?' Before the program was implemented the researcher collected results from the individual subjects on the achievements of Year 7 students who were going to participate in the integrated Project-Based Curriculum program, and those who were not.

The researcher was known by the students involved in the research project, being, at the time of the research, their science teacher. This was seen as an issue in relation to a power differential between the students and their teacher. To mitigate this issue the researcher made use of another teacher who did not teach the students. This teacher conducted the student interviews and student focus groups. The researcher developed the questions for the student focus groups and briefed the employed teachers on how the sessions were to be run. The researcher was not present at those meetings and received the data at a later stage. The researcher used the information obtained from the focus group meetings along with past and present results as data to analyse.

In essence the researcher took on a practitioner research role. Anderson et al. (2007) talk positively about this type of research, stating:

> As practitioners gain their voices, self-consciously observing and recording their day-to-day activities and using tacit knowledge to inform their data further, implications for the field of education – from improving practice to rethinking research methodologies to expanding theory bases – are varied and exciting. The courage to follow the research process and take ongoing actions based on it is part of what is noteworthy here. It is also what can put practitioner action research in the vanguard of educational change. ("Chapter 3," para. 120)

However with this type of research brings some limitations; "[e]ach research approach brings its own ethical challenges, and action research is no exception. Action research is a dynamic, evolving practice, and we should assume that there is no foolproof plan to avoid ethical dilemmas as the research develops" (Anderson et al., (2007), "Chapter 5," para. 34). To overcome the issue of 'biasness' to the success of the program a mixed method approached was used to confirm all findings; an independent interviewer conducted all focus groups, and quantitative data was collected from multiple sources. With all of these systems in place the research project was granted ethics approval.

3.3 Participants and site selection

The research project involved 52 Year 7 students from two separate classes. These students were selected for the study as the researcher was their teacher for two subjects. One was a core subject (Science); therefore, the researcher had an influence on the curriculum that these students were involved in and the way in which it was delivered. The school caters for both primary and secondary students, therefore most students in the Year 7 classes had simply moved up a year with their fellow peers, making transition a lot smoother for them. The classes did, however, also contain nineteen students who had recently enrolled at the school that year and were all finding their way and learning to fit in. The school is located in a medium-to-low socio-economic area and there is considerable cultural, linguistic and economic diversity in the students' backgrounds.

A range of teachers were also consulted throughout this research project. Teacher participants who were interviewed before the implementation were used to explore ideas associated with what constitutes a good integrated Project-Based Curriculum, and what they felt were negative aspects of integrated Project-Based Curriculum. Their ideas and opinions, along with past research, were considered when developing the curriculum that would produce the best results for the case study school. The teachers involved in the research covered a range of ages, genders, subject areas and school type (i.e. independent, Catholic or state). Whilst this diversity cannot be considered to give a comprehensive view of where integrated Project-Based Curriculum is positioned throughout schools in Australia, it does give a reasonably diverse range of views of teachers in different settings.

The following teachers were interviewed before the curriculum was implemented:

Pseudonym	Age	Gender	Subject	Type of School
Amanda	40 – 50	Female	English/Bible	Independent
Barry	20 – 30	Male	Maths/Science	State
Calub	40 – 50	Male	Maths/PD	Catholic
Denise	30 – 40	Female	Humanities	Independent
Eva	40 – 50	Female	Leadership	Independent
Frank	50 – 60	Male	Science	Independent

Table 3.1 Teachers interviewed before case study

The teachers were all employed at different educational facilities and therefore the data generated from these interviews was only used in the development of the integrated Project-Based Curriculum program. The teachers were not able to be part of the program and therefore were not able to be part of the group of teachers who were interviewed after the program. The decision not to use the teachers from the case study school was to broaden the range of views that could be obtained on the development of the integrated Project-Based Curriculum program. It is believed that this could not be achieved if all teachers interviewed were part of the same educational facility and had experienced the same successes and failures with similar programs that had been implemented within the facility in the past.

The teachers were asked the following questions:

1. Have you taught in a Project-Based Curriculum format?
2. Initial thoughts on how you thought the program was carried out.
3. What made the program work?
4. Did the program benefit the students? How?
5. What made the program not work?
6. Would you teach using a Project-Based Curriculum again?
7. How would you set up a Project-Based Curriculum – what must the program consider?
8. Any other thoughts about Project-Based Curriculum?

Teachers who were interviewed after the implementation were those involved in the curriculum. These teachers were chosen and interviewed to gauge how successful the program was in the case study school and whether it had:

i) made an impact on the engagement of students, and

ii) improved learning of these students in their classes.

The following teachers took part in the program and were interviewed after the curriculum was implemented:

Pseudonym	Age	Gender	Subject	Type of School
Gertrude	20 – 30	Female	Art	Independent
Hannah	40 – 50	Female	English/Bible	Independent
Indra	40 – 50	Female	Mathematics	Independent
Jacob	20 – 30	Male	IT	Independent
Kevin	40-50	Male	Design & Technology	Independent

Table 3.2 Teachers interviewed after case study

These teachers were asked the following questions:

1. What were your initial thoughts on Project-Based Curriculum?
2. Did you find that this style of curriculum engaged students more so than the regular curriculum?
3. Did you find that there was a deeper learning and students achieved better results?
4. Did you find it more enjoyable to teach?
5. Any other benefits including positives or negatives?

The case study school was located west of Melbourne. It was a non-denominational, co-educational Christian school that catered for students from Prep to Year 12. It was in its 25th year of service and had an open-enrolment policy and encouraged all families who were comfortable with the Christian philosophy to enrol.

At the time of the case study, the Australian Curriculum was yet to be implemented. The school, similar to all other Victorian schools, was adhering to the Victorian Essential Learning Standards (VELS).

3.4 Data collection methods

The following methods were employed to obtain and collect the relevant data:

1. Focus groups with students
2. Structured teacher interviews (before and after the program)
3. Natural-setting classroom observation of both students and teachers with researcher as non-participant observer

4. Review of academic results before and after the integrated Project-Based Curriculum program was implemented.

3.4.1 Focus groups and interviews

One of the key techniques used by the researcher was to collect qualitative data through the use of student focus groups. Focus groups were considered more appropriate than student interviews as young participants might have found one-on-one interviews intimidating, creating a bias in the information they may have given. Having students participate in focus groups provided them with a safe environment, where they could openly express their thoughts and beliefs and share their opinions on the integrated Project-Based Curriculum program they had just been involved in. The students were asked to sit in on a lunchtime session. A teacher who was not the researcher and was not involved in their current studies hosted the session. Each focus group was attended by between five and ten students. The students were seated close to each other, on chairs, in a circle, in a classroom. The teacher then asked the group semi-structured questions, giving individuals the opportunity to lead the session at particular times. After the initial response this led to other students interjecting and contributing to the leading of the discussion until a variety of answers was given by each student for each question asked.

The following questions were asked of the students during the focus group session conducted at the end of each respective week:

<u>AFTER WEEK ONE</u>

1. Did you like studying and learning about your machine/invention this week?
2. What was your favourite activity this week?
3. What would you change about this week?
4. What was different about studying this unit on machines/inventions this week than things you have studied in the past? Was this a good thing or a bad thing?
5. What did you learn about your machine/invention this week?
6. Are you looking forward to continue this topic next week?

<u>AFTER WEEK TWO</u>

7. Did you like studying and learning about your machine/invention this week?
8. What was your favourite activity this week?
9. What would you change about this week?
10. What was different about studying this unit on machines/inventions this week than things you have studied in the past? Was this a good thing or a bad thing?
11. What did you learn about your machine/invention this week?
12. Are you looking forward to continue this topic next week?

AFTER WEEK THREE

13. Did you like studying and learning about your machine/invention for the last three weeks?
14. What was your favourite activity overall?
15. What would you change overall?
16. What was the most interesting thing you learnt about your machine/ invention?
17. Do you feel you have learnt more about your machine/invention in the last three weeks than the other topics you have studied in the past?
18. Have you enjoyed learning in this format more than the usual format where there is a different topic for each subject?
19. Would you continue this topic next week if you could?

Another method for collecting qualitative data was through teacher interviews. Structured interviews were conducted with six differently qualified teachers and school leaders before the designing of the curriculum. The questions were designed to draw out the teachers' opinions and thoughts on Projected-Based Learning, to highlight any personal experience in the delivery of such a program and what had made it either negative or positive.

The same questions were asked of the teachers interviewed after they were involved in the case study integrated Project-Based Curriculum program. This series of interviews was designed to ascertain whether teachers had a positive or negative experience during the program and whether they thought that as a result their students were better engaged and/or developed a deeper learning. All teachers were invited to participate and advised that the meeting would take roughly thirty minutes in an office or meeting room of their choosing.

3.4.2 Classroom observations

During the delivery of the three week integrated Project-Based Curriculum program, the researcher made natural classroom observations. The researcher sat through four randomly-selected lessons from both Year 7 classes. The researcher remained towards the back of the classroom and silently observed in a non-obtrusive manner, allowing students to behave and act as they normally would have in their respective classes. The researcher refused to answer any questions that may have been asked by students in the class and instead made a consistent effort to review as many of the following behaviours as possible in each class:

- Student positive and negative behaviours in class
- Student engagement with curriculum
- Student interaction with teacher and peers

During the last class where students presented their projects - a PowerPoint presentation on a machine of their choice - the researcher was able to sit in and observe as part of his natural classroom observations.

3.4.3 Past and present student results

Before the program was implemented in both Year 7 classes, the teachers from the subjects English, Mathematics, Science, Art and Information Technology were asked to provide an average mark for each student on a previous assessment similar to the type of which they would grade as a part of the integrated Project-Based Curriculum program. Teachers were able to provide this as the integrated Project-Based Curriculum program took place in semester two, allowing teachers to have past results for each student from semester one. For example, for mathematics a test at the end of the program was going to be used so the average test marks for semester one was given. History results were not requested or used due to an untimely change in teachers. What was discovered was that one particular class consistently achieved better results. It was decided that the program would be implemented in the lower achieving class so that when results were analysed, a comparison could be made to see if the lower achieving class reached or surpassed the achievements of the high achieving class. Therefore, at the end of the program teachers of the same subjects were asked to provide results on their particular assessment during the integrated Project-Based Curriculum program.

3.4.4 Summary of data collection methods

Table 3.3 summarises the data collection methods used in the research, the number of participants involved in each method and the frequency of interactions amongst the researcher and the participants.

Method of data collection	**Participants involved in data collection**	**Frequency of data collection sessions**	**Total number of data collection sessions**
Teacher Interviews before implementation of program	6 x variety of secondary teachers and school leaders, researcher	Interview 1x 30- minute session	5 interviews
Classroom Observations	2 x classes of 26 students, teacher, researcher	1 x 45-minute observation of each Year 7 class per week the program runs	3 observation classes per class (x 2) = 6 observations
Student Focus Groups	5 – 10 students, conducted by a different teacher	30-minute session per Year 7 class at the end of each week the program runs	6 focus groups
Past and present student results	Researcher	52 past and present student test results for the Science subject	104 student results
Teacher Interviews after implementation of program	4 x variety of secondary teachers, researcher	Interview 1x 30- minute session	4 Interviews

Table 3.3 Summary of data collection methods, participants and frequency.

Table 3.4 explains the purpose of each chosen method and what data was provided to help answer the question, *Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?*

Method of data collection	**Purpose**
Teacher Interviews before implementation of program	- Teacher initial perception of Project-Based Curriculum programs and whether it is a preferred teaching method - Teacher perception whether Project-Based Curriculum improves student engagement - Teacher perception whether Project-Based Curriculum improves students learning - Teacher opinion on the positives and negatives of such programs
Classroom Observations	- Student behaviour in class - Student engagement with curriculum - Student interaction with teacher and peers - Teacher use of Project-Based Curriculum - Teacher engagement in topic, pedagogy
Student Focus Groups	- Student initial perception of Project-Based Curriculum programs - Student perception on lesson design and how interesting the classes were - Student perception on self-education - Student perception on teacher - Student group interaction and relationships
Past and present student results	- Student academic performance before the Project-Based Curriculum program - Student academic performance after the Project-Based Curriculum program - Student improvement in learning
Teacher Interviews after implementation of program	- Teacher initial perception of the Project-Based Curriculum programs implemented - Teacher perception whether the Project-Based Curriculum implemented improved their students' engagement - Teacher perception whether the Project-Based Curriculum implemented improved their students' learning - Teacher opinion on the positives and negatives of the Project-Based Curriculum implemented

Table 3.4 Purpose of chosen data collection methods

3.5 Procedures for data collection

The Principal and school Chaplain* were first briefed on the research project and the research goals. The Teacher's Plain Language Statement and Consent Form were then given to the initial six teachers and school leaders (these can be found in Appendix Two). Interviews of these six teachers and school leaders took place shortly after receiving the consent forms. Using past research and the information attained during the interviews, a curriculum was developed. Parent/Student's Plain Language Statement and Consent Form were then handed out to all Year 7 students. Teacher's Plain Language Statement and Consent Forms were handed out to the teachers involved in the program. Consent was granted by all participants. Reviews of participating students' past and current results were conducted. The integrated Project-Based Curriculum was implemented. Classroom observations were taken during the three week integrated Project-Based Curriculum program. At the end of each week of the program Student Focus Groups were held by a teacher other than the researcher, who taped the conversations. A week after the program was finished the teachers were asked to ensure student results from the program were finalised. Final interviews were held with the teachers involved in the program. A data collection table can be found below.

Date of Data Collection	Data collection	Frequency
March 2011	Teacher interviews before the implementation of the program	5 interviews
May 2011	Past and present student results	52 results
May/June 2011	Classroom observations	6 observations
June 2011	Student focus groups	6 focus groups
June 2011	Present student results	52 results
July 2011	Teacher interviews after the implementation of the program	4 interviews

Table 3.5: Data collection timeline and frequency

3.6 Protection of students

Most participants involved in the research were young teenagers, so a high level of ethical consideration needed to be sought. Firstly, all researchers and teachers directly involved with the students required a Victorian Working with Children Check. The Principal and Chaplain of the school involved were briefed on all aspects of the research. Informed permission was sought from all guardians of the participants under legal age through a Plain Language document. In the Plain Language document, participants were advised that they did not need

* The school Chaplain worked at the school as the Bible teacher and ran the Chapel program. He also took responsibility for the pastoral needs of students who experienced personal problems due to school or home life reasons.

to be involved in the research and that they could withdraw at any time before the collating of information without reason or penalty. They were given contact details for the university body where they could make a complaint and the number for Kids Helpline* should they become distressed.

All participants, both student and teachers, were identified in the research project by pseudonyms chosen by the researcher, and all data has been kept confidential. There was a reasonable attempt to keep all classroom procedures and discipline constant during the project to maintain similar conditions for the participants.

3.7 Data coding and analysis techniques

While collecting the data during focus groups, students who were involved were known to the researcher. The researcher did not conduct the interviews and only received a voice recording of the session. There was no record of which student was responsible for each comment. There were no student names used throughout the writing of the thesis, and where necessary pseudonyms were allocated, which eliminated the possibility of tracing back any comments.

The same level of anonymity was used for teacher interviews. Throughout the collection of data teachers were referred to through pseudonyms in alphabetical letter. Again throughout the writing of the thesis no teacher names were used, which eliminated any ability to trace comments back to the original source.

Classrooms observations were recorded in a way that described the happenings and the attitudes of the class as a whole. Individual students were not named and the teachers conducting the class were not named. Only the class title, subject and time were recorded.

For the purpose of the research it was necessary to match present student results to their average past results so an analytical comparison could take place to determine whether there were any improvements. Therefore, it was impossible to collect the data anonymously; however, when recording the comparison in table format all names were omitted and the only detail that was recorded was whether the student was male or female.

3.8 Study reliability and validity

Yin (2009 p.45) describes the objective of reliability, which:

> …is to be sure that, if a later investigator followed the same procedure as described by an earlier investigator and conducted the same case study all over again, the later

* Kids Helpline is an Australian free, private and confidential telephone and online counselling service specifically for young people aged between 5 and 25.

> investigator should arrive at the same findings and conclusions…the goal of reliability is to minimize the errors and biases in a study.

There is reasonable assurance that both the qualitative data and the quantitative data collected were free of any biases from the main researcher, and if another researcher was to have conducted this research the same results would have been produced.

The qualitative data came out of the student focus groups. While the main researcher designed the questions to be asked, he was not present during the focus groups and could not lead the conversation in any way. A neutral teacher with no direct connection to the students ran the sessions with an unbiased attitude. Students were free to respond in any way they wished and were therefore free from any recrimination towards anything they said. The comments were open and honest and reliable for the research. This shows if another researcher had been in charge, and had carried out the same procedure to collect qualitative data, the same comments from the students, which were open and honest, would have been recorded.

The only data used in the quantitative research were the raw scores that the subject teachers had assigned during the integrated Project-Based Curriculum, or that previous teachers had awarded in past assessment tasks. Both scores for all but one subject were independently awarded by teachers free from the main researcher's input and have been recorded in official school records. Again, if another researcher was to have conducted the collection of data in a similar manner, the same results would have been collected, showing that these scores are considered reliable and free from any deceitful manipulation.

The last issue that needed to be addressed was whether the process of collecting all the data was valid. The overarching question to be answered is, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' Integrated Project-Based curriculum could be seen as beneficial if it could be shown that students are more engaged and experienced a deeper learning. The data collected needed to be able to address the questions and not contradict itself. "Triangulation had been generally considered a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation" (Denzin and Lincoln, 2005, p.454). Stake (1995, p.107) explains the importance of validity through triangulation by suggesting in research that "…we need accuracy and alternate explanations, we need discipline, we need protocols which do not depend on mere intuition and good intention to '…get it right'".

In qualitative research, those protocols come under the name 'triangulation'. This concept of triangulation was present in the collection of the data for this case study. The qualitative data collected through questioning and observations was later confirmed by the quantitative data collected through a comparison analysis of past and present student results. Having the quantitative data support the qualitative data produces a triangulated argument that can be considered both reasonable and valid.

3.9 Limitations of methods used

There were a few limitations during the project that might have affected the data collected. These limitations involve:

1. A small sample size in one school only. The case study observed only two classes that consisted of nine teachers and fifty-two students. Due to the small number of observed participants it cannot be argued that this is a comprehensive study intended for broad generalisation. However, as previously discussed, this is not the intent of case study research, which has its own limitations as do other forms of research, including standardised tests and randomised sample surveys.
2. As students were not interviewed individually, but instead met in focus groups to discuss their opinions, this would have allowed the more vocal and confident students to take control of the group's conversation and offer more comments and more of their opinions. This would imply that the quieter students, who did not have the confidence to challenge their louder counterparts, might have their opinions underrepresented in the final data that was produced from these meetings.
3. As the main researcher was not present during these focus groups meetings, the main researcher could only listen to and analyse the recording of the conversations that took place. Other non-verbal information that occurred during these sessions, such as body language and movements and student seating arrangements, was not able to be observed and discussed in the final data collected.

3.10 Summary

This chapter has presented the justification for using a case study, mixed method approach to answer of the overarching question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?'. It has shown that the study's overarching question had *how* and *why* components; that it was clearly evident the researcher had little control over the behaviours of the subjects; finally, choosing a contemporary issue to study complied with Yin's conditions for using a case study approach, which made this a suitable choice of method. The decision to collect data in a mixed method approach, therefore collecting both qualitative data and quantitative data, was supported through the triangulation of such data. This provided reliable and valid data that were both deep and rich in detail and complemented by statistical support. It is to some of this data that we turn our attention in the following chapter.

CHAPTER 4: FACTORS, FEELINGS AND FOCUS GROUPS

4.1 Case Study Overview

This chapter investigates the qualitative data that was collected for the case study. The qualitative data was sourced from interviews with teachers from various types of schools, at different stages of life and with varied teaching experiences using integrated Project-Based Curriculum. The purpose was to explore a diverse range of opinions about what made a successful integrated Project-Based Curriculum program, which would be used in the designing of the case study's program. The program designed for this case study involved the disciplines of Maths, English, Bible, Art, IT, Design and Technology and Music; these were integrated with Science and involved the students developing artefacts that would be used in a final presentation to answer the essential question, 'How were lives changed by machines that were created by men and women with God-given gifts and talents?' The entire program and its development can be found in Appendix One.

During the case study, qualitative data was collected from natural observations in the classroom of two Year 7 classes consisting of 52 students (23 female students and 29 male students) who were selected to take part in the three week case study. During this time one class received the standard Victorian Essential Learning Standards (VELS) curriculum while the other class experienced an alternate structured program involving the integrated Project-Based Curriculum program. Focus group data was also collected at regular stages during the program from the integrated Project-Based Curriculum group. After the program, the teachers who were involved in teaching both curricula were interviewed using open-ended questions, and qualitative data was collected in the form of their responses to the questions and thoughts on the program.

The data is presented using unedited narratives highlighting teacher and students' voices in their responses. Unedited narratives were used and organised in a manner to make the qualitative data obtained from the case study clear and meaningful. Denzin and Lincoln (2005) promote that "Narrative is a way of understanding one's own and others' actions, of organizing events and objects into a meaningful whole, and of connecting and seeing the consequences of actions and events over time" (p. 656). The benefit of using this narrative approach was not only to describe what happened during these meeting and focus groups but to also highlight emotions and viewpoints throughout the case study. No teacher or student names were used in this study and where necessary pseudonyms were used to eliminate the possibility of identifying individual students.

4.2 Qualitative data collected before the case study through teacher interviews

The purpose of the teacher interviews was to explore and understand the different perceptions of integrated Project-Based Curriculum from a range of teachers who came from diverse backgrounds. The idea was to collect data that highlighted particular attributes that were necessary and/or advantageous in an integrated Project-Based Curriculum program and then develop a new program which included the previously discussed attributes. The themes that arose from the teacher interviews confirmed and extended the findings reported in the literature review. Frasier (2008, p.3) outlined three prerequisites that are essential to a successful program: time, a curriculum map and resources. These were confirmed by the initial teacher interviews.

4.2.1 Allocation of enough time for preparation, duration and reflection of the integrated Project-Based Curriculum

The findings in the literature review suggest that teachers need enough time to design a successful program, manage a successful program and finally evaluate overall results (Blumenfeld et al., 1991, p.381). The teachers interviewed confirmed this. A teacher retold a past experience of an integrated Project-Based Curriculum program in which he was involved. He stated that he experienced:

> …far too little preparation, and probably far too little collaboration between the teachers in the different curriculum areas…so whilst in theory the idea [of integrated Project-Based Curriculum] kind of sounds okay, in practice because there probably wasn't enough time preparation given to, you know, the organisation of it, I don't think they were that successful.

Another teacher began her interview by saying that "…the success of the project depends on the depth of preparation". The last teacher interviewed spoke about how important it was for a single teacher to be given enough time to lead other teachers in the preparation of the program. She spoke about the past programs she had been involved in and that it seemed that the teachers involved were all:

> …doing it ad hoc, we were all sort of learning blindly together, and if we had someone like you [a lead teacher] to guide them in how it should be done or could be done, a successful program could be established.

The same teacher commented that it was important to allow time to reflect and "…properly document it so a brand new group of teachers could easily pick it up and run with it the following year". Time to properly prepare and collaborate was considered important by all teachers in implementing a successful integrated Project-Based Curriculum program.

4.2.2 Creation of a well-developed curriculum map by all teachers in the program

Following enough time for preparation, the next important prerequisite for a successful integrated Project-Based Curriculum program that Frasier (2008, p.3) outlines is a well-developed curriculum map. This was a prerequisite that was almost stated *verbatim* by the final teacher interviewed. When she was asked what she would not do without when implementing an integrated Project-Based Curriculum program, her immediate response was:

> …a plan…a plan with what all the teachers are going to be doing… the teachers need to have a real think about what they want to achieve…and then come back and formalise it into a document, so everyone knows where they are going.

A plan was considered important by a number of teachers; however, they extended the significance of a plan by saying that this 'plan' needed to have a driving 'vision' that made it 'real' for students. One of the more experienced teachers commented that if the program had a well-developed integrated plan then students:

> …will see a distinct link in the real world, so in other words, their learning becomes less compartmentalised. So I need to know this in Maths but it has no relevance in Science, it has no relevance in Geography – by tying it together they can see that the subjects are interrelated, there is relevance to what they are learning. It is much easier to have meaningful application if you draw subjects together.

It was confirmed by most teachers that to implement a successful program they thought that all teachers involved in the program needed to know the overview for the entire program, and where their discipline fits into that overview. A concluding comment from one teacher confirmed this view, "…if you can't clearly convey the vision or a program or a structure that everyone could get on board with, then it becomes very difficult" for both teachers and the students.

4.2.3 Allocation, division and investment into resources

Frasier's (2008, p.3) last prerequisite for a successful integrated Project-Based Curriculum program was the investment and allocation of teacher resources. Teachers passionately confirmed this need, along with the support of school leadership. One teacher commented, "It [Project-Based Curriculum program] needs to have strong support from leadership, and if it wasn't going to get strong support from leadership…I wouldn't even bother". Another teacher, who described a successful program that she had led, suggested some of the reasons for her success involved the formats she was using: "…a lot of different resources to put my hand on, and the other thing too is that it was accessible". She later stated that if she was to repeat the program she would need to make sure there was the "…money and the resources for that…" and even "expertise outside the school" made available.

Support from leadership in terms of finances and resources was an issue that created strong opinions from the teachers interviewed. It seemed most teachers would not consider being

part of a program without the knowledge that leadership was going to support the staff and supply the resources required.

4.2.4 Other factors that produced a successful integrated Project-Based Curriculum program

Whilst the pre-case study interviewed teachers confirmed all three of Frasier's (2008, p.3) prerequisites, other interesting factors were considered to be necessary for the success of the program. These factors included involving an excursion, giving student choice or ownership of the program and having a 'wow factor'.

A common factor that was mentioned in a number of interviews was that, as one teacher expressed, the program had to involve "some off-campus learning". This was further supported by another teacher who stated:

> I think you have to have an excursion to see how the whole thing works. I think it ties it together and it sort of show kids that yes, real people in real life do do these sorts of things. Kids aren't really going to take anything on, unless it has a reality factor and a basis of real life learning for them.

The second factor that was common in the data was the need for involving students as early as possible in the planning of the integrated Project-Based Curriculum program to give them as much ownership of their education as possible. The last teacher interviewed rationalised it by stating that:

> …you need to make sure it's not a teacher-run thing. Students need to be on board with it or else it's basically for the benefit of the teachers to make them feel like they are actually doing something engaging.

She continued to suggest that the teachers come up with several types of project possibilities and then "see what the students want to do". She extends her argument for the need for student input and the need to encourage the students to take ownership of their education. By this they are "…active learners [and] be part of a team and have good participation and engagement".

The last factor that many teachers touched on but found difficult to articulate was the notion of an engagement factor. As noted above, one teacher concisely and simply stated that the program "…has to have a 'wow factor', a factor that engages students. This could be the topic of the project, or the activities involved in the project, or an interesting excursion or the creation of something tangible". The same teacher extends this thinking by suggesting that "…forming relationships might be part of it; doing the project with a sister school for example around the world" might be one way to 'wow' the students and would definitely engage them.

One resounding comment during the pre-case study interviews was made by a teacher who had been teaching for well over thirty years and seen curriculum change and evolve and the teaching pedagogy respectively adapt. This comment stood out as one of the most defining

warnings about integrated Project-Based Curriculum: "If it is done poorly, it's actually worse than not doing it at all… and if it is done well, it's better than any other model I can think of which is confined to a classroom".

In summary it was evident that most teachers had experienced an integrated Project-Based Curriculum program. These teachers also had an opinion on what made the program successful and what made the program redundant. They agreed with Frasier's (et al) prerequisites of the allocation of preparation time, a well-developed curriculum map and the program being well resourced. But these teachers also confirmed that having student choice and a 'wow factor' - possibly through off-campus learning - was just as important.

4.3 Qualitative data collected during the case study through regular student focus groups and natural observations in the classroom

Throughout the three weeks, the class that was studying the alternate integrated Project-Based Curriculum program was asked to take part in weekly focus groups. The next part of this chapter is organised around the accounts made by individual students from that class. The open-ended questions asked in the focus groups allowed the identification of several themes which became evident though the students' responses and teacher observations. These themes are tabled below:

	THEME IDENTIFIED
1.	Students' engagement and enjoyment through the hands-on learning approach
2.	Students' ownership of their own education. Students selected their own topic to study, then individually researched their selected topic. Furthermore, they had the ability to continue studying the topic through their own individual tangents
3.	Students' awareness that they were extending their own knowledge by being able to articulate pieces of acquired knowledge
4.	Students' opinions associated with working and collaborating with their fellow peers
5.	Students' sense of achievement and their level of accomplishment at the completion of the subject

Table 4.1 Identified themes found in the qualitative data

4.3.1 Student engagement and enjoyment

4.3.1.1 Students' initial response

Students' initial responses were to acknowledge that the new curriculum was 'fun'. This was clear in the data through the use of phrases such as, "…it is going to be fun" and "…it was

fun". A number of the male students had chosen to do their projects on weapons. One student explained how they were designing a model which would implement the use of tic tac* projectiles, while another exclaimed, "I'm doing the musket and it's going to be fun". It seemed having a choice in the project, such as being able to 'do the musket', a subject that interested the student, positively changed their perception of the task and precipitated the engagement of the students.

In addition to being able to choose the project topic, the next sense of enjoyment was the hands-on factor. A number of female students listed the 3D drawing as the most enjoyable task. When one student was asked what their favourite activity was, their response was, "…the drawing…because I really like to draw". It seemed being able to include a learning style that was enjoyable for the student made the entire project enjoyable. Drawing was not the only hands-on activity identified in the data. One student mentioned that creating the PowerPoint presentation was their favourite activity. Having a range of disciplines involved in this integrated Project-Based Curriculum program meant that each student's preferred discipline was developed and used in the final presentation.

Activities involving enhanced student research were also clear in the data. An example of this was highlighted when a student was asked whether she enjoyed the hands-on activities the most. Her response was, "…no, mine was probably looking at the old radios, like images, 1920s and 1950s". The enjoyment of the topic had encouraged this student to continue researching and learning outside of what was necessary to complete the required task. This seems opposite to what currently occurs in traditional classrooms, where students have a tendency to stop researching and learning after they are satisfied that they have completed the teacher's set tasks, often having taken a minimalist approach.

One further benefit related to task enjoyment evident in the data was students' perception of future lessons. All students who took part in the first focus group indicated that they were looking forward to continuing the curriculum the following week. When asked the question, "Are you looking forward to continuing this topic next week?", they all responded positively with statements such as, "Definitely yes", "Definitely", "It would be cool" or, "one hundred percent and everything's been fun!"

4.3.1.2 Students' ongoing responses

It seemed the fun was still evident in the data into the second week of the integrated Project-Based Curriculum program. The awareness of the workload had set in and students' own expectations of what they wanted to accomplish had increased as they wanted to complete a broader range of tasks. When asked if they felt the same as they did in the previous week, one student response was that they felt "…a bit different; we are not doing as much; we are more doing like work on other things, not the project itself". This suggested that they were expanding their research into other things that interested them, which then took them away

* Tic tacs are small white confectionary similar in size to a tablet.

from the task at hand and placed extra pressure on them with the knowledge that the project still needed to be completed. Another student response to the same question was, "I did because I really like doing it; it's really cool and I found different radios on the web". Again because they enjoyed the topic, they expanded their research to find a different variety of information regarding their chosen project. The common theme was that they were still enjoying the project. The only negative comments were all based around, "…just the time thing". The students wanted more time so they could put more work into getting their project to a certain academic level which was beyond simply completing the task, indicating their desire to strive further and to attain a deeper learning. They wanted to hand in the best submission possible and they were willing to spend more time on it because they enjoyed doing so.

The data indicated that the students' favourite activity shifted in the following week of the project from drawing their chosen topic to actually making a model of it. When asked what was their favourite activity their responses were very similar. One male student described his favourite activity as "…woodwork, because I have to cut up a giant pallet for the parts for my biplane", and a female student said, "Mine would be woodwork because I'm making a really retro 80s 3D radio". Another female student stated, "Woodwork was fun because I was working with a light bulb, like a 3D light bulb". It appears the more hands-on the tasks were, the more the students enjoyed the topic. The male students particularly thrived with these types of activities, with one talking about how he "…just ripped through five pallets in about two minutes". The other disciplines mentioned in the first week, however, were not lost in the mix, with responses that their favourite task was, "…the PowerPoint again because I like making PowerPoints and slideshows and stuff" and again, "…art was fun because I like to draw". The data indicates the consensus that all students interviewed enjoyed the practical side of the project and the integration of various disciplines.

When the students were asked whether they were looking forward to the end of the project their responses were varied: 'no', 'yes', 'no', 'half half'. Those students who were not looking forward to the end wished for further time as they wanted to accomplish more before having to hand it in. They were not satisfied with submitting a project that merely completed the task that was requested of them. They wanted to spend more time on their own projects and ideas and continue developing and researching them and attaining a broader knowledge of what they were researching. Finally they were asked whether they were looking forward to the following week. Students responded as they did in the first week, that they were looking forward to the week through positive feedback such as, "…yeah [and]…it's also more fun doing it".

4.3.1.3 Students' final responses

It seemed at the end of the integrated Project-Based Curriculum program that little had changed. Students continued to request more time to perfect their artefacts, and it seemed the male students' woodwork was the most enjoyable activity, with comments such as "the woodwork was probably the most fun". It was interesting to note that when questioned

further as to why woodwork was fun and why hands-on type activities were enjoyed the most, one male student explained, “I was really enthusiastic about building it and that really helped my learning about how it operated”. It seemed that by physically building their chosen topic, it gave them the best understanding of how it actually operated. In one project students were determined to build a functioning catapult. Their first task was to understand how it worked so they could replicate and assemble the individual parts that would see a 10cm catapult launch a tic tac the distance of the length of a standard size school desk.

The most enjoyed task depended on what students felt their best final product was. Whilst they all had to present their machines, they were given the choice that the presentation could use any artefact they were able to create in any part of the integrated study in any discipline. The students enjoyed making their own artefacts, and they were proud of them: “I made a biplane!” However, they also enjoyed observing other student’s creations. “Josh made a catapult which is awesome, it was fully functional and everything,” was just one of the comments made by students during the final focus group session.

The final focus group session ended by asking the students if overall they enjoyed learning with this style of curriculum. There was an overwhelmingly positive response to this question, despite the fact that they all thought there was more work involved. Students made comments like, “It was fun”, “it was really good”, “I would keep going because I like doing the activities that we are doing so far”, “It’s been fun and exciting and this has been a pretty good four (sic) weeks”. The final comment made by one student was that the program should be repeated again next year but “…make it go for like a term or two, that would be better”. For any student to ask to do something for a whole term or even two really supports the fact that they had enjoyed the tasks asked of them. Students’ lives today are entirely different to the lives that previous generations experienced as children. Robinson (2011, p.21) talks about how his own children have a quaint view on his childhood with “…only two television channels, no colour or surround sound, not TiVo, no computer games, cell phones, iPods, fast food, Twitter or Facebook. Their world is inconceivably different”. Vast amounts of information are consumed by students via these sources, and the speed at which students live their lives means that they are constantly looking for something new. To have a student not grow bored and want to move on to the next ‘new’ thing and instead want to spend another term or two working on the same project really highlights the engagement in and enjoyment of the task. It is possible that what students are engaging in is the depth of learning which is taking place. Students are going beyond the superficial and experiencing a greater depth of learning in topics that were initially chosen by the students themselves.

4.3.1.4 Classroom observations of student engagement

Classroom observations supported the focus group argument that students remained engaged during the program. It was not uncommon to observe nearly all students remaining on task for the entire duration of the lesson. Observation comments similar to the following remarks were regularly recorded: “All but one student was on task and this student was having trouble

logging on to his account despite attempts of assistance from the teacher". Another observation noted that, "…a student who usually completed the bare minimum, was today creating a detailed presentation on washing machines. She found some excellent historic images of the evolution of the washing machine and was setting up an order of appearance in her presentation so that it flowed, going above and beyond what was necessary to answer the question". The data that came out of natural classroom observations showed that even the students who were usually disengaged in class were involved somehow and contributed to their team's project.

4.3.2 Student educational ownership

4.3.2.1 Students' first responses to ownership

Students who participated in the integrated Project-Based curriculum were able to choose to study things that they enjoyed: "Well I'm doing a plane because I like aerodynamics, you know, flying and crashing". This freedom of choice initially gave the students the sense that they were in charge of what they wanted to study and therefore could choose something that they were interested in. Not only were they able to study a particular interest but they also had the ability to choose how they were going to study and present it: "I'm doing a catapult and I like it because I get to build one".

This integrated Project-Based Curriculum program was able to break away from the traditional style of teaching, in which the teacher typically decides the content, proceeds to talk about the theory and then assigns a task that results in students regurgitating the information. There has been significant research that shows that male students learn better by doing rather than listening. West (2007) postulates, "Boys are not terribly good listeners. Cut the words you use down to the absolute minimum. Get boys active early in the lesson. Avoid a long preamble". During the integrated Project-Based Curriculum program, because of the freedom of choosing what activities were to be accomplished, the boys were able to become more active earlier in the project and chose more practical activities to work on. What also was discovered in this case study was that this choice of being involved in more practical activities was not just a male response. When the female students were asked if they liked the idea of choosing what they wanted to study, they also answered in a positive manner. One female student remarked, "I'm doing the radio and, like, I like radios because I really like music".

It seemed that the more ownership that was given to the students the more ownership they wanted. During the integrated project the VELS curriculum still had to be met, so ideas often had to be taught in parallel to study for each student-chosen project. What was repeated a number of times by the students was that they wanted and preferred to keep studying and bettering their own project and to dismiss the rest of the curriculum. Students often suggested that "more time was wanted on the integrated unit in Science rather than Chapter 8!"

At the end of the first week, when asked whether students preferred being given the opportunity to decide what they wanted to study, where little structure was given by the teacher and students had to work hard to create their own ideas on how their project should look, there was an overwhelming positive response. "[The] positives are you are doing something you want to do; [the] negatives maybe some extra work on top of what you would normally be doing". Students were well aware that there was more work involved in the integrated Project-Based Curriculum program. They understood that under previous curriculums the teacher would source the content information needed, deliver it to the students and then have the students recite it back in various teacher-chosen assessment tasks. It was now up to the individual students to research and find the information that they needed to acquire and then decide on and develop the delivery of the content back to the teacher and class. This extra work was accepted because of the ownership that was given; students responded with, "…we actually studied what we choose", or "…we study what we choose not what the teacher chooses….it's better".

4.3.2.2 Students' ongoing response to educational ownership

Each student had decided what standard they wanted their project to reach, but because they were responsible for the process of their own research, students experienced some issues. Often during the time that students allocated themselves for research, they would struggle to complete what they set out to achieve as they found themselves reading about interesting tangents related to their projects. They would therefore use this valuable time understanding information irrelevant to their original project. Due largely to time being taken up by interesting but less relevant topics, students soon realised that the time they had on their actual project was coming to an end and that they were not going to reach the level of quality that they wanted. Student responses that they needed "…more time to write the picture book" or "more class time on the reports" were common. The lack of class structure set by the teacher was a learning curve for most. Time organisation was a skill that students had never had to be conscious of previously, as in a traditional setting the teacher was responsible for the timing of delivered content. It is expected that with more practice at this type of curriculum, students would improve at being able to organise their time more efficiently and productively, an important life-long skill to attain through such programs.

Students were not afraid to change the theme of their projects if they thought they could not achieve what they wanted to with their initial project idea. They still had enough time to start again with another topic. One group changed after the first week, finding that there was "…not enough information about the inventor". In the past they may have stuck with the original idea and completed it to the best of their ability, making sure they had completed just the required work. This new ownership meant they felt more in charge and could transfer to a topic they felt they could achieve a greater amount of success with.

4.3.2.3 Students' final response to education ownership

After the project was completed students could see the benefits of a traditional teacher-led curriculum. Benefits included more class structure developed by the teacher and a lighter workload on students. One student even said that teachers were better able to "…pick things for you to learn that are quite interesting and you don't hear about every day". Even though students acknowledged the benefits of a teacher-led curriculum they still preferred the integrated Project-Based Curriculum program, due to their perceived educational ownership and freedom to study anything they wanted. "We got to do what we wanted to do," and "This made it better because we could do whatever we wanted," and even "I mean we could have chosen a sword and been allowed to make a sword", were all comments made by students at the end of the integrated Project-Based Curriculum program. It seemed what made it enjoyable and engaging for the students was the fact that they had the choice. When questioned whether the project would have been just as enjoyable if the topics were chosen for students by the teacher so they would 'not get the choice', they all indicated that this would not have been as engaging. Again one student continued this discussion with the comment, "We get to learn about what we want so it will make us more enthusiastic about learning it".

At the end of the integrated Project-Based curriculum students were also coming up with ideas on how to include or study other disciplines through the topic they had chosen. With one invention students thought it would have been an idea to include the Language Other Than English (LOTE) discipline they studied and made comments such as, "…it would have been better if they added Japanese into it," and "…learning about planes or something in Japanese…" The fact that they could see their topic in other disciplines meant they could see the value of these other disciplines, and that in turn raised the importance of the other disciplines in their opinion. Suddenly they were not learning unrelated subjects throughout the day that they would possibly never use again. Instead, they were learning about a topic that interested them from different angles and through different perspectives, with each view no more important than another. Robinson's 'hierarchy of disciplines' seemed to be dismantled under this program.

The different angles encouraged students to go home and learn more about their topic through self-managed experiments. One student reported the following story: "I grabbed two light bulbs and I clear glazed one of them and mucking around they both didn't work and I dropped them and the clear glazed one didn't break at all". It is not easily determinable as to what this student was trying to achieve with glazing a light globe, but what this student discovered was that the glazing not only changed the colour but also strengthened the light bulb. This knowledge would not have been discovered in a school setting, as the student rightfully said, "I don't think school would let me break it". This educational ownership provided the encouragement for students to continue to broaden their own knowledge of their chosen topic without any direction or influence by a teacher. Another student who was running out of time to make the model they desired simply stated, "You can always do woodwork at home". This again was with no prompting or input from a teacher. While in the past teachers had to prompt and encourage some students to keep learning, to keep working

and to challenge themselves with harder activities, under the integrated Project-Based Curriculum program such urging was no longer necessary. The encouragement and prompting now came from the ownership of the student to educate themselves, creating a certain amount of intrinsic motivation to achieve their desired level of quality in their final product.

The final comment made in the final focus groups was “thank you for listening”. This simple phrase really highlighted what the students appreciated the most from the curriculum - that they were listened to. Students appreciated the fact the teacher had stopped teaching in their usual method to deliver the required curriculum, and had started to hear and value students’ ideas about what they felt was important to know.

4.3.2.4 Student ownership classroom observations

Throughout the three weeks of the integrated Project-Based Curriculum program, where the students took charge of their own projects and learning, a renewed enthusiasm was observed. One observation was of a student who claimed that in the previous ‘group’ assignment he had managed not to contribute at all. However, during this project, having topic choice enabled him to research 2-stroke and 4-stroke engines (something that interests him), and he had already typed 500 words in that class alone. Another observation was of a group who decided to “change their invention due to the fact they could not find enough information on it”. The fact that students had the ability, part way into the project, to decide to stop researching one topic and choose another topic showed that they were prepared to own their work and the outcomes of the decision they made that directly affected the time they had to research, design and deliver their project’s presentation.

4.3.3 Student Self-Assessment

4.3.3.1 Initial thoughts on student self-assessment

From the very beginning of the program students were aware that the task they were being asked to complete was at a higher level of difficulty than tasks they had completed in the past. They realised very early that it was more challenging, with a student commenting that “you get to research lots and lots of stuff because it’s really hard to find out”. Realising the workload was large, another student remarked, “There is a bit of work, a fair bit of work”. They also discovered that sometimes the research was difficult. One group complained, “It’s hard to find out who actually invented it,” and “I’m doing the light bulb and it’s really hard because they say somebody invented it and then a heap of sites say he didn’t invent it, that he copied it”. However, when a group of students was questioned as to whether they thought the task was within their means and if the workload was manageable, most responded with “Yes”, “yeah”, “it’s okay”. This showed that they were happy to do the extra workload and to challenge themselves in areas they were not confident in, “…like drawing, it’s challenging”.

Most students realised that they were attaining knowledge due to the research they were carrying out. One comment was, “It’s given me more knowledge”. Most were able to articulate what they learnt: “I learnt who invented the catapult,” or “I learnt that there were many, many prototypes before they actually flew the final plane, that was the ground-breaking one,” or “the radio was invented in 1855”. Some information was learnt and lost, for example, “…the inventor, I can’t remember their name exactly but I do know the last name, Marconi”. Some information that was learnt throughout the integrated Project-Based Curriculum program had corrected previous inaccurate ideas, with a student remarking that “a car engine did a little bit different to what I thought it did”.

The integrated Project-Based Curriculum program encouraged extra learning. A student exclaimed, “I learnt who invented gunpowder…the Chinese”. This comment seemed unusual as this student had never mentioned gunpowder before, so when the student was questioned as to whether gunpowder was part of their catapult research they replied, “No, I just found it on a website”. Another interesting comment from a different student was: “This doesn’t have to do with my invention but I know that Leonardo Da Vinci created a pistol during the Renaissance. The pistol that Da Vinci made had only one shot and then you had to get a new pistol”. This showed that students didn’t stop researching and learning after they were satisfied that they had answered the question being asked in their project, but instead kept on reading, learning and researching tangent topics that interested them; this resulted in giving the students a broader and deeper knowledge and education of their original topic.

4.3.3.2 Ongoing thoughts on student self-assessment.

During the second week of the integrated Project-Based Curriculum program students agreed that they felt that they were learning more by researching their own ideas than if the teacher had just given them the information. They also felt that the subjects involved made more sense when relating it to a real world example. One student commented that “…maths has been a bit easier”.

Even in the second week students were able to articulate different acquired knowledge. One student went into great depths with the new topic he was researching: “It was proved that Sputnik could be launched in 1903 but it wasn’t actually launched until 1957… well, because they didn’t actually have the idea for Sputnik yet; this guy just proved that if you launched certain objects at certain velocities they could obtain orbit”.

Even their research skills were identified as improving. Students were starting to make judgements on the quality of the information based on the sources and internet sites they were attaining this information from. Students made comments like, “You can never trust Wikipedia because it can be entered by anyone”. They had decided without teacher input that Wikipedia was unreliable because anyone could type in the information and that this was not a reliable source. On the other hand, if you found information that was published in an encyclopaedia, you could be confident that the information had been checked and verified, with one student commenting, “…but you can trust the Britannica”. These research skills

were not taught in class, but were obtained by the students who participated in the self-learning and researching of the integrated Project-Based Curriculum.

4.3.3.3 Final thought on student self-assessment

After the integrated Project-Based Curriculum program was completed and students had presented their projects, they reflected on their choice of topics, on what challenges would have been achievable and what tasks would have been too simple. One comment was from a male student who had considered researching a sword for his project but later said, “I think a sword would have been too easy”. Another student who originally wanted the report to be excluded from the project changed his mind and said, “I don’t know. I think the report (it) took up a lot of time, but I see its point and why we did it because the slideshow…it was a little bit about them and the report was more about them and that, and I see why we did it”. The students in the final focus group understood and accepted that the challenges they gave themselves were necessary for their own growth and development.

Even further knowledge was attained and remembered by the end of the program. One student could articulate the operation and workings of a catapult, commenting that “…the catapult was operated by a twist rope, not strings or pulleys or anything. They shove a stick into it and twist it in the middle, and then they exchange that stick for the catapult arm, which then wants to go that way, but then they pull it back and it goes boom”. This description was made without any notes or diagrams prompting their memory, only his arms and hands were being used to help describe how the catapult functioned. Another student spoke about soundwaves in some depth, a topic that would be studied in science in future years; however, he had already read about it after studying his inventor’s life: “His mother was deaf and his Dad worked with deaf people and he was in a corn field and he wanted to see if he could hear the corn grow, but instead he could hear his Dad calling for him, so since then he’s been interested in sound waves”.

Finally, when asked if they had learnt more about the machines they had chosen in the previous three weeks than other topics that had studied in the past, the students all responded with a positive “yes”. They also agreed that they had learnt more in a shorter period of time than what they usually would in an entire term. The reason they had learnt so much was that the topics interested them, with one male student commenting about his catapult project, “It’s really, really interesting finding out how they built it and what they used for it and finding out how many types of catapults there are”.

4.3.3.4 Student self-assessment classroom observation

Throughout the program, during the natural observations, it was clear that students had a preconceived idea of their end goals. Students would often stop working and go through what they had completed, whether it was a PowerPoint presentation or a piece of artwork, and make a judgement on whether they thought they had achieved what they had set out to achieve. Students seemed pleased with their work and were observed redoing complete work if they were not satisfied.

4.3.4 Student collaboration

Of all the different aspects that the integrated Project-Based Curriculum program provided, student collaboration was the most difficult for the students to achieve. Some handled it well by organising time to meet to discuss and develop their projects, with one student remarking, "I'm going over to Jennifer's house tonight so we can work on it together…get the reports out of the way so that will be good". The groups that succeeded were the most organised groups, consisting of students who trusted one another in the work they were producing, groups which could easily delegate tasks to each member and trust that each member would complete the task satisfactorily. One group commented, "With woodwork Bill has got an hour and a half to cut apart their whole pallet and then make the biplane. We are both working on a biplane".

Other students felt they were left out of the group and felt they were not doing enough. When asked what she would do better, Judy stated, "…probably helping out more with the PowerPoint because Kylie and Kate are just doing it and I hardly ever get a part of it," and that she was "…not even helping at all except writing my report, that's all I'm doing". When asked how they would solve the problem of this exclusion in the group, the response was desiring "…to go individual" and "…I would do my own PowerPoint…instead of being in a group".

Apart from being left out, another problem groups faced was disagreement with the research and ideas. Issues with agreeing on information found and ways forward were apparent and regular, with one student commenting, "Yeah, like Catherine says something and then I say from my point of view that I've seen different information on five or six other websites and she just says no, what I say is right". When asked how the group dealt with and resolved group conflict, the student responded with an unsure, "Well, we have just been like looking on sites again and again".

The skill of collaborating with colleagues is an important but difficult social skill to learn. Students will have to face this problem in future careers working with colleagues. Collaboration can be difficult even with cooperation, good will and competent colleagues. However, it can become extremely challenging if working with colleagues who may be unreliable, untrustworthy or inflexible. It is necessary to acquire these collaborating skills as a student. The integrated Project-Based Curriculum program has highlighted how unskilled these students were at working efficiently in groups. Teaching students how to work in groups is important and is worth considering as an essential component of the initial stages of the integrated Project-Based Curriculum program. If these skills are taught and routinely practised, these students will develop the necessary skills to work with different peers and in varied situations. However, it is evident that they do not currently have these skills and therefore it is important that more of this type of curriculum is implemented.

4.3.4.1 Student collaboration classroom observation

Through natural observation, it was noted that students endeavoured to improve their weak collaboration and teamwork skills. Observations of students who in the past were "…content to not contribute or complete anything in class, were [now] contributing substantial amounts and endeavouring to do their best for the group". Even when students were expected to produce individual work in classes it was observed that "…group partners would sit next to each other and continue to collaborate as a team". Even though the focus groups meetings produced frustrating responses from the student participants due to the required group work, it did not stop the students from endeavouring to work in these groups and improve those skills.

4.3.5 Student desired level of achievement

What was noticeably different throughout the integrated Project-Based Curriculum program was that students displayed a higher desired level of achievement. Students were not interested in merely ticking all the boxes to get the task completed as they had been in past curriculum. Each student wanted to hand in their project at a high level.

Some students were willing to work extra hard, spend more time on it and even submit it late just to get it to their desired level. One student who was determined to complete it to the level they wanted, stated, "I haven't finished all my project things that I've got to do for it and I'm not going to be able to hand it in on time. I'm pretty much going to have to use the computer for an hour a day and I [still] don't have enough time". Another said that they will be "…glad with the finished product, but you know that it's going to be flat out". The students who were not willing or could not put in the extra effort still had an idea of where they wanted their project to be, but admitted that "it probably won't be finished by then," or that they wanted to do it a certain way but "it's probably not going to be done". Both cases had students who had raised their own standards. This was done without the prompting or encouragement of a teacher. It seemed that the integrated Project-Based Curriculum program naturally encouraged students to achieve and strive for their best.

After the project was completed most students were satisfied with their accomplishments and the challenges they had set for themselves: 'I made a light bulb out of wood which was really hard but it turned out really good". Some students were even inspired by other's achievements: "Josh made a catapult which is awesome, it was fully functional and everything". It seemed that they were willing to strive for their best and achieve greater goals due to the curriculum engaging them and "…because it was really fun. We got to actually make our inventions".

4.3.5.1 Students' level of achievement - classroom observation

It has been stated that students desired to complete a better standard of work or a more comprehensive project; the natural observations in the classroom also confirmed this.

Observations such as 'high quality' 3D artwork were observed. In the final presentation observation it was noted that "…the content and information of each presentation was in depth and well understood. A group who had problems with their PowerPoint presentation were still able to deliver a highly detailed oral presentation without notes or prompts due to the knowledge they were able to attain and retain throughout their research preparation time".

4.4 Qualitative data collected after the integrated Project-Based Curriculum Project through teacher interviews

4.4.1 Implementation of the integrated Project-Based Curriculum

The teacher interview data confirm that Frasier's (2008, p.3) three prerequisites - time, a curriculum map and resources - were established in the integrated Project-Based Curriculum program appropriately. In terms of the time allocated to preparation, and the curriculum map being well designed, this was confirmed with one teacher commenting, "I think it worked quite well; I think you had it fairly well organised, fairly well structured. I mean I pretty much had all the information I needed". There were not a lot of resources used in the program; the topic chosen did allow for this. In terms of resource division and allocation, comments such as, "You did a very good job at co-ordinating the whole thing, which made it easier for the teachers just to plug into it," seemed to confirm that everyone had everything they needed.

4.4.2 Experienced benefits from the integrated Project-Based Curriculum

A number of different benefits were reported during the post-case study teacher interviews. The benefits included: a deeper learning of content due to a greater prior knowledge being brought to class; students were also more engaged in the curriculum; and students appeared to own their education.

A common benefit that a number of teachers reported was that students came to class with a greater prior knowledge. One teacher commented, "Because of having it [the program] in the other subject areas they [students] had more prior knowledge on the topic when they started doing their research [for the maths discipline]". This was seen by the teacher as an advantage, as she could now teach more maths content, instead of teaching the preliminaries. Students would come to class with background information on what topic they wanted to study and instead of asking questions about the theme, students could delve straight into the discipline's content. The art teacher was pleased that, "…most of them [students] come knowing what object they were going to do" and instead of using time in choosing the topic, students instead used this time to learn how to draw 3D pictures so they could draw their topic. This shows that the students who came to class with a greater prior knowledge were able to be taught more of the content in each discipline, and therefore effectively deepened their learning.

The next reported benefit that teachers were pleased with was the students' engagement in class. One teacher commented at the start of her interview that she immediately "…noticed that the kids attune to the topic because it is cross-curriculum". Another teacher found it was easier to get students to complete and hand in work because of the student engagement in class. The "7MV [Project-Based Curriculum] group, (they) got their work completed on time and all of them got it submitted…compared to 7BK [alternate group]. I had a lot more trouble getting work out of them. Only half of them submitted their work and I was chasing them". He thought this was the case as "…it [the discipline's task] seemed more important or something [to the student] because it was related to other subjects, it carried more weight". This confirms the existence of Robinson's discipline hierarchy in the normal curriculum delivered class. The final teacher suggested that students were more engaged due to the fact they had ownership over their education: :If the children own it, then the children will engage in it more". This engagement supports the data found in the student focus groups with the term 'fun' being used to describe the program a number of times.

4.4.3 Experienced problems from the integrated Project-Based Curriculum

The post-case study teacher interviews did highlight some teacher concerns. The data did show that most teachers were open to the implementation of the program. A number of teacher comments confirm this, such as, "I was enthusiastic about it, it had a lot of positives," and "I didn't mind, I quite enjoy anything that requires any mental agility," and even "I think Project-Based Curriculum is a good direction to go".

However, when asked whether they would be involved in similar future curriculum programs, one teacher was more hesitant, saying, "I wouldn't be advocating that again, at least not in that form. I don't know; it could be done in some other way, maybe?" and "We need to think it through more fully". On further examination, these comments were made due to the reduction of average academic results that were received in her discipline. It was argued by this teacher that the wrong class was used in the program, that the other class was "more creative in their thinking and more focused" and that because the Project-Based Curriculum class was "operating at a fundamental level" she "had to coach quite a few of them and had to provide the story for them because they didn't have the imagination". This teacher was indicating that the integrated Project-Based Curriculum program had a negative effect on academic results. Further discussion of this issue was had with other members of staff who disagreed with this teacher's conclusion. It was suggested that the inappropriate and limiting chosen work task was the problem. The chosen task was a creative children's story and this, rather than the curriculum, was the cause of a reduction in marks. The creative children's story was limiting in the integrated Project-Based Curriculum program because it had to be designed around the chosen invention, whereas if students could choose any topic, more appropriate subject matter could have been selected, such as small animals etc. It was suggested that instead of assigning "a creative story, you might have done an informative essay…you could have set up an essay on how does this machine affect your life today". This anomaly in teacher's opinions will be explored further in Chapter Six.

4.5 Summary

In this chapter the data shows that to implement a successful integrated Project-Based Curriculum program, a number of elements were required. This included Frasier's (2008, p.3) essential three requirements involving sufficient preparation time, a well-designed curriculum map and proper allocation, division of and investment in resources. However, the qualitative data also produced other findings, which included off-campus learning, student involvement in the planning and a 'wow factor' in the program.

The themes identified in the qualitative data showed that if a program was successfully implemented, then there were a number of perceived student and teacher benefits. The first theme identified was that students perceived the program as more enjoyable and that they became more engaged in the work. This approach allows the teacher to satisfy Mitra's (2012) paradigm where the teacher simply asks the learners a questions and can then "stand back and watch as learning emerges" ("2062: Learning and babble," para. 36).

Student engagement led to the second and third themes identified, which were respectively students' ownership of their learning and the awareness of the extension of their knowledge. This self-learning or meta-learning is a highly sought skill in the workforce. After students took ownership of their own learning they began to self-assess what they were producing in order to reach a higher level of achievement. These perceptions created a willingness in the student to further engage in the learning and continue their learning even when the required task had ended. This supports Johnston's idea that they experience a deeper learning. Johnston suggests deeper learning is happening when "…students are likely to read extensively around a given topic, to discuss the topic and ultimately achieve higher grades in assessment tasks" (2000, p.3).

Collaboration was the fourth theme identified and an area where students in this case study did struggle, due to the limitations of their individual skills in group work. Whilst their struggle was not large enough for them to abandon their group projects and reject the program altogether, their frustrations were present in the data collected. It is important to note that collaboration is a life-long skill, and is essential for the future development and growth of each student It is one of the 21st century skills that Juke (2010) suggests are critical to today's students along with "critical thinking, problem solving, working in teams, learning in teams" ("Chapter 9," para. 15). This highlights the importance for such programs to exist in today's schools as all of these 21st century skills list are learnt, practised and perfected in integrated Project-Based Curriculum programs.

The last theme identified was that once the program was completed students experience a real sense of accomplishment and achievement. By implementing this program which incorporates the student's individual abilities and interests then the end result is one of satisfaction and accomplishment. This will then see teachers achieve in students what Jukes

et al. calls the “ultimate goal of fostering a love for learning” (Jukes et al., 2010, “Chapter 11,” para. 5).

The qualitative data collected from the teachers also confirmed that they thought the program helped to deliver a deeper learning for the students involved. This was explained through students coming to class with a greater prior knowledge. Topic preliminaries could be omitted and the teaching could delve straight into the course content, which could then be taught in more depth, providing that deeper learning. Another benefit identified to the program was the dismantling of Robinson’s hierarchy of disciplines, which encouraged students to perceive each discipline as important as the rest. This created a greater importance in some disciplines that may have been previously deemed less important by students, resulting in the individual student working harder and ensuring that all required work had been submitted.

In this chapter I have analysed the data produced from the case study implementing an integrated Project-Based Curriculum program. The data has indicated that students who were involved in the integrated Project-Based Curriculum experienced a number of benefits. By incorporating students’ interests and abilities there was an initial engagement and enjoyment of the program. This resulted in the students taking ownership of their education, which inspired them to do more than what was asked of them resulting in further reading of their program and a deeper learning. Problem solving and learning to work in teams introduced students to the necessary 21st century skills that students need for their future prosperity. Finally, completion of the integrated Project-Based Curriculum program delivered a sense of accomplishment and fostered in students a love for learning; this has been identified by Bender (2012), who described this style of learning as “an exciting, innovative instructional format in which students select many aspects of their assignment and are motivated by real-world problems that can, and in many cases will, contribute to their community” (“Chapter 1,” para. 2).

CHAPTER 5: THE ACADEMIC SHIFT

5.1 Overview

This chapter will review and analyse the quantitative data generated during the case study. The case study focused on two Year 7 mixed-gender classes. Initial testing showed that one Year 7 class performed better academically. The lower-performing Year 7 class was selected to be the test group and would be involved in the integrated Project-Based Curriculum program. The higher-performing class was selected to be the control group and were delivered the standard traditional curriculum. The aim was to increase the test group's academic performance to match or surpass the control group.

To monitor and compare each group's academic performance, five disciplines were chosen to take part in this study. They were selected based on teacher's willingness to take part in the study and on the ability to match past results in the discipline. The five disciplines chosen were Art, English, ICT, Mathematics and Science. In Art, students studied 3D drawings. In English, students studied children's picture books. In ICT, students studied PowerPoint presentations. In Mathematics, students studied Statistics and Data. Science took the lead role in the program, where students studied Heat and Heat Transferral, and were also required to produce a presentation on an invention and its respective inventor using artefacts created in the other four disciplines. Whilst the integrated Project-Based Curriculum class studied woodwork and used it extensively for their integrated study, the control class had been involved in this discipline in the previous semester and were not enrolled in this discipline during the time of this case study. As such, a comparison using this discipline was not able to be made.

Each discipline recorded a final assessment mark. The final assessments varied from discipline to discipline. The final assessments for Science and Mathematics were unit tests and these were matched with students' previous semester exam marks. ICT's final assessment was students' final PowerPoint presentation; this was matched with students' previous semester coursework marks. Art's final assessment was on students' final 3D drawing; this was compared with students' previous semester coursework marks. The final assessment for English was a children's picture book, which was also matched with students' previous semester coursework marks.

When students were absent during tests or exams, those marks were excluded from the study. When students failed to hand in an assessment, a zero grade was given and included in the study. This is in line with the school's reporting policy to exclude missed exam marks and average out the final grade, but to include a zero mark for students who fail to submit work. It is important to include and acknowledge students who failed to submit work requirements as this may show whether the integrated Project-Based Curriculum program engaged students enough to complete the required work.

The following section presents a series of graphs summarising individual discipline data produced from both classes. Whilst small in scale the project produced a complex data set enabling several comparisons to be made:

Academic results for the integrated Project-Based Curriculum class could be compared *with their own previous results* in several disciplines

Academic results for the integrated Project-Based Curriculum class could also be compared with the results of the class working with 'normal' or traditional curriculum

The first graph in each series represents data from the class that was involved in the integrated Project-Based Curriculum. This graph contains a blue line that represents the results the class experienced from *past* assessments (that did not involve integrated Project-Based Curriculum). The red line represents the results the class achieved during the implemented integrated Project-Based Curriculum program. The vertical axis denotes the assessment's awarded percentage. The school used a bonus mark system during some of their assessments, this explains the few times the awarded percentage exceeded 100%. The horizontal axis denotes each student and their gender involved in the case study.

The second graph represents the data collected from the class that was not involved in the integrated Project-Based Curriculum program. This graph contains a blue line that represents the results the class achieved from their past assessments. The red line represents results the class achieved studying similar topics as their Project-Based counterparts, but did not incorporate the integration of other disciplines or any Project-Based Curriculum approaches. This class was taught using the standard traditional curriculum. The vertical axis denotes the assessment's awarded percentage. The school used a bonus mark system during some of their assessments, this explains the few times the awarded percentage exceeded 100%. The horizontal axis denotes each student and their gender involved in the case study.

The final (third) graph in each series has two sections. The first section, which is on the left hand side of the graph, shows the difference between the averages of each class's academic achievement before and after the case study. The blue lines represent an average student mark of a past assessment for both classes. The red lines represents the average student mark for each class depending whether they were involved in the integrated Project-Based Curriculum program or not. The vertical axis denotes the class' average assessment percentage and the horizontal axis denotes whether it was the Project-Based Curriculum, the Traditional Curriculum or the overall average improvement for each class.

The second half of this graph, which is on the right hand side of the graph, shows the average student improvement of each class. The blue line represents the integrated Project-Based Curriculum Year 7 group and the red line represents the alternate Year 7 group that were taught using traditionally delivered curriculum. This eliminates the effects on the difficulty and fluctuation of the assessment task and shows solely the effect the integrated Project-Based Curriculum program had on the tested Year 7 class compared to the alternate control class.

5.2 Mathematics

5.2.1 MATHEMATICS – Integrated Project-Based Curriculum Year 7

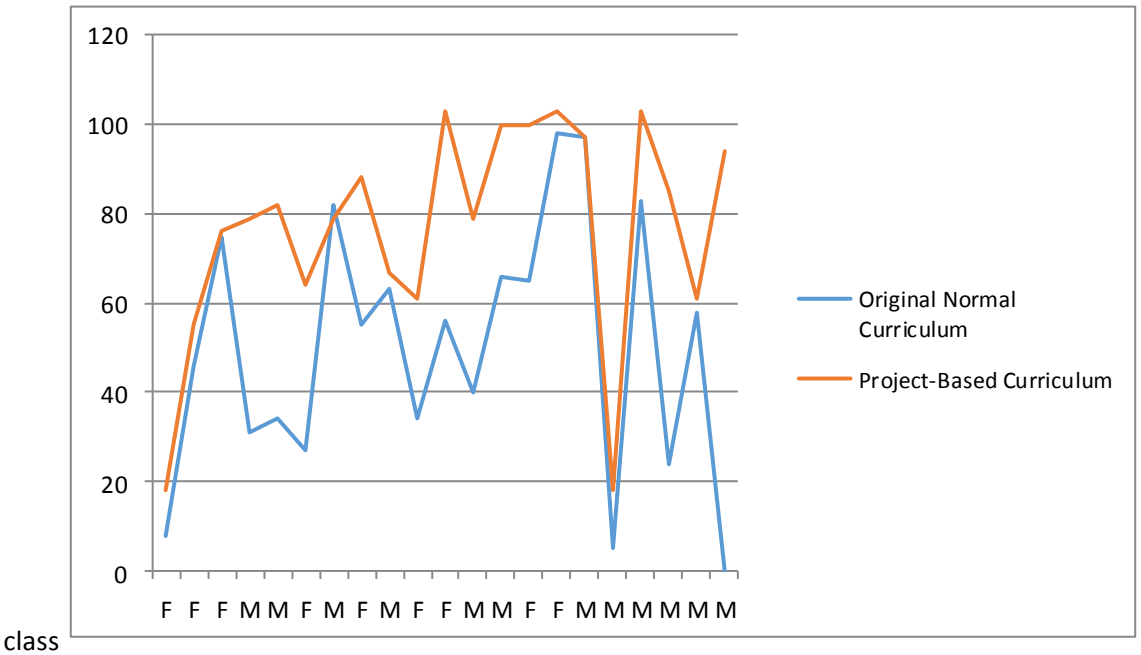


Figure 5.1 - Project-Based Curriculum compared to the original normal curriculum for the Year 7 test group in Mathematics

The quantitative results obtained from the Mathematics discipline indicated that integrated Project-Based Curriculum improved students' academic results.

Figure 5.1 shows the results from the integrated Project-Based Curriculum Year 7 group. The blue line represents each student's mark during the previous semester's end-of-semester exam. This mark was taken from their reports and was used to indicate how each student performed in a Mathematics test. This test is relevant to the project as it was a unit test used for the integrated Project-Based Curriculum Mathematics assessment. The red line represents the actual mark each student received at the end of the unit test for the topic studied during the integrated Project-Based Curriculum. The topic studied was Statistics and Data as the Mathematics teacher felt this could be taught by using data on the improved outcomes of each of the inventions each student chose as their project. An example of these projects involved the ability to plough and harvest fields before and after the plough and harvester were invented.

The graph shows the red line remaining on top for all but one student result, showing that 95% of the students produced a better result in this Mathematics topic under the integrated Project-Based Curriculum. Students who were not present at the test were excluded from this analysis.

5.2.2 MATHEMATICS – Traditional Curriculum Year 7 class

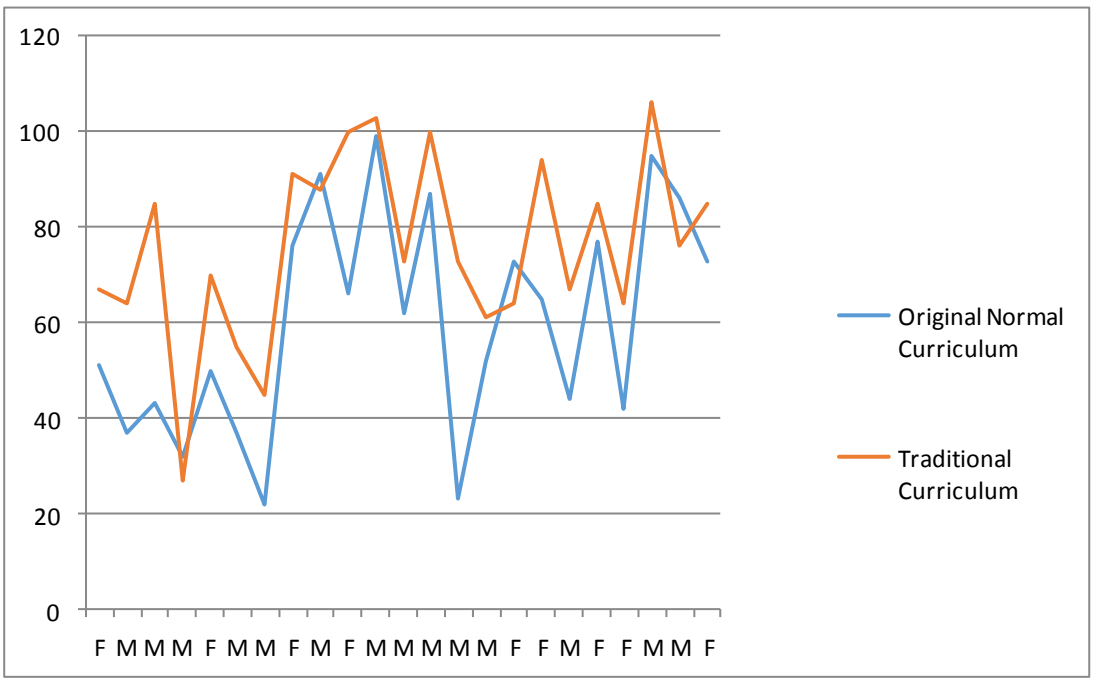


Figure 5.2 – Traditional Curriculum compared to the original normal curriculum for the Year 7 control group in Mathematics

Figure 5.2 shows the results from the alternate Year 7 group, who also studied Statistics and Data. The curriculum delivered to this group did not incorporate other disciplines or involve Project-Based learning approaches. The blue line again represents these students' end-of-semester exam result. The red line represents each student's graded result from the end of the unit topic test Statistics and Data, which was taught differently from the integrated Project-Based Curriculum class as explained above. In this case both curriculums taught were using the same traditional teaching pedagogy, therefore the two lines should have remained very similar. Any deviation would be due to the way students responded to the different topic studied. This gives an indication of the level of difficulty of the topic taught which we can then use to compare the integrated Project-Based Curriculum class.

The graph shows that the red line still remains typically on top; however, there is less variation between the two results, and less than 95% of students did better in this topic. Again, students who were not present at the test were excluded from this analysis.

5.2.3 MATHEMATICS – Class Averages

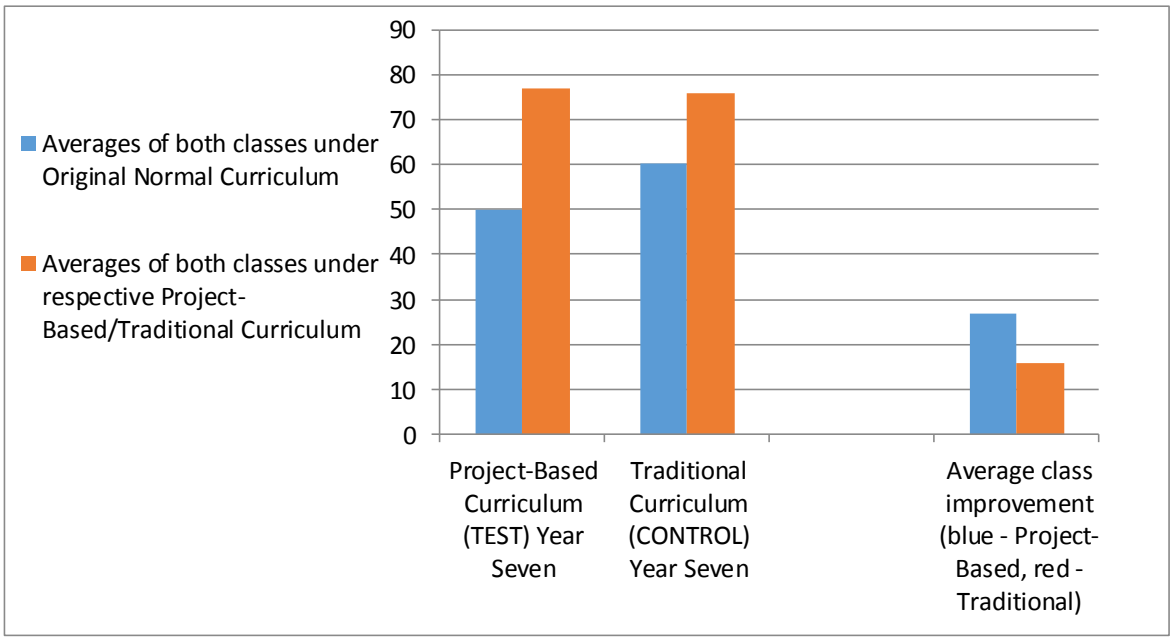


Figure 5.3 – Average results for both classes and the average improvement for both classes in Mathematics

Looking at the average results for each class it shows that there was a greater improvement with the integrated Project-Based Curriculum group.

The first part of Figure 5.3 shows the difference between the averages of each class's academic achievement. The blue bars represent the original average student marks at the end of the semester exam in the previous semester. The graph shows that the Project-Based Curriculum Year 7 group was at a lower academic level than the alternate Year 7 group. The red bars represent the average mark for each class in the final testing of Statistics and Data. The data shows that both classes improved in their academic achievement for the Statistic and Data topic. This might have been due to the topic being easier to understand or more engaging to the class. Not evident in the data is that the Project-Based Curriculum class originally struggled academically. The graph indicates that not only were these students able to match the other class academically but were able to produce a better average under the integrated Project-Based Curriculum.

The second half of this graph shows the average improvement of each class. The blue bar represents the integrated Project-Based Curriculum Year 7 group and the red bar represents the alternate Year 7 group who were taught using normal delivered curriculum. It is clear that the Project-Based Curriculum Year 7 group experienced a greater increase of improvement in their results.

5.3 ICT

5.3.1 ICT – Integrated Project-Based Curriculum Year 7 class

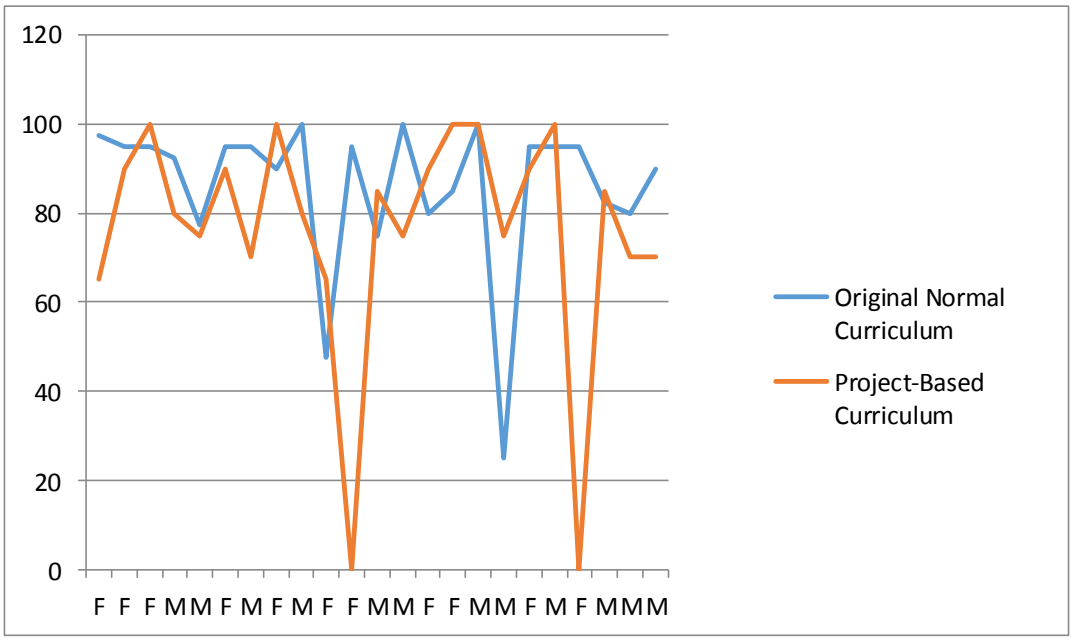


Figure 5.4 - Project-Based Curriculum compared to the original normal curriculum for the Year 7 test group in ICT

The quantitative results obtained in the Information Communication Technology (ICT) subject again reflected a benefit for students being taught under an integrated Project-Based Curriculum.

Figure 5.4 shows the results from the Project-Based Curriculum Year 7 group. The blue line represents each student's average mark during the previous semester. This mark was taken from their reports and was used to indicate how each student was performing in ICT. It was decided that the integrated Project-Based Curriculum assessment for ICT would be a PowerPoint presentation on an invention the student chose for their Science project. This PowerPoint presentation could then be incorporated into their oral presentation project for Science. The red line represents the actual mark each student received for their PowerPoint presentation.

The graph shows that, unlike Mathematics, the red line does not remain on top for all of the results; some students did better and some did not. Where the red line occurs at the bottom axis it indicates that the student failed to complete and hand in their PowerPoint presentation and therefore received no marks. In this class two students failed to hand in the work required.

5.3.2. ICT – Non-Project-Based Curriculum Year 7 class

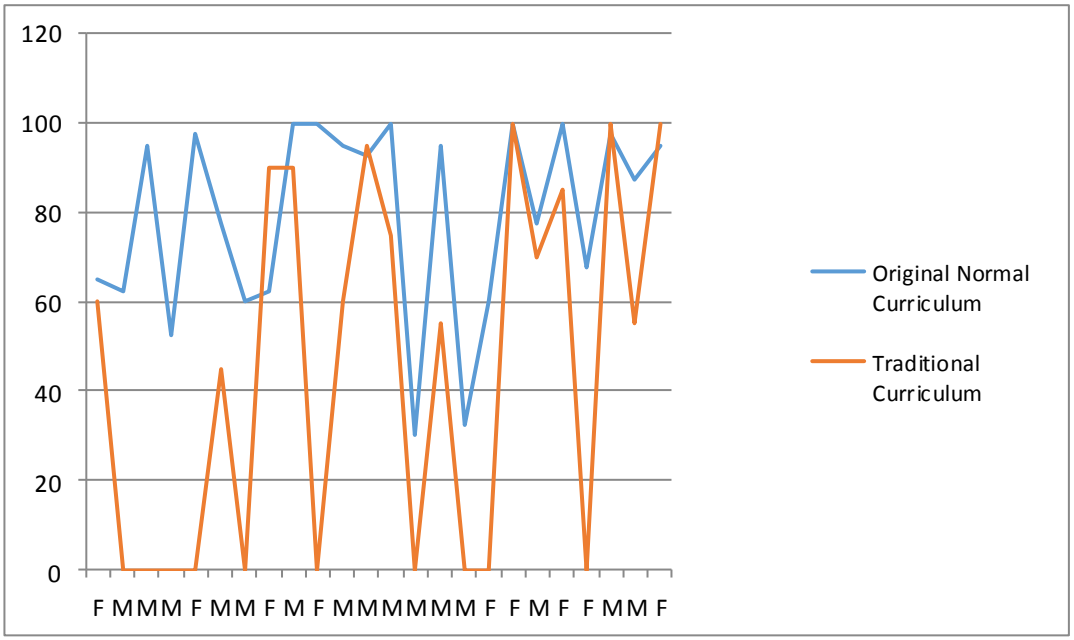


Figure 5.5 – Traditional Curriculum compared to the original normal curriculum for the Year 7 control group in ICT

Figure 5.5 shows the results from the alternate Year 7 group who also studied PowerPoint presentations. The curriculum delivered to this group did not incorporate other disciplines or involve Project-Based learning approaches. Students had the choice to create a PowerPoint presentation on any topic. The blue line represents students' average semester result from the previous semester. The red line indicates each student's mark from their PowerPoint presentation, which, as previously mentioned, was taught differently from the integrated Project-Based Curriculum class. In this case both curriculums taught were using the same traditional teaching pedagogy, therefore the two lines should have remained very similar. Any deviation would be due to the way students responded to the different topic studied. This gives an indication of the level of difficulty of the topic taught which we can then use to compare the integrated Project-Based Curriculum class.

The graph in Figure 5.5 shows a different result; the blue line now remains mostly on top, suggesting that students studying this topic either found it difficult to understand when delivered in the usual format or were not engaged in the topic. Where the red line occurs at the bottom axis, this indicates that a student had failed to complete or hand in the assignment and therefore received no marks. Ten students failed to hand in their work, eight more than the integrated Project-Based Curriculum group. This could be due to the importance the PowerPoint had in the Project-Based Curriculum group. The graph results indicated that the students in the Project-Based Curriculum group saw benefits in completing this task outside of the subject and as a result fewer fail to submit the required work. The non-Project-Based Curriculum group, however, knew that failing to hand in the work would not affect other disciplines. This reduced the motivation to complete the work and fewer students were fully engaged in the project. This indicates that integrated Project-Based Curriculum programs

help to create a levelling of the hierarchy of discipline, resulting in students placing the same effort and importance on all disciplines.

5.3.3 ICT – Class Averages

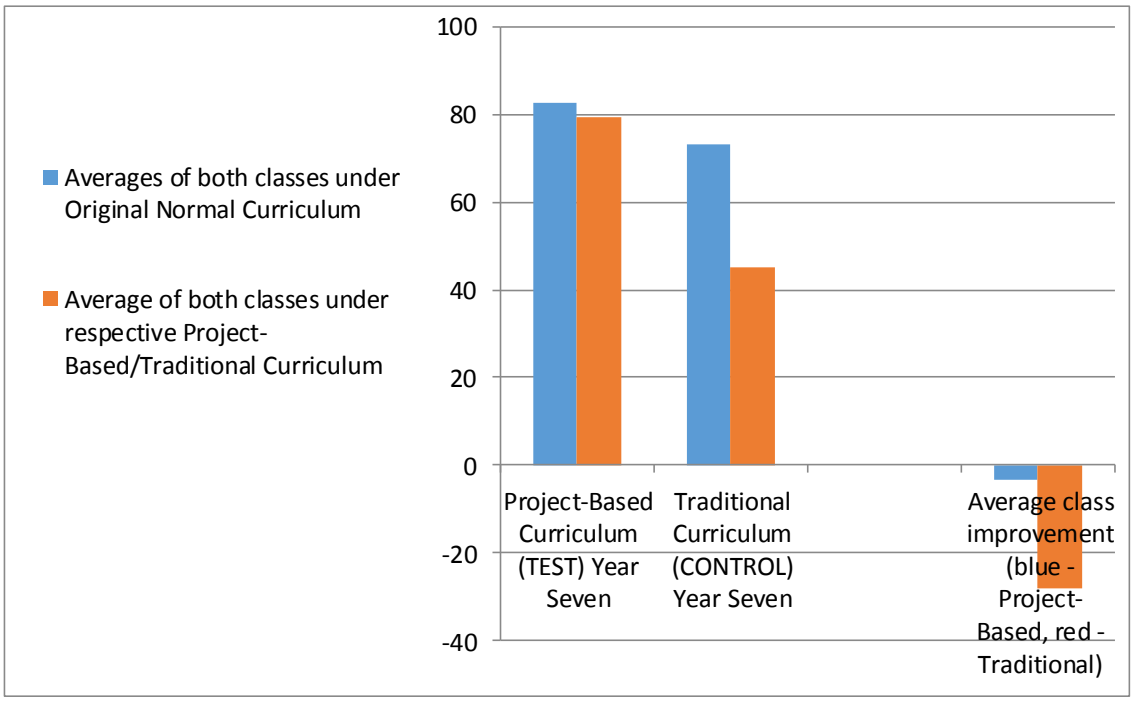


Figure 5.6 – Average results for both classes and the average improvement for both classes in ICT

Looking at the average results for each class, the graph indicates the integrated Project-Based Curriculum group achieved a better result.

The first part of Figure 5.6 shows the difference between the averages of each class's academic achievement. The blue bars represent the original average student marks at the end of the previous semester. The graph shows that the Project-Based Curriculum Year 7 group was at a higher academic level than the alternate Year 7 group. The red bars represent the average mark for each class in their PowerPoint presentation. The data shows both classes experienced a decrease in academic achievement for the PowerPoint presentation topic (this might have been due to the topic being harder to understand or less engaging to the class). One thing that is evident is that whilst both groups achieved better results in the previous semester, the Project-Based Curriculum group was able to maintain a result similar to their previous result compared to the alternate Year 7 group.

The second half of this graph shows the average decrease in academic achievement for each class. The blue bar represents the Project-Based Curriculum group and the red bar represents the other Year 7 group. It is clear that the Project-Based Curriculum group experience a minimal decrease in their average academic achievements in comparison to the alternate Year 7 group who were taught without the integrated Project-Based Curriculum.

5.4 Science

5.4.1 SCIENCE – Integrated Project-Based Curriculum Year 7 class

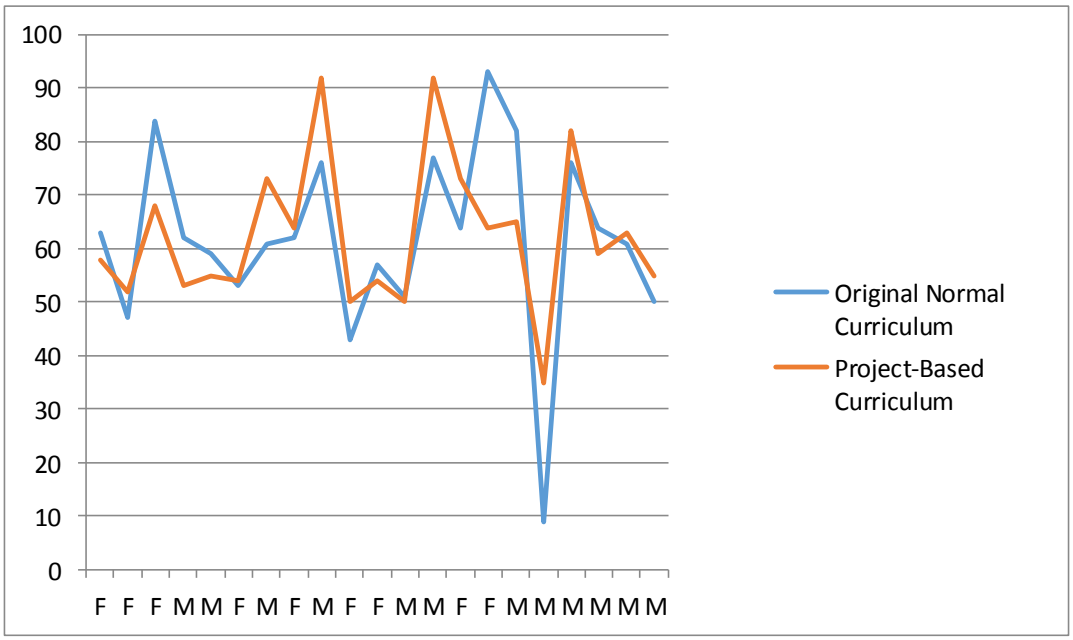


Figure 5.7 - Project-Based Curriculum compared to the original normal curriculum for the Year 7 test group in Science

The Science discipline was used as the main facilitator of the integrated Project-Based Curriculum and was another discipline whose results supported the benefits of integrated Project-Based Curriculum.

Figure 5.7 shows the results from the Project-Based Curriculum Year 7 group. The blue line represents each student's mark during the previous end-of-semester exam. This mark was taken from their reports and was used to indicate how each student performed in the Science test. A test result was important as it was a test in which the Science component was going to be assessed in the integrated Project-Based Curriculum. It was decided that 'Heat and Heat Transferral' was the topic that was going to be taught in the integrated Project-Based Curriculum topic Inventions. The red line represents the actual mark each student received on their Heat and Heat Transferral topic test.

The graph shows the red line does not remain on top for all of the results, similar to ICT; this indicates that each student performed differently in this science topic. The graph does appear to be very closely related within their fluctuations. Students who were not present at the end-of-semester exam and the test were excluded from this analysis.

5.4.2 SCIENCE – Traditional Curriculum Year 7 class

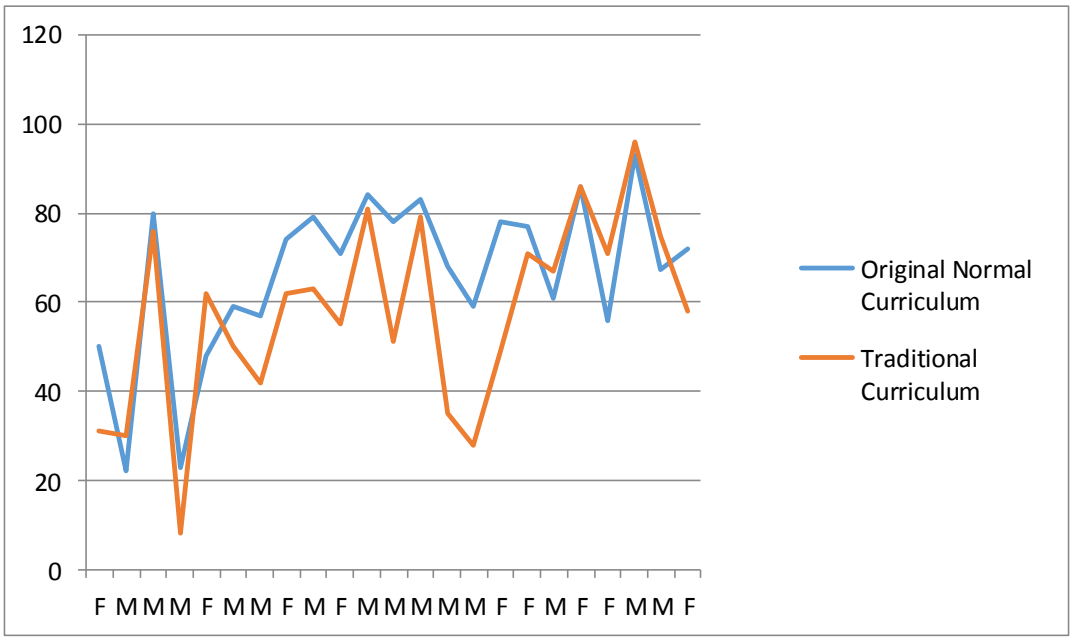


Figure 5.8 – Traditional Curriculum compared to the original normal curriculum for the Year 7 control group in Science

Figure 5.8 shows the results from the alternate Year 7 group who also studied Heat and Heat Transferral. The curriculum delivered to this group did not incorporate any other subject or involve Project-Based learning approaches. The blue line again represents these students' end-of-semester exam results. The red line indicates each student's mark from the end of unit topic test on Heat and Heat Transferral, which was taught differently from the integrated Project-Based Curriculum group as mentioned before. In this case both curriculums taught were using the same traditional teaching pedagogy, therefore the two lines should have remained very similar. Any deviation would be due to the way students responded to the different topic studied. This gives an indication of the level of difficulty of the topic taught which we can then use to compare the Project-Based Curriculum class.

The graph indicates that students had difficulty in understanding and learning Heat and Heat Transferral. The blue line in this graph remains mostly on top, suggesting that there was a decrease in student performance, suggesting that students studying this topic either found it difficult to learn when delivered in the usual format or were not engaged in the topic.

5.4.3 SCIENCE – Class Averages

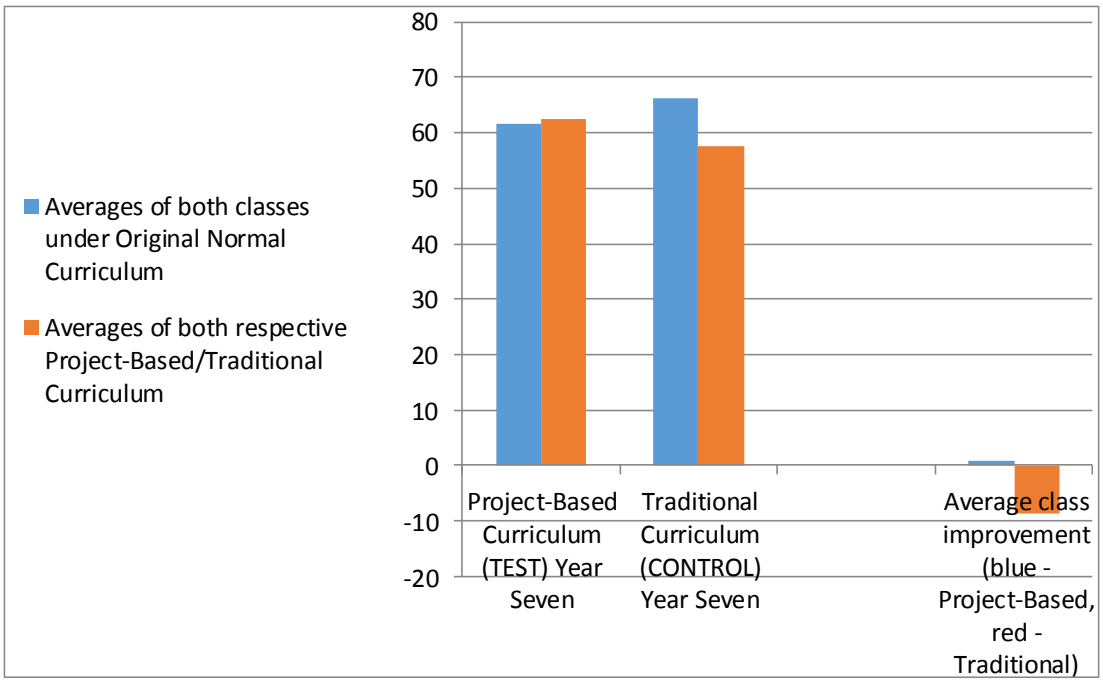


Figure 5.9 – Average results for both classes and the average improvement for both classes in Science

Looking at the average results for each class, the graph indicates again that there was a small improvement under the integrated Project-Based Curriculum. In this graph under integrated Project-Based Curriculum academic achievements increased whilst under the normal curriculum academic achievements decreased.

The first part of Figure 5.9 shows the difference between the averages of each class's academic achievement. The blue bars represent the original average mark of how each class performed in their previous semester exam. The graph indicates that the Project-Based Curriculum Year 7 group was at a lower academic level than the alternate Year 7 group. The red bars represent the average mark for each class in their final testing of Heat and Heat Transferral. The data shows that the Project-Based Curriculum group experienced an increase in academic results whilst the alternate Year 7 group experienced a decrease in their academic results.

The second half of this graph shows the average increase or decrease in academic achievement for each class. The blue bar represents the Project-Based Curriculum group and the red bar represents the alternate Year 7 group. This graph again shows that the Project-Based Curriculum group was able to improve their academic achievements in Science (albeit minimally) whilst the alternate Year 7 group experienced a decrease in academic achievement.

5.5 Art

5.5.1 ART – Integrated Project-Based Curriculum Year 7 class

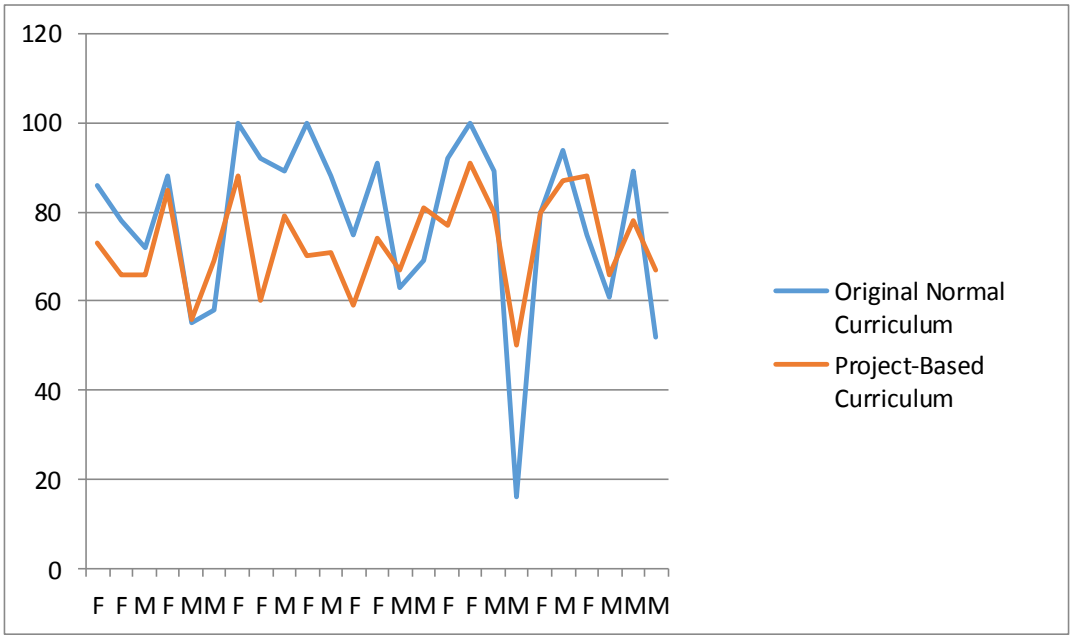


Figure 5.10 – Average results for both classes and the average difference for both classes in Art

The quantitative results obtained from the Art subject indicated that integrated Project-Based Curriculum did not have a great effect on students' academic results.

Figure 5.10 shows the results from the Project-Based Curriculum Year 7 group. The blue line represents the average result each student received in the previous semester. The red line represents the actual mark each student received on their integrated Project-Based Curriculum assessment. Students studied 3D drawing during the integrated Project-Based Curriculum delivery.

The graph shows the red line failing to remain on top for all student results, indicating that every student performed differently in the art topic. However, the graphs appear closely related.

5.5.2 ART – Traditional Curriculum Year 7 class

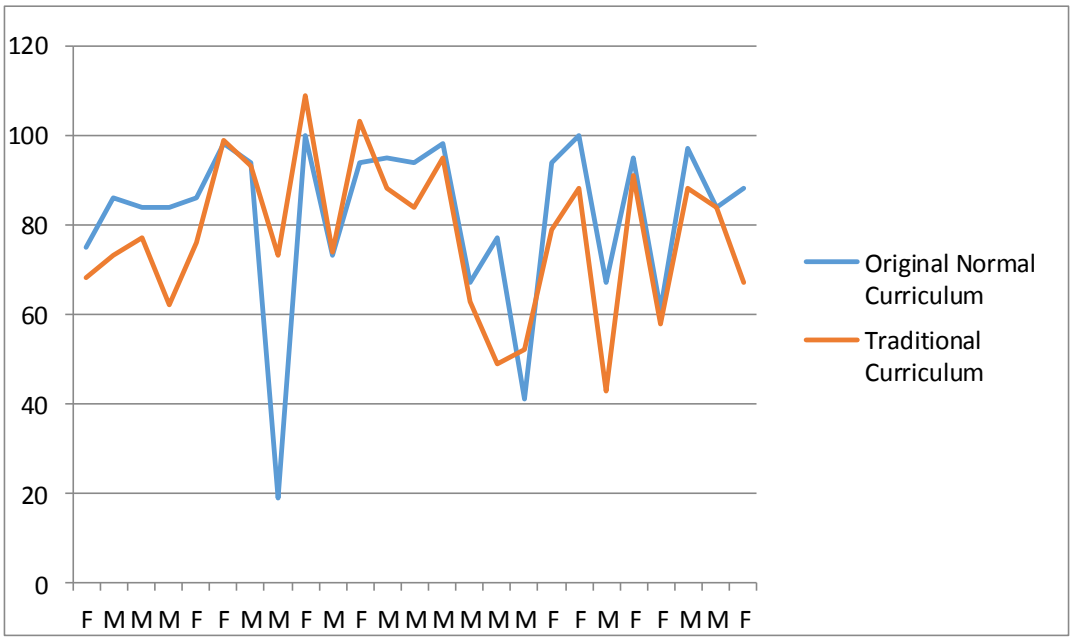


Figure 5.11 – Traditional Curriculum compared to the original normal curriculum for the Year 7 control group in Art

Figure 5.11 shows the results from the alternate Year 7 group who also studied 3D drawing. The curriculum delivered to this group did not incorporate other disciplines or involve Project-Based learning approaches. The blue line represents these students' previous semester results. The red line indicates each student's actual mark on their 3D drawing which was taught differently from the Project-Based Curriculum class as mentioned before. In this case both curriculums taught were using the same traditional teaching pedagogy, therefore the two lines should have remained very similar. Any deviation would be due to the way students responded to the different topic studied. This gives an indication of the level of difficulty of the topic taught which we can then use to compare the integrated Project-Based Curriculum class.

The graph shows that neither the blue line nor the red line predominately remains on top, which indicates a mixed result for individual student performance.

5.5.3 ART – Class Averages

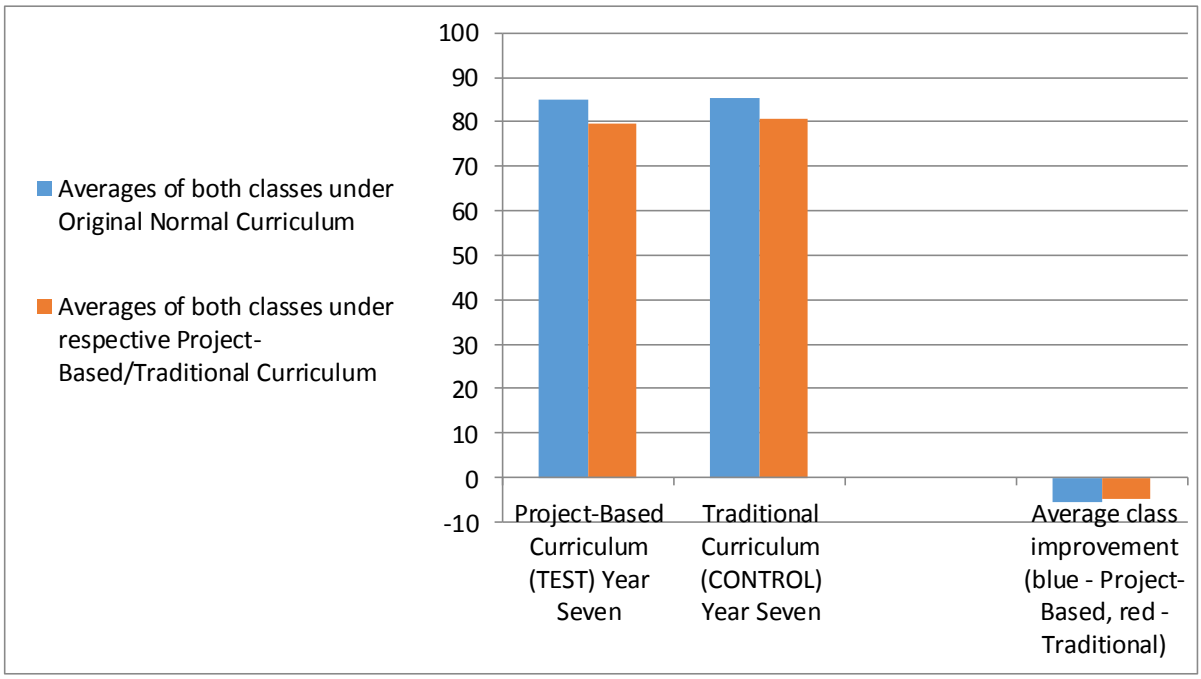


Figure 5.12 – Average results for both classes and the average improvement for both classes in Art

Looking at the average results for each class, it shows that both classes experienced a decrease in academic performance of roughly the same magnitude.

The first part of Figure 5.12 shows the difference between the averages of each class's academic achievement. The blue bars represent the original average student marks at the end of the previous semester. The graph shows that both the Project-Based Curriculum Year 7 group and the alternate Year 7 group were roughly on the same level in terms of their academic success. The red bar represents the average result each class received for their 3D drawing. It is evident that both classes experienced a decrease in their academic results of roughly the same percentage.

The second half of this graph shows the average decrease for each class's result. The blue bar represents the Project-Based Curriculum Year 7 group and the red bar represents the alternate Year 7 group. It is clear that both classes experienced a decrease in results. The integrated Project-Based Curriculum class did experience a slightly larger decrease but not one that would suggest the other class had advantage in their results.

5.6 English

5.6.1 ENGLISH – Integrated Project-Based Curriculum Year 7 class

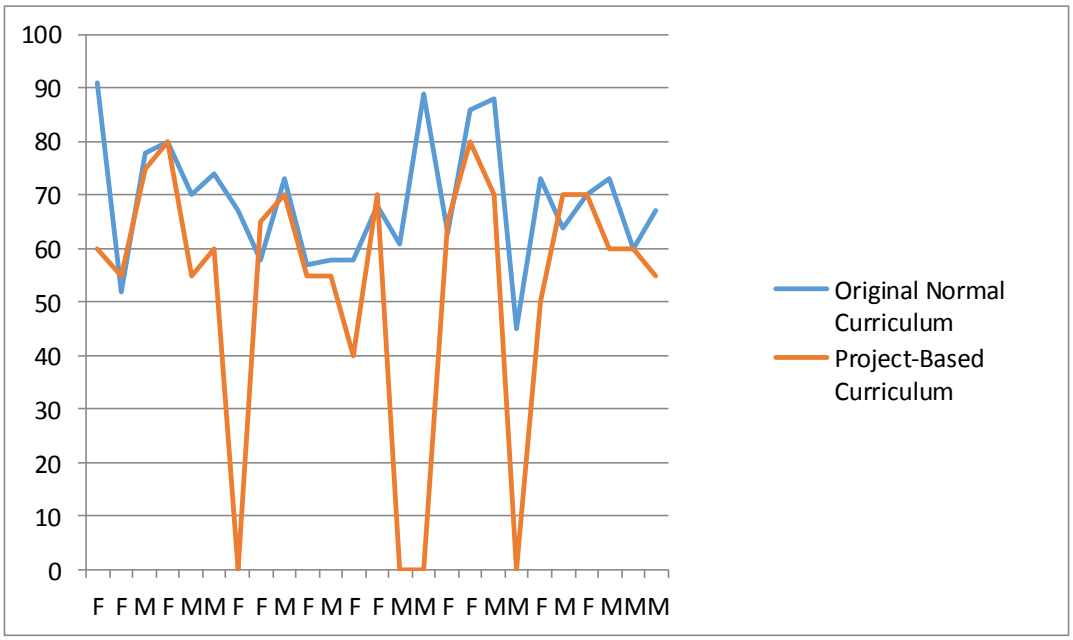


Figure 5.13 – Average results for both classes and the average difference for both classes in English

The quantitative results obtained from the English discipline indicated that the integrated Project-Based Curriculum had a negative effect on students' academic results.

Figure 5.13 shows the results from the Project-Based Curriculum Year 7 group. The blue line represents each student's average mark during the previous semester. The red line represents the actual mark the student received in the integrated Project-Based Curriculum assessment. The topic studied during this period was children's books, which resulted in students producing their own children's book.

The graph shows the red line failing to remain above the blue line in almost all of the student's results, indicating that on average students performed worse under the integrated Project-Based Curriculum studying children's picture books. Where the red line occurs on the bottom axis, this indicates that a student had failed to complete or hand in the assignment and therefore received no marks. There were twice as many students who had failed to hand in their assignment in this class as there were in the alternate Year 7 group, which indicates that students were not engaged in this assessment piece or found it more difficult to complete.

5.6.2 ENGLISH – Traditional Curriculum Year 7 class

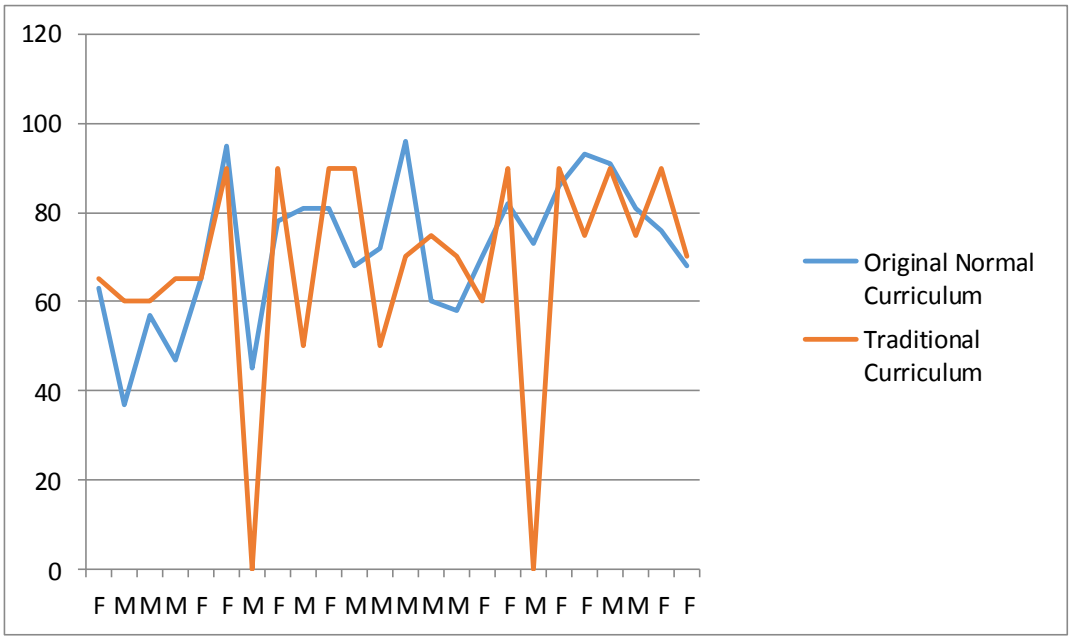


Figure 5.14 – Traditional Curriculum compared to the original normal curriculum for the Year 7 control group in English

Figure 5.14 shows the results from the alternate Year 7 group who also studied children's books. The curriculum delivered to this group did not incorporate other disciplines or involve Project-Based learning approaches. The blue line represents the average result each student received in the previous semester for English. The red line represents the actual mark the student received for their children's picture book, which, as mentioned before, was taught differently from the integrated Project-Based Curriculum class. In this case both curriculums taught were using the same traditional teaching pedagogy, therefore the two lines should have remained very similar. Any deviation would be due to the way students responded to the different topic studied. This gives an indication of the level of difficulty of the topic taught which we can then use to compare the Project-Based Curriculum class.

The graph shows that neither the blue line nor the red line predominately remain on top which indicates a mixed result for each student's performance. Where the red line occurs on the bottom axis, this indicates that a student had failed to hand in the assignment and received no marks.

5.6.3 ENGLISH – Class Averages

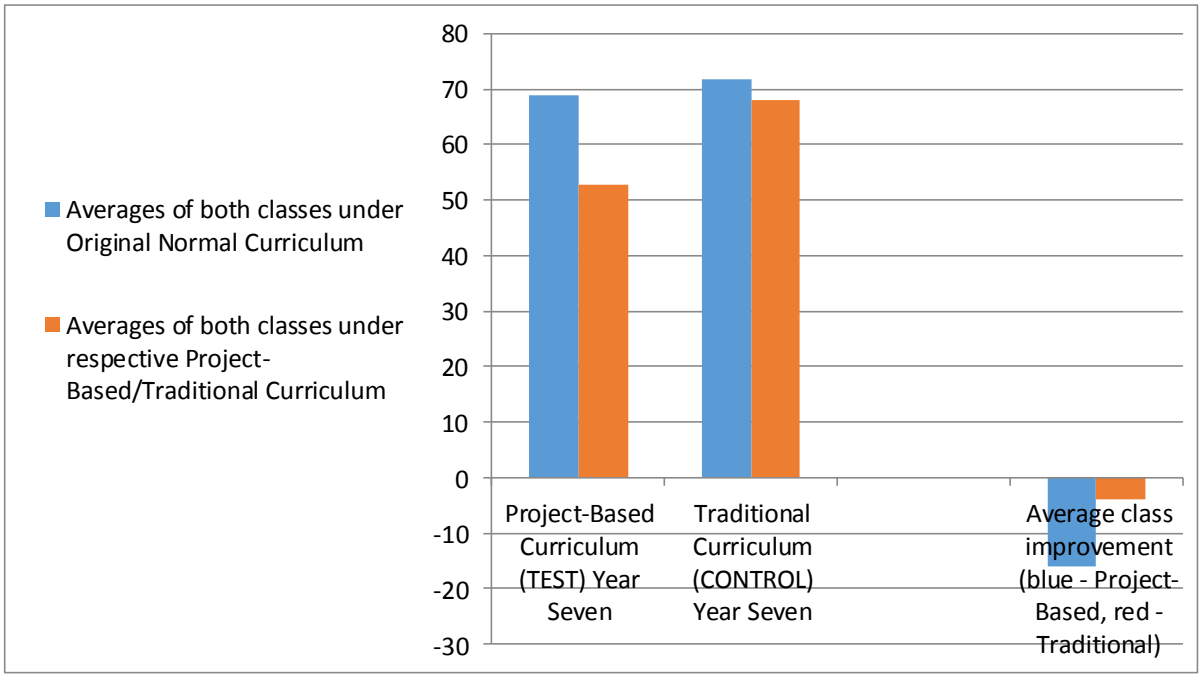


Figure 5.15 – Average results for both classes and the average improvement for both classes in English

Looking at the average results for each class it shows that there was a larger decrease in academic achievement for the Project-Based Curriculum Year 7 group.

The first part of Figure 5.15 shows the difference between the averages of each class's academic achievement. The blue bar represents the original average student mark at the end of the previous semester. The red bar represents the average student mark for each class in their final production of a children's book. The data shows the opposite result in contrast to the first three disciplines analysed in this chapter. This graph indicates that under the integrated Project-Based Curriculum students results were lower that the students that had the normal delivered curriculum.

The second half of this graph shows the average decrease in results for each class. The blue bar represents the Project-Based Curriculum Year 7 group and the red bar represents the alternate Year 7 group. It is clear that the Project-Based Curriculum Year 7 group performed much lower than the alternate Year 7 group.

5.7 Summary

In summary, this chapter explored the quantitative data collected from the five disciplines involved in the study. Three of the five disciplines - Maths, Information Communication Technology and Science - produced quantitative data confirming an increase in academic achievement under the implemented integrated Project-Based Curriculum program. The Art

discipline experienced no change in academic performance and the English discipline experienced a decline in academic performance. This decline will be further discussed in the following chapter.

Another interesting result was produced by the ICT discipline, where ten students failed to hand in their assessment pieces under the normal delivered curriculum compared to only two under the integrated Project-Based Curriculum program. It could be argued that students placed a higher importance on this assessment piece than the control group, as it was used in another discipline's assessment in the integrated program. Robinson's 'hierarchy of discipline' was evident under the normal delivered curriculum, as the failure of some students to submit their work requirements may have indicated that these students studying ICT did not view the discipline as important enough to complete the set work. However, in the integrated Project-Based Curriculum program only two students failed to submit the required work tasks, highlighting work submission improvement under the integrated Project-Based Curriculum program and levelling Robinson's hierarchy theory.

CHAPTER 6: CHOICE CULTIVATES CREATIVITY, CRITICAL THINKING AND COLLABORATION

6.1 Overview

It is clear from Robinson (2011) that some schools today are not achieving what students or their parents expect. He argues that:

> Most parents assume that education will help their children to find work and become economically independent…Parents also want education to help young people to identify their unique talents and to lead a life that has meaning and purpose. This is also what young people want for themselves. As we grow up, education is meant to guide us from childhood to maturity. It should be high among the ways in which we realise our creative abilities. More often it is why we lose sight of them. (p.15)

For Robinson (2011), today's schools fail to help students achieve their potential. He argues that the reason for this is our outdated mass systems of public education, created "primarily to meet the needs of the Industrial Revolution and, in many ways, they mirror the principles of industrial production" (p.7). In today's educational climate they are no longer effective.

Jukes (2010) agrees that there is a problem with the current educational system:

> We have watched in amazement as young teachers who have just graduated from teacher training start out their careers just like teachers did 50 years ago. The established ideas about what teachers and students are supposed to do are so pervasive it is almost impossible to escape their influence. Because the thinking behind our current instructional approach was developed so long ago, nothing in our educational paradigm has equipped teachers to deal with the digital world. ("Chapter 2," para. 26)

A shift is needed in the teaching model and a better pedagogy implemented if more students today are to be engaged in education, so that they can be better equipped with the 21st century skills required for today's digital world.

The previous two chapters explored the qualitative and quantitative data collected during the case study. This chapter will put forward an argument to support the findings that the benefits of integrated Project-Based Curriculum pedagogies are constructive and beneficial to today's schools. The chapter will begin by reviewing the implementation of the integrated Project-Based Curriculum program. It will then support the overarching question that integrated Project-Based Curriculum programs are constructive and beneficial to today's schools by drawing from three cases. The first case asserts that integrated Project-Based Curriculum programs are set up to allow students to make choices in their own education, which creates an appreciation of each discipline and a connection to the 'real world'. The second case contends that integrated Project-Based Curriculum involves a great deal of group work which develops a number of 'life-long' 21st century work-related skills, including collaboration, communication and creative and critical thinking. The final case and most significant

argument is that integrated Project-Based Curriculum programs engage students to self-learn and come to class with a greater prior knowledge. This enables teachers to teach a more in-depth content that creates a deeper learning. This self-learning or meta-learning the students are engaging in would also be a very attractive skill from the viewpoint of any employer. Employers in the 21st century are looking for employees who do not need to be managed and supervised constantly; they are seeking employees who are responsible and capable of understanding what is required and finding new and different solutions to complete work-related tasks. Finally, this chapter will discuss whether the issues raised in the literature review resonate in the research program, explore the notion of authorising a leader to 'champion' the program, and whether integrated Project-Based Curriculum aligns itself with the new Australian Curriculum that is currently being implemented in all Victorian schools.

6.2 Implementation

Before analysing the results of the research a short discussion around the effectiveness of the implementation of the integrated Project-Based Curriculum is required. Drawing on the literature review and Frasier's (2008, p.3) three prerequisites for a successful program, it will be discussed whether the implementation of the integrated Project-Based Curriculum in this case study was well organised in terms of time, mapping and resources.

6.2.1 Allocating enough time for the preparation, duration and reflection of integrated Project-Based Curriculums

The first of the three prerequisites that Frasier (2008, p.3) defines to achieve a successful program is time. The allocation of enough time for the preparation, the duration and the reflection is important.

6.2.1.1 Time allocated for preparations

The program was led by a single lead teacher who was shown to allocate enough time before the curriculum was implemented. The lead teacher, who was the Science teacher, started preparations in the school term before the implementation of the curriculum and was able to meet with all other teachers who would be involved from the Year 7 subject areas of Maths, English, Bible, Art, IT, Music and Design and Technology. Although History is also a core subject at Year 7, this subject was omitted from the integrated Project-Based Curriculum program due to the History teacher's short-term contract. During these individual meetings a three-week curriculum program complete with assessment pieces was created for each discipline. The common vision throughout all disciplines was to answer the essential question, 'How were lives changed by machines that were created by men and women with God-given gifts and talents?'

It can be said that the success of the preparation of the program was due to the enthusiasm and organisation of the one lead teacher who found the time to meet with the teachers involved and consequently united the focus of each individual teacher. Under a leader who is passionate about the program it is possible to implement a successful program that, according to Savage (2010), can guide a "…group of teachers that will facilitate a shared vision amongst themselves and their leader and produce meaningful collaborations at all levels of curriculum design" (p.42). This was confirmed in post teacher interviews, with one teacher commenting, "[I] think it worked quite well, I think you had it fairly well organised, fairly well structured, I mean I pretty much had all the information I needed". Happy with the support received, this teacher felt they could successfully carry out the necessary preparation for the curriculum that was being implemented. Another teacher also commented, "You did a very good job at coordinating the whole thing, that made it easier for the teachers to just plug into," suggesting that all teachers should have been able to successfully involve their discipline in the integrated Project-Based Curriculum. These comments suggest that the program benefited and was largely successful due to the efforts of this one lead teacher who seemed to 'champion' the program.

6.2.1.2 Time allocated for duration

Throughout the qualitative review students had voiced that they needed more time, that there was too much to do and that next year it should be done again but "make it go for like a term or two". This suggests that the time allocated for the duration of the integrated Project-Based curriculum was insufficient.

Yet, in the quantitative data, Figure 5.9 in particular shows that the same students who asked for more time on average handed in work of a higher standard than previous assessment. Students wanting to achieve a deeper understanding could explain their desire for more time. In any case, it can be concluded that due to students achieving a higher level of academic achievement than on previous assessment pieces, the time allocated for this integrated Project-Based Curriculum was in fact appropriate, allowing enough time for students to achieve a deeper learning without becoming tired or bored with the program.

6.2.1.3 Time allocated for reflection

Similar to *6.2.1.1 Time allocated for preparation*, the same lead teacher initiated a comprehensive reflection of the program. The reflection made use of focus groups, teacher interviews and a raw score data comparative analysis on past and present student results. The teacher did this for personal research reasons and may have reflected more than was necessary for improvements on implementing future integrated Program-Based Curriculum programs. It was evident, however, that some form of reflection was necessary. Reflecting on the three-week program highlighted that there were issues with the English discipline's final assessment in the program and that in the future a more suitable assessment task might be

necessary. Reflecting also helped acknowledge that the integrated topic was engaging and enjoyable for all students involved.

6.2.2 Teachers create a Curriculum Map for the program

The second of Frasier's (2008, p.3) three prerequisites is a well-defined Curriculum Map. The Curriculum Map is required to be developed early in the initial preparation period so that all staff involved can share the same vision and can prepare their classes accordingly. As it has been mentioned previously, the preparations were led by a single lead teacher. After a consultative process with all other staff involved, the lead teacher drafted the initial Curriculum Map, a tool which would prove to be integral to further discussions. This Curriculum Map can be found in Appendix One.

The Curriculum Map takes the form of a Brainstorm or Concept Map, all pointing inwards to the essential question, 'How were lives changed by machines that were created by men and women with God-given gifts and talents?' The map was used during each meeting with the teachers involved to generate conversation on how their subject could be integrated to teach the essential question. Some teachers agreed with the suggestions, while others had different and valid ideas. The purpose was to align all disciplines to the common vision, the essential question. Each discipline's curriculum and assessment was then further refined in consultation with the teacher into a three week program which was inputted into a table; this can be found in Appendix One.

After the meeting and agreeing to the three week program, each teacher then generated their own assessment tasks. Some teachers decided to create a unique and new assessment task, while others modified a previous assessment task to suit the integrated Project-Based Curriculum. The lead teacher reviewed all assessment pieces to ensure they were aligned with the essential question. Those that were not aligned were modified through negotiation with the discipline's teacher so that the assessment piece adhered to what was required. All assessment tasks were submitted to the lead teacher for review; these can be found in Appendix One.

Savage (2010, p.42) describes how the development of meaningful co-operation and collaboration between staff can have dual benefits for curriculum and for professional development. This was also evident in the case study, with a number of teachers agreeing to become involved in the integrated Project-Based Curriculum research. Under one lead teacher sharing the project's vision, the other teachers involved were able to create curriculum and assessment pieces for their respective disciplines that not only were able to integrate into the project but also complied with the respective VELS standards. Because the vision was sufficiently and appropriately shared with the integrated Project-Based Curriculum team, teachers were able 'to just plug into' it, as one teacher put it, and create innovative curriculum for themselves.

6.2.3 Allocation, division of and investment into resources

The final prerequisite of the three that Frasier (2008, p.3) mentions involves resources. As discussed in the Methodology chapter, the school is located in a medium-low socioeconomic area. One of the commitments the school has to the community is to provide 'an excellent education at an affordable price'. Therefore, school fees remain low so that families in the area can access a Christian education. Independent schools do not receive funding from the state government and receive minimal funding from the federal government. Due to the low fees and minimal government funding, the school is short of teacher resources.

During the planning stage it was observed that because of the topic chosen, and its associated student tasks and assessment pieces, minimal teaching resources were required for the program. As the sharing of resources was a regular challenge for teachers at the school, adapting to what was needed for the integrated Project-Based Curriculum and implementing the program with minimal resources was a condition that teachers readily accepted. Under the leadership of the lead teacher the few resources that were available were carefully allocated; this management alleviated the need for lengthy discussions about allocations of resources.

In the next section three cases are described to put forward the argument that integrated Project-Based Curriculum programs are constructive and beneficial to today's schools.

6.3 Cases for integrated Project-Based Curriculum

6.3.1 Case one: student ownership of education

Integrated Project-Based Curriculum programs are set up to allow students to make choices in their own education, which creates an appreciation of each discipline and a connection to the 'real world'.

The importance of students 'owning' their education was discussed during a number of teacher interviews. Teachers put forward the idea that there was a need for student input early in the development of the program. This would mean that students would become engaged in the program and take ownership of their education. One teacher suggested that if programs were designed with student input, those same students would become "…active learners… [and] be part of a team and have good participation and engagement". The argument was that students would choose concepts and projects that interested them, which were likely to be current real world issues in their lives, and they would then be able to connect the different perspectives of each disciplines and realise 'real world' applications. During one interview a teacher summed this up by suggesting that under an integrated Project-Based Curriculum program a student would:

> …[S]ee a distinct link in the real world, so in other words, their learning becomes less compartmentalised. So I need to know this in Maths but it has no relevance in

> Science, it has no relevance in Geography – by tying it together (under an interested student's chosen topic) they can see that the subjects are interrelated, there is relevance to what they are learning.

There was some data collected that suggested that the case study's integrated Project-Based Curriculum program produced ownership of learning and consequently real life applications. The qualitative data showed that both students and teachers reported that students 'owned' their education. The integrated Project-Based Curriculum allowed students to choose their own topic to answer the project's question. This had a positive response from the students, with one commenting, "We study what we choose, not what the teacher chooses…it's better". This was then supported by a teacher's comment as to why the program worked, responding, "If the children own it, then the children will engage in it more". These comments show that it was believed by students that they had the choice to direct their learning to discover topics of interest, which often naturally led boys to choose to research weapons and vehicles, and girls to choose to research music. These choices led to students connecting their school work, through the respective disciplines, to personal interests and their 'real world'.

Richmond et al. (2008, p.511) reports that "…students uniformly felt that they gained a great deal of real-world experience". This was also confirmed in the qualitative data collected during the case study, with students commenting, "[I]t's given me more knowledge," and even corrected previous misunderstandings of real world applications: "…a car engine did a little bit different to what I thought it did". It even gave them 'real world' experience in research methods, with one student commenting, "You can never trust Wikipedia because it can be entered by anyone".

In summary, the data indicates that through the integrated Project-Based Curriculum program students were observed to 'own' their education which allowed them to choose 'real world' topics relevant to them. Through these 'real world' connections, students appreciated each discipline, and were ready to work hard and complete what was required to attain this knowledge.

6.3.2 Case two: development of 21st century work-related skills

Integrated Project-Based Curriculum involved a great deal of group work which develops a number of 21st century work-related skills, including collaboration, communication and creative and critical thinking.

It is becoming increasingly important for students to be able to manage themselves so that they can relate to others, develop resilience, resolve conflict and engage in teamwork to respond to the challenges of the 21st century with its complex environment, social and economic pressures. So complex are these social and economic pressures that Wynn (2012) suggests that this generation:

> …are preparing for an irreversibly transformed world, in which unpredictable personal and social challenges make gender flexibility and work-family balance not

> just appealing but essential. Yet the realities of resistant social and economic institutions make these ideals seem distant and elusive. With no way back to a dimly perceived past and no clear path toward their desired goals, young adults must formulate 'second best' strategies to cope with an uncurtained future. (p.12)

Meanwhile "employers say they want people who can think creatively, who can innovate, who can communicate well, work in teams and are adaptable and self-confident" (Robinson, 2011, p.69). It is important for students to be involved in school programs that require the use of these skills. There were many instances in the case study and in the research which suggest that these skills were used by students during the integrated Project-Based Curriculum program.

In Allan's (2007, p.81) research she described observing "…enhanced problem-solving skills, communication skills, (and) team work skills". It is unclear in the qualitative data collected whether these skills were improved during the course of the case study; however, it is clear that these skills were applied by students throughout the case study. It was evident that the integrated Project-Based Curriculum program required students to use problem-solving skills. One observation showed students problem solving during one of the student focus group sessions, where there was inconsistency in the students' group research. One group found two websites that attributed different inventors with the same invention the students had chosen. Initially the group disagreed as to which website was correct. After some time, the group decided on how they were going to solve their problem. They created a procedure to analyse what information in their collected data was true and what was false. They would only accept information from a website as true if a second website confirmed it.

Communication and teamwork skills were also used and at times tested. This was evidenced by an unsatisfied student who exclaimed that she "…was not even helping [on the PowerPoint presentation] at all, except writing the report, that's all I'm doing". However, at the time of the comment this student had not spoken to her colleagues about her concerns but was deliberating on doing so due to her frustration.

It cannot be ascertained whether these skills improved during the case study as a result of the integrated Project-Based Curriculum program. However, it is evident through this research that involvement in integrated Project-Based Curriculum programs requires students to use creative and critical thinking to solve problems. Students are also required to be able to communicate with their team members and overcome problems in a team setting in order to achieve their common goals. If students were regularly involved in integrated Project-Based Curriculum programs they would then be practising these skills on a regular basis. However minimal their problem-solving and teamwork skills might be to begin with, it stands to reason that with regular practice these skills would improve over time. These are 'life-long' skills which students can take with them to their next educational setting or future place of employment, much like a tool in a toolbox. They will be able to positively use these skills in all areas of adult life.

6.3.3 Case three: engagement in self-learning

Integrated Project-Based Curriculum programs engage students to self-learn and come to class with a greater prior knowledge. This enables teachers to teach a more in-depth content that creates deeper learning.

Students' lives today are entirely different to that of previous generations. Mitra (2012) reminds us that "50 years ago there were no computers, no cellphones, no internet, no Google, no Facebook and no Prozac. And we have every reason to expect that 50 years from now there will have been equally momentous and transformative changes" ("Introduction," para. 5). Jukes et al. (2010) supports this argument by suggesting that there are new ways to do many things:

> …new instant access to online multimedia information that can be used in discussions, essays, reports, labs and so on; new ways to search for information; new ways for students to publish their work, including videos, websites, blogs, wikis, desktop publishing, sound recording, mashups, and interactive multimedia; and new tools for doing all these things including laptops, smartphones, iPods, iPhones, iPads, or multimedia headsets. ("Chapter 1," para. 26)

It is hard to describe the vast amounts of information consumed by today's students on a number of different platforms. Educators cannot continue teaching in the manner they did 50 years ago and expect to warrant students' engagement. Educators must look for different and more contemporary teaching strategies. Students will not respond to out-dated teaching methods.

Bender (2012) argues that Project-Based Curriculum "is one of the most effective ways available to engage students with their learning content" ("Chapter 1," para. 1). Allan (2007, p.87) supports this idea by reporting that "…students were totally engaged and enthralled by the research and learning process". This student engagement was also confirmed in the qualitative data collected during the student focus groups that were held at regular intervals throughout the integrated Project-Based Curriculum program. At every meeting the students would commonly respond with how much enjoyment they were receiving from the program. They would constantly use the word "fun". The last comment made during the final focus group was that next year the program should run for the entire term. These forms of responses show that students were engaged and benefiting from the integrated Project-Based Curriculum program.

Similarly, teachers reported that they noticed increased engagement in the work that was being completed in class. As one teacher commented, "I noticed that the kids attune to the topic because of it being cross curriculum". Another teacher noted that the integrated Project-Based Curriculum class were more engaged in their studies and consequently improved the submission rate of their assessment tasks; he remarked that the "7MV (Project-Based Curriculum) group, they got their work completed on time and all of them got it submitted…compared to 7BK (alternate group), I had a lot more trouble getting the work out

of them, only half of them submitted their work and I was chasing them". When asked why he thought there was this difference in submission behaviour, the teacher responded with, "It [the discipline's assessment task] seemed more important or something; because it was related to other subjects it carried more weight". As students were using this artefact created in this discipline in the overarching Science discipline, students viewed its completion as important not just for that discipline but also for the presentation in the Science discipline. The alternate group did not have this incentive and therefore some within the class were not engaged enough to meet the submission deadline.

Apart from improved submission rates there were other advantages to having engaged students. For instance, it was common to see students continue or extend their work outside of the classroom. This additional learning created a greater knowledge of the topic, which they then brought back into the classroom. This enhanced understanding eliminated the need to teach some content and instead allowed the teacher to delve deeper into the topic, share more content and provide students with a deeper learning experience. This finding was supported through post teacher interviews. Teachers reflected that because of the integrated Project-Based Curriculum program, students came to class with a better prior knowledge due to the fact they had started thinking about and researching their topic before class. One teacher commented that "they had more prior knowledge on that topic when they started doing their research [for maths]"; this meant they could then go further into their discipline as they were not wasting time on the preliminaries. Another teacher added that "most of them [students] came knowing what object they were going to do". Instead of wasting time choosing a topic during class time, the integrated Project-Based Curriculum students had already made their decision and instead used the time in class to further their understanding of the project, thereby creating a deeper learning of the topic. This concept is further supported by meeting Hammond's (2005) validity criteria that "triangulation corroborates or challenges the validity of the interpretation" (p.245). The discussion above represents the analysis of qualitative data that supports the contention that deeper learning was taking place in the integrated Project-Based Curriculum group. The next section of the chapter will examine the quantitative data generated in the research.

The quantitative data generated an analysis of student results in the five disciplines that took part in the program. The results are as follows:

- Three of the five disciplines reported higher average academic performances under the integrated Project-Based Curriculum program and a deeper learning transpired. These three disciplines reported a major improvement in results in the Project-Based Curriculum class. The data showed the original less successful academic class raised their average academic result to above that of the original most successful academic class.

- One discipline reported that there was not much variation between the two groups.

- The final discipline reported a decline in academic performance, which was attributed to a poorly designed assessment piece.

Teachers involved in the case study discussed the decreased result in academic achievement in the English discipline. One teacher indicated that it was due to the poorly chosen assessment piece and that the project limited the student's creativity. The English assessment was to create a children's book. The integrated Project-Based Curriculum Year 7 group was limited in their creativity as they were required to base their children's book on their chosen invention, whereas the alternate Year 7 group was allowed to use any topic, including animals and fairies, which allowed them to produce a more creative and higher quality children's book. The same teacher suggested that instead of designing the English assessment task around "a creative story, you might have done an informative essay… you could have set up an essay on how this machine affects your life today".

The three disciplines that demonstrated an increase in academic performance confirms the qualitative data analysis: that a deeper learning had occurred, producing higher academic performance. The quantitative analysis supports the qualitative data analysis and confirms the argument that the program produced a deeper learning through triangulation.

6.4 Did the case study experience the problems discussed in the literature review?

6.4.1 Teachers who resist change due to increased effort

Richmond et al. (2008, p.512) stated that Project-Based Curriculum "…increased faculty time and effort". Those teachers under Project-Based Curriculum would have to allow time to meet up initially in groups to develop strategies and the actual Project-Based Curriculum, then meet during the curriculum delivery phase to ensure all disciplines were running to schedule, and finally meet up at the end to reflect on the program. Due to this increased workload it would be expected that teachers may resist redesigning their classes to a Project-Based Curriculum model.

This case study found that if the school supported the program and carried out the first of Frasier's (2008, p.3) three prerequisites, which was to allocate enough time, then teachers resisting due to increased workload and effort was not an issue. This was mainly due to the fact that the school authorised a teacher to lead the project and, in consultation with the subject teachers involved, create the vision of the program. The lead teacher found appropriate times to consult with staff according to their availability. The lead teacher then drew up Frasier's (p.3) second prerequisite, a well-defined Curriculum Map, which was distributed to the teachers involved. During the program the lead teacher also ensured that disciplines were running to schedule, and at the conclusion collated all reflections, reducing the workload for the teachers involved. This management resulted in the teachers' acceptance of the project, and they spoke about it in a positive light: "[I] was enthusiastic about it, it had a lot of positives," "[I] didn't mind, I quite enjoy anything that requires any mental agility," and "I think project-based curriculum is a good direction to go".

6.4.2 Teachers who resist change due to lack of skills

Allen (2007, p.89) states that one challenge for an experienced teacher within Project-Based Curriculum is to "…link the project with the curriculum and more importantly to find ways to link learning with the experience of doing". This may explain why the English discipline produced a negative result in average student achievement at the end of the integrated Project-Based Curriculum program. In a post teacher interview, the teacher responsible for the discipline thought the program "had a lot of potential" and supported it, suggesting they had no initial resistance to the program. However, when reflecting on student marks the teacher insisted that the alternate group should have been involved in the integrated Project-Based Curriculum because they were "more creative in their thinking and more focused" and that the teacher instead "…had to coach quite a few of [the Project-Based students] and had to provide the story for them, 'cos they didn't have the requisite imagination". This was a different response to that of the teachers in the other disciplines involved in the case study, for whom the same students, of a lower academic standing than the alternate test group, were able to produce better results overall.

Reflection on the efforts of the lead teacher confirmed that a well-defined Curriculum Map was essential, with a teacher during a post program interview commenting, "You could actually place any topic you wanted in that framework". However, it would have been beneficial for the lead teacher to place a greater emphasis on the use of the map once designed. During the lead up to the integrated Project-Based Curriculum program the lead teacher did not coach or train other staff in how to link their discipline's curriculum and/or assessment into the project or vision. The lead teacher collected and reviewed all assessment tasks submitted into the integrated Project-Based Curriculum program to ensure that each integrated well within the topic; however, they did not focus on the quality of the assessment task. Therefore, it can be argued that some assessment tasks that were implemented as part of the integrated Project-Based Curriculum program may not have been of a high quality or appropriate for the project. The poor assessment task for the English discipline was an example of this issue. Had this assessment task been used in a previous year and had it been loosely integrated it into the project with little thought? This argument is further supported by another teacher's comment on that assessment task by suggesting that instead of doing, "…a creative story you might have done an informative essay…you could have set up an essay on how this machine affects your life today." A more carefully chosen and broader assessment task would likely remove the limitations the students experienced.

Despite an initial enthusiasm from the English teacher for the integrated Project-Based Curriculum, it was evident by the program's conclusion that the experience had not been completely positive, and that they may be hesitant to undertake a similar program in future: "I wouldn't be advocating that again, at least not in that form, it could be done in some other way, maybe," and "…we need to think it through more fully". On a positive note, these statements also suggest that with further training and more support in setting up the discipline's program, this resistance could be overcome. This could further the argument that it is necessary to assign a champion to the program, one who not only ensures teachers share the same vision but coaches each team member to produce a high quality program.

6.4.3 Students who resist change due to lack of skills

Blumenfeld (1991, p.378) suggests that "students need to have sufficient knowledge of the content and specific skills to explore information pertinent to the problem". This is evident in this case study by revisiting the English discipline's poor results. One reason for the students' poor performance was a poorly chosen assessment piece. However, this was not the only determining factor, and was coupled with the capabilities and skill levels of the students involved.

The assessment piece was to create a children's storybook around their chosen machine theme. Students in the alternate class were able to choose any topic for their storybook including a popular animal choice, which consequently seemed to make the task easier. The English teacher's post interview revealed that most students in the integrated Project-Based Curriculum class found the task hard; it was said that the students struggled "to actually translate this invention into a story", suggesting that the students did not have the skills to solve this problem. The integrated Project-Based Curriculum required more from the students to complete the task. Students had to adhere to requirements and prerequisites. This is the reason why the teacher responsible for the discipline suggested that "…they would have achieved better [in the normal program] because there would not have been the complexities" as these students were "operating at a fundamental level" and were struggling with abstract ideas. Due to the narrow focus of the assessment piece, these students required more support at their skill level and more guidance as to how to overcome problems to complete this task. One could also argue that this would increase their practice in creative and critical thinking, which are necessary 21st century skills students need to develop.

The case study again confirms the research of Blumenfeld et al. (1991, p.373), who contends that "without adequate attention to ways of supporting teachers and students, these innovative educational approaches will not be widely adopted". It seems the success of this integrated Project-Based Curriculum program hinged largely on the lead teacher's involvement. The lead teacher initiated the preparation, consulted and collated staff opinion, developed the program, monitored its delivery and collected feedback afterwards. There is an argument that can be made that the lead teacher was in fact the integrated Project-Based Curriculum 'Champion' for and of the program.

6.5 The notion of a Champion

Using a Champion to drive change or lead teams is not an entirely new concept. Champions are well established in business organisations. Thompson (2009) describes two kinds of organisational leaders, the champion leader or transformational leader and the non-champion leader or transactional leader. These two types of leaders work differently: "the transactional leaders execute the work, while transformational leaders create a movement through a mission-oriented, principal-based mindset" ("Chapter 1," para. 32). Integrated Project-Based

Curriculum's new pedagogy can be identified as the new movement or mindset. Therefore, the champion is identified in the research as necessary to the success of the integrated Project-Based Curriculum, as Thompson (2009) points out:

> Champions know what they are passionate about, and they know how to integrate their purpose with their organisational responsibility. They find extreme satisfaction in their work because they are able to align their core identity with what they do. Their work matters to them in the grandest sense. ("Chapter 9," para. 4)

Champions operate differently from normal transactional leaders. Champions who are passionate about the project they are involved in "have a better outlook, and feel more enabled by their organization regardless of their level in the organization" (Thompson, 2009, "Chapter 1," para. 38). They do not need to be on top of the hierarchal pyramid to lead others positively. Their style of leadership is different from most leaders: "Organizational champions do not manage through intimidation or edict; they build teams by relating through trust and genuine concern, and by communicating frequently and openly" (Thompson, 2009, "Chapter 1," para. 44). In times of crisis or when entering the unknown, champions are the leaders you want in control because "organizational champions are grounded in principles that are timeless to them and definitely not circumstantial. They aren't easily shaken by the tidal wave of issues or challenges that might come their way" (Thompson, 2009, "Chapter 1," para. 61). This is in stark contrast with transactional leaders, who would fall back on what was done in the past, even if it had not been entirely successful, since executing past processes is what they are comfortable with, rather than throwing traditional processes aside and creating something new.

In the business arena, key outcomes have been observed as a result of the direction of an organisational or champion leader. These include the creation of trust, inspiring to produce a better product, helping build collegial teams and leading in undefined territory. A school integrated Project-Based Curriculum team would experience similar benefits from the guidance of such a leader.

Champions are able to create and grow a culture of trust within the team:

> Because champions are enlightened, authentic, and consistent, they inspire trust. They are significantly more trusted by others than are non-champions. These champions have been seen going through the fire and recovering, even excelling. Challenges haven't changed them, nor has corporate or competitive pressure. These champions have an amazing ability to remain steady and poised despite the crisis or the crucible. (Thompson, 2009, "Chapter 10," para. 5)

Having established a culture of trust, the team can feel safe to follow a leader and feel confident that their leader's best intentions are for the good of the project and the group and not their own personal agenda. "No one can question their integrity as they're consistent in their accountability, regardless of who you are. As mentioned earlier, "they don't operate for political power but for progress. Even if you don't like them, you respect them" (Thompson, 2009, "Chapter 10," para. 6). Moving towards an integrated Project-Based Curriculum

program would arguably create a measure of anxiety and stress in some team members. What was instead observed during the case study was a genuine interest and even excitement about the program. Teacher comments that the lead teacher "did a very good job at coordinating the whole thing" and that it was easy for the teacher to "just plug into it" confirms a level of respect and trust they had for the lead teacher. If this lead teacher was then able to become the champion who inspired team members to go further, a better product would be achieved:

> The most effective leaders give their teams true glimpses of themselves, and they are often vulnerable with their excitement or concerns. A champion's emotional expression is given as a gift to his or her team for the sake of authenticity and energy. (Thompson, 2009, "Chapter 1," para. 64)

It is important to note that integrated Project-Based Curriculum programs are varied. As shown in the research data, an integrated Project-Based Curriculum program can benefit from what Thompson (2009) argues as "transformational leadership [that] requires envisioning possibilities that aren't clearly defined. It requires an ability to move beyond what's established to what's possible" ("Chapter 1," para. 35). Thompson summarises the aims for requiring a champion in any business organisation by stating that, "… champions create trust and inspire this innovation community, building enthusiasm through their authenticity and openness and their goal of mutual benefit. And we find that, through this, champions time and time again, outperform others in all business categories" ("Chapter 10," para. 41). These arguments can be translated into the educational arena. If a champion was assigned to lead an integrated Project-Based Curriculum team then the program that this team would create under an inspiring and trusted champion's leadership would be of a superior quality.

In summary, the qualitative research observed indicates that whilst the lead teacher had some resemblance of being a champion to the program, the lead teacher was not fully authorised to take on the whole champion role and become the coach-type mentor that a champion is required to be. This is evident through the observations, that whilst a strong team was formed and a successful integrated Project-Based Curriculum program implemented, some negative feedback was also encountered from individual team members. If the lead teacher had been authorised to take on the responsibilities of a champion in the case study's integrated Project-Based Curriculum program, this likely would have eliminated the observed negative feelings experienced by teachers and their comments such as "I wouldn't be advocating that again, at least not in that form, it could be done in some other way, maybe," and "…we need to think it through more fully". Had the lead teacher been authorised to champion the case study's program, they would have coached each team member until they were confident in the program they were to deliver to their respective students. The lead teacher championing the program would have ensured that each team member was responsible for carefully reviewing assessment pieces implemented in the program to ascertain that they were of a high quality and that each discipline had integrated itself appropriately into the program. This would have meant that a poor assessment piece would not have been chosen in the English discipline; there would not have been an observed decline in the student's academic performance; the

English teacher would have been satisfied with their discipline's results and would have had a more favourable experience of integrated Project-Based Curriculum programs. Furthermore, having the lead teacher authorised as the champion of the program would have made them ultimately responsible for the quality of the entire program and they would have ensured that each student involved would have been able to participate in an integrated Project-Based Curriculum program of a superior quality.

6.6 Does integrated Project-Based Curriculum align with the Australian Curriculum?

6.6.1 Discipline-based learning areas included in the Australian Curriculum

The Australian Curriculum sets out what all Australian students are required to be taught. These requirements are outlined through the specification of achievement standards. One of the goals developed in the Melbourne Declaration on Educational Goals for Young Australians[*] was that "Australian schooling promotes equity and excellence" …[and the provision of] challenging, and stimulating learning experiences and opportunities that enable all students to explore and build on their gifts and talents" (MCEETYA, 2008, p.7). Teachers are required, in their respective discipline areas, to endeavour to provide these standards through a deeper learning program.

Accordingly, if every teacher in their discipline were to attempt to provide a much more in-depth curriculum for their discipline, it would soon become evident that time constraints would emerge as a limiting factor. The integrated Project-Based Curriculum program takes advantage of the fact that one topic can be shared amongst a number of disciplines so that students walk into the classroom with a higher level of prior knowledge skills, which in turn enables the teacher to make more effective use of class time, allowing the ability to teach further into their discipline area instead of requiring class time to teach the preliminaries. Project-Based Curriculum also facilitates one assessment task having the ability to be shared amongst a number of disciplines which could be assessed with different objectives. This pedagogical approach endorses integrated Project-Based Curriculum as not only aligning itself well to the teachings and the objectives of the Australian Curriculum, but in addition assists teachers to achieve the aims of the Australian Curriculum and the commitments made in the Melbourne Declaration on Educational Goals for Young Australians document.

[*] The Melbourne Declaration on Educational Goals for Young Australians report was the document responsible for the creation of the Australian Curriculum

6.6.2 General Capabilities as essential 21st century skills in the Australian Curriculum

The Australian Curriculum mandates that critical and creative thinking is a general capability that is taught to Australian students. Those students are required to develop their capabilities in:

> …critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school. (ACARA, n.d.)

Another general capability that is mandated to be taught by the Australian Curriculum is the student's personal and social capabilities. Here students need to:

> …develop personal and social capabilities as they learn to understand themselves and others, and manage their relationships, lives, work and learning more efficiently. These capabilities involve students in a range of practices including recognising emotions, developing empathy for others and understanding relationships, establishing and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively and developing leadership skills. (ACARA, n.d.)

Effectively, schools are required to develop student skills in problem solving and teamwork. It has been argued in this chapter that throughout the integrated Project-Based Curriculum program, students were observed using and therefore developing skills in these two areas. Students were also observed using and developing problem-solving skills, demonstrating that they were thinking more creatively and innovatively. Meta-learning was developed and students became responsible for their learning that took place outside of the classroom and what necessary information they had to learn individually before entering the class. In addition, students were observed developing and exercising teamwork skills such as planning and organising, demonstrating their abilities to think flexibly, to communicate well and to work in teams. Overall, integrated Project-Based Curriculum programs have the capacity to facilitate the creation of generic and employability skills that have particular application to the world of work, which is one of the commitments the Australian Curriculum has set out to achieve.

6.6.3 Contemporary cross-curriculum priorities included in the Australian Curriculum

The Australian Curriculum does not only set out to teach disciplined-based learning areas and general capabilities but has:

> …been written to equip young Australians with the skills, knowledge and understanding they will engage effectively with and prosper in a globalised world.

> Students will gain personal and social benefits, be better equipped to make sense of the world in which they live and make an important contribution to building the social, intellectual and creative capital of our nation. (ACARA, n.d.)

In order to achieve this, the Australian Curriculum embeds three contemporary cross-curriculum priorities. These priorities include: Aboriginal and Torres Strait Islander histories and cultures; Asia and Australia's engagement with Asia; and Sustainability. The priorities are not allocated to any one discipline and in fact are to be taught across the curriculum. This aligns well with the principles of an integrated Project-Based Curriculum program, where a unit of work is taught through a number of disciplines. These contemporary cross-curriculum priorities can be taught through a number of given disciplines. Teaching these cross-curriculum priorities through different disciplines gives students different perspectives on each cross-curriculum priority, which effectively achieves the objectives placed in the Australian Curriculum.

6.6.4 Conclusion on the alignment of Australian Curriculum and integrated Project-Based Curriculum

It has been shown that an integrated Project-Based Curriculum program can achieve a number of objectives the Australian Curriculum sets out to achieve. An integrated Project-Based Curriculum can be set up to teach a number of different disciplines, effectively providing students with deep learning across discipline areas. An integrated Project-Based Curriculum program can help develop life-long skills in critical and creative thinking and teamwork. Finally, an integrated Project-Based Curriculum program can successfully and efficiently teach the contemporary cross-curriculum priorities the Australian Curriculum endorses. The argument being developed here is that integrated Project-Based Curriculum aligns itself with the Australian Curriculum and therefore should be considered in developing any curriculum program in today's Australian schools.

6.7 Conclusion

This chapter has discussed a number of issues that were observed in the qualitative and quantitative data. It began with an acknowledgement that the challenges facing the current education system stem from a system designed during the Industrial Revolution that is no longer effective in today's educational climate. It proceeded to then affirm the implementation of the integrated Project-Based Curriculum program used in the case study and that it had adhered to the prerequisites found in the literature review. This chapter also briefly discussed the strong correlation between the outcomes of integrated Project-Based Curriculum programs compared with the goals set by the Australian Curriculum. It showed that integrated Project-Based Curriculum programs supported the Australian Curriculum's mandated teaching of 21st century skills and cross-curriculum priorities running across a number of disciplines.

This chapter carefully showed that, through the efforts of the lead teacher, the program was allocated enough time, had a well-designed Curriculum Map established through teacher consultation and that teaching resources were allocated effectively to achieve a successful program. It also discussed some of the negative results and problems found in the case study. It argued that by authorising the lead teacher to be a 'champion' of the program, it would be possible to overcome the negative results and problems observed. There was a discussion that a 'champion' was not only trusted and well respected but a person who could also inspire a team to reach their full potential; that a champion who was passionate about the project they were involved in could create a movement in new pedagogy, and successfully lead an integrated Project-Based Curriculum program.

This chapter concluded that if a high quality integrated Project-Based Curriculum program was developed and implemented, three cases could be put forward to positively answer the case study's overarching question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?'

The three cases observed through the data produced by the qualitative and quantitative research are:

- Firstly, during the integrated Project-Based Curriculum program students were observed 'owning' their education. When students were given the opportunity to make choices about their own education, they made choices that led to 'real world' connections in subjects they were interested in. They were then able to understand the relevance of what they were learning. This observation aligns itself with Richmond et al.'s (2008, p. 511) suggestion that "…students uniformly felt that they gained a great deal of real-life experience" through these types of programs.

- Secondly the program ensured students become life-long learners who possess 21st century skills, defined by Robinson (2011) as "…people who can think creatively, who can innovate, who can communicate well, work in teams and are adaptable and self-confident" (p. 96); in short they are creative, can think critically and collaborate. Once developed, students will rely on these skills well after they finish their formal education. This will help them to become the 21st century citizens they need to be to survive in this constantly changing world.

- The final and most significant benefit that emerged from this study was the observation and confirmation of Bender's argument that integrated Project-Based Curriculum programs are "…one of the most effective ways available to engage students with their learning content" (2012, "Chapter 1," para. 1); therefore, students became more engaged with the progress of their own education. Once engrossed in the study, students would continue to research and learn outside of school hours and return to the classroom with a greater knowledge. This allowed teachers to minimise preliminaries, and delve into more in-depth content. This in turn resulted in the students experiencing a deeper learning, which helped them to attain better knowledge and academic results.

These three cases are powerful arguments that demonstrate that if an integrated Project-Based Curriculum program is developed and well implemented by a committed champion who inspires an enthusiastic team, these programs are indeed constructive and beneficial to today's schools.

CHAPTER 7: RESEARCHER'S RECOMMENDATIONS

7.1 Overview

In the previous chapter the argument was made that there were a number of perceived benefits identified in both the qualitative and quantitative data that positively answered the overarching question, 'Are integrated Project-Based Curriculum programs constructive and beneficial to today's schools?' The benefits that were observed through the quantitative data included the students owning their education, which resulted in a higher level of engagement at school, and the inclusion of 21st century skills that saw students collaborate, think critically and be creative. Quantitative benefits observed were students achieving better academic results. This chapter will now focus on the essential factors identified in implementing a successful integrated Project-Based Curriculum program that will produce those aforementioned benefits.

7.2 Essentials for an integrated Project-Based Curriculum

It was evident during the case study that teachers and students responded positively to a number of aspects of the program. These positive responses were what made the program successful; arguably, without these factors the program may not have produced all the perceived benefits outlined in the previous chapter.

To implement a successful integrated Project-Based Curriculum the program must have the following essential components: a champion, a driving question, choice and ownership, expeditionary learning, 21st century skills, inquiry and a final product.

7.2.1 A Champion

The first and arguably the most important essential component is the notion discussed in the previous chapter: that is, having a champion for the program. The champion is likely to be the lead teacher who is responsible for the entire program and would strive to ensure that all duties outlined in table 7.1 were completed.

DURING THE PREPARATION OF THE PROGRAM	
The Champion initiates first teacher meeting, to discuss and choose a common inquiry and essential question.	It is necessary for the champion to connect with all staff involved in the program before any organisation or lesson plans are designed, and ensure that a common vision is developed. This could be through one group meeting or by meeting up individually. The advantage of a champion is that it is not necessary to have all staff involved in the program meet at one particular time and place to finalise and agree on everything that will happen during the program. Due to the large workloads of teachers, having everyone involved meet up is often difficult and at times impossible. The champion can instead meet up with each individual at times and places convenient to them, listen to staff ideas and take on board what they say. Another advantage of having a champion is that when there are conflicting ideas, the champion can have the final say and choose a direction. This avoids potential disagreements not being resolved, stalling the process and producing the necessity for further meetings to resolve the issue.
The Champion finalises the program.	The champion then finalises all aspects of the program, what content each discipline is teaching, the final product, and how each discipline will assess the work. This ensures that students receive a variety of perspectives, that resources are shared equally and that there is not duplication of content. The champion then reconnects with each staff member to ensure that they have an understanding of the common vision, a plan and a timeline for what they have do and when they are required to finish.
DURING THE RUNNING OF THE PROGRAM	
The Champion continually monitors progress of each discipline and finds opportunities to encourage both teachers and students.	Throughout the program the champion continues to monitor the progress of each discipline, ensuring that they are remaining on schedule and helping out when they are not. The champion positively encourages teachers with small successes and cheers students on to strive for excellence.
AFTER THE PROGRAM HAS ENDED	
The Champion initiates final meeting with teachers to discuss what was successful and where improvements could occur.	At the end the champion initiates a reflection procedure which includes the staff satisfaction of the program and the students' results from the program. He can then use this information to inform continuous improvement processes for the next integrated Project-Based Curriculum program.

Table 7.1 Duties of the integrated Project-Based Curriculum Champion

7.2.2 A carefully-worded essential question

One area that requires careful planning during the preparation of an integrated Project-Based Curriculum program is the essential question. It is important that the essential question is carefully worded so that it has ability to meet a number of objectives. The champion needs to consult with all staff involved so that they can construct a question that meets these objectives.

Firstly, the essential question has to be broad enough to be inclusive of all disciplines and the intended topics being covered in each class. The essential question cannot be one that is closed, loaded and/or directs students to one answer, an answer that is teacher driven. The question needs to be one that is interesting to the student, current and topical to the world the students live in and flexible enough so that students have the ability to incorporate their own individual interests and abilities.

However, the essential question cannot be so broad that it leaves students directionless; accordingly, it should anchor the student in a theme. It needs to give them a starting point so that they can make small and quick decisions on how they want to answer the question and not leave the student overwhelmed with too much decision making. It should also ensure that teachers are able to cover the mandated curriculum; teachers have a large amount of curriculum to cover and often feel that they do not have enough time. It is important that this question allows teachers to cover some of their required content during the integrated Project-Based Curriculum program. From the teacher's point of view the project needs to be part of the solution, not another problem to be resolved.

7.2.3 Choice and ownership (students' individual interests and abilities)

If the essential question is worded carefully, it will allow students to make choices as to how they want to answer the question. It was observed through the case study that students positively responded to the opportunity to make choices in the integrated Project-Based Curriculum program. They would often choose to answer the essential question in a way that incorporated their own interests. This empowers students with personal ownership of their education, and, without teacher direction, will often dedicate large amounts of their own time to the research of their project and will exceed what is necessary. Due to the fact that students are researching content that interests them, it may seem to the student less like work and more like exploring personal interests. Hence students are likely to then explore a number of different tangents related to the project they are working on which can broaden their knowledge. They are then arguably able to use this attained knowledge and incorporate it into their project and final product and produce high quality work.

7.2.4 21st century skills

To achieve the mandate of Jukes et al. "to equip students with knowledge and skills that will make them effective individuals, family members, citizens and workers in the 21st Century" (2010, "Introduction," para 21), it is important that the essential question ensures that students use critical thinking, are creative and collaborate.

One of the general capabilities in the Australian Curriculum is critical and creative thinking. It is important that the champion constructs an essential question that ensures students are required to problem solve. The question must require students to do more than carry out a series of tasks. It should be one that requires students to research, reflect, think and solve. Solving the problem must be achievable but it may also require students to be creative in their solution.

During the case study it was observed that students showed that they had experienced little collaboration during their education and were not very skilled at it. Students are rarely taught how to work in teams even though after their educational years are completed most professionals are required to work in teams. It is important that students are working in groups during the integrated Project-Based Curriculum program. The more coaching and exposure to collaboration, the better students will become at negotiating working in teams.

7.2.5 Expeditionary learning

It is important that students can see real world applications to their work; this gives students the 'why' are we learning this and shows them the importance of the topic. It may even inspire students to make career decisions

An engaging and impressive way to show students real world applications is for the champion to take the students out of the classroom on an expedition that incorporates what they are studying. Expeditionary learning helps students link what they are doing in the classroom to what happens in the real world context. They will get the opportunity to hear from various professionals and therefore experience different forms of pedagogy which might help engage some students who are not so connected in the classroom.

If expeditionary learning is not possible due to financial constraints, then the champion might decide on bringing the real world into the classroom as a secondary solution. Inviting guest speakers or presenting and using industry equipment might help students connect their studies to the real world.

7.2.6 Inquiry

Another important essential is that students at the end of the class leave the room and continue their learning of their own accord. It is important that students take ownership of their education, in contrast to traditional processes involving the teacher collecting information in preparation for a class, then delivering content to the class and finally testing students on how much they have memorised. The essential question must involve the student being required to do some inquiry and research.

The research aspect of the program is important as this will help students develop their inquiry and researching skills. If students understand how to research effectively to efficiently discover answers to questions, they will no longer need to wait for input from others in order to learn. These students can actively, without assistance, start answering questions that they may have, and in doing so build upon their researching skills. Anything is possible. An example of this is Mitra's Hole in the Wall Project, where "children seemed to learn to use the computer without any assistance. Language did not matter, and neither did education" (2012, "2062: Child's play," para 23). Mitra's project was the placement of a computer in a socioeconomically low area where children socialised. Without adult assistance these children in teams would learn how to use the computer and then research questions even if it was in a different language. Mitra's project observed Tamil-speaking children teach themselves biotechnology in English. He commented, "If Tamil-speaking children could teach themselves biotechnology in English on their own, how far could they go with someone there to help them?" (2012, "2062: The cube in the tank," para 17). Being able to research effectively will enable students to self-learn and become the workers needed in the 21st century.

7.2.7 A final product/presentation

It is important during the integrated Project-Based Curriculum program that all involved discipline areas are working towards a common objective, and that the knowledge that is being learnt from the disciplines' different perspectives come together to produce a single product. It is also important that students understand the value that each discipline has in critically and creatively solving problems to create a product. The champion will have to again carefully decide on what this final product is, so that all disciplines involved are equally important to its production.

It is also important that at the end of an integrated Project-Based Curriculum program there is a sense of achievement. A final product on display or in a presentation can bring the program to a satisfying close. This final product could then be used by a number of teachers to assess the student in their respective disciplines. This would see the student create one piece of work which might cover several different discipline curriculum areas, reducing the workload and pressure on the student.

7.3 Concluding Commentary

It is important that our schools equip students with the skills and abilities necessary to be citizens and workers in the 21st century. Not a lot has changed in education since the Industrial Revolution according to Robinson:

> The world is changing faster than ever and there are major problems facing all organisations in recruiting and retaining people with the creative abilities needed to engage with these changes. The lives of individuals and communities too are deeply diminished by the lack of these abilities. There are many complex factors at work, but the inherent deficiencies of industrial/academic systems of education are playing a major part. (2011, p.78)

It is necessary for educators to reflect on their practices and align themselves to what society is asking for, that is workers who are critical thinkers, creative and can work collaboratively. In this project there is evidence that integrated Project-Based Curriculum programs develop these 21st century skills and engage students to achieve better results.

The recommendations from this study to schools interested in developing their own integrated Project-Based Curriculum programs are:

- To start developing integrated Project-Based Curriculum programs within year level cohorts
- To cultivate Champions who can lead groups in a transformational manner and are able to collaboratively produce engaging inquiry programs with carefully worded essential questions
- To have carefully worded essential questions that are relevant to students so they become interested and engaged at school, and possibly including expeditionary learning
- To help develop in students their inquiry research skills along with the necessary 21st century life skills of collaboration, critical thinking and creativity
- To properly resource integrated Project-Based Curriculum programs, not only with tangible teacher resources, but also in terms of staff and their allocated time available to prepare, implement and assess these programs.

This thesis suggests that the answer to the overarching research question, ‘Are integrated Project-Based Curriculum programs constructive and beneficial to today’s schools?’ is shown in this project to be a resounding ‘yes’. Not only are programs such as integrated Project-Based Curriculum constructive and beneficial to today’s schools; they are necessary for schools to be relevant to learners of today. If schools continue to teach using the Industrial Revolution model that the educational system was developed under, then educators and even schools may become obselete. The sharing of the discipline’s content based on the regurgitation of knowledge can be administered and assessed by a machine. Educators need

to become more than just a process of learning and checking slabs of information. Educators need to become facilitators of the development of higher order skills. Students with today's technology have access to literally libraries of information that all sit comfortably in their back pocket. Remembering certain information on the spot is now less important. Students today need these higher order skills: to undertake meta-learning and address self realised areas of weakness, to be able to solve problems, to think critically about the issues surrounding the problem, to do this in teams and to be creative if the solution is not straightforward. If designed and implemented carefully, an integrated Project-Based Curriculum program can allow teachers to coach students with these necessary skills, allowing students to research the discipline's content in their own time. With the current workforce necessitating a higher level of skill from the next generation of workers it seems that programs like integrated Project-Based Curriculum have a promising future.

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