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Character cars : How computer technology enhances learning in terms of arts ideas and arts skills and proceses in a year 7 male visual arts education program

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CHARACTER CARS: HOW COMPUTER TECHNOLOGY ENHANCES LEARNING IN TERMS OF ARTS IDEAS AND ARTS SKILLS AND PROCESES IN A YEAR 7 MALE VISUAL ARTS EDUCATION PROGRAM.

Gemma Eva Scarparolo (B.Ed)

CSESS

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

"The possibilities that the technology can offer are seemingly endless and remain to be fully explored in [visual] art education." (Callow, 2001, p.43)

The aim of this research is to investigate whether the integration of *Visual Arts Technology Tools* (TECH-TOOLS) into *Traditional Visual Arts Programs* (TRAD-PROG) enhance the students' learning in terms of *Arts Ideas* (AI) and *Arts Skills and Processes* (ASP) and whether it is a cost effective option for Western Australian primary schools. To determine whether it is worth the inclusion of TECH-TOOLS in terms of enhancing learning, this research will statistically state whether the combination of TECH-TOOLS and *Traditional Visual Arts Media* (TRAD-MEDIA) enhance the expressive outcomes of Year Seven boys' artwork.

The comparative case study method has been chosen as the most suitable method to enable the Researcher to establish the impact that combining TECH-TOOLS with TRAD-MEDIA have upon Year Seven boys' artwork. The Control group only used TRAD-MEDIA and the Experimental group used both TRAD-MEDIA and TECH-TOOLS to create a piece of artwork based on the chosen theme, *Character Cars*. There were 23 students in the Control group and 24 students in the Experimental group, however not all students attempted or completed the task for reasons which will be explained in Chapter Four. Each group was involved in three sequenced activities based on the chosen theme, with the second activity varying only according to the media used to complete the task.

Combinations of quantitative and qualitative methods have been used in this research. To present quantitative data which provides insights into whether *Visual Arts* (VA) teachers should be combining TECH-TOOLS with TRAD-MEDIA in their *Visual Arts Programs* (VAP), each piece of artwork was assessed and analysed using descriptive analysis of the data. Each participant completed a written feedback form outlining their attitudes, feelings and thoughts about their artwork and the media that they used. The Researcher and an independent *Visual Arts Education* (VAE) expert also took anecdotal records during the VA activities with the aim of recording the participants' involvement and enjoyment of the activities.

This study is significantly different from the current research in this area as it will: provide quantitative data which will demonstrate whether the combination of TECH-TOOLS and TRAD-MEDIA enhances students' artwork; link the relevant literature and findings of this study to the Western Australian primary school context; provide links to the Western Australian Curriculum Council's Curriculum Framework; and comment on the influence of gender in VAE. All of these factors contribute to the uniqueness of this study.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

(i)   incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education;

(i)   contain any material previously published or written by another person except where due reference is made in the text; or

(ii)   contain any defamatory material.

I also grant permission for the Library at Edith Cowan University to make duplicate copies of my thesis as required.

I acknowledge the mentoring of my supervisor, Dr. Geoff Lummis and his expertise in the area of Visual Arts Education. His guidance and assistance has been invaluable during the writing and research process.

Gemma Scarparolo

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Chapter One

1.0   INTRODUCTION

1.1   The Background to the Study

The motivation for this study emerged as a direct result of my teaching experience as a classroom teacher and a VA teacher (of boys in years 5 and 7) at a private boys' school in Perth. During my time as a classroom teacher I was particularly aware of the increased motivation and interest levels of the boys when I provided projects in which the students used technology tools (digital cameras, scanners, computers and different software packages) to complete a variety of learning tasks. It was obvious that the boys enjoyed this different mode of learning where the learning was hands on and the tools that they were using were relevant to them in their lives outside of school. I was able to see the benefits of including technology into my Mathematics, English and Society and Environment lessons, such as increased peer collaboration and higher motivation levels. I began to wonder whether I could include the same technology tools into my VA classes and capture the same enthusiasm.

In August 2001, I attended an international conference in Melbourne convened by an Australian computer distribution company *Computerlec*. The conference theme 'Expanding Learning Horizons' explored educational uses of computer technology with an emphasis on the advances in software and hardware. All of the presentations and information focused on the integration of technology (both software and hardware) into the 'core' learning areas of Mathematics, English, Science and Society and the Environment. As a result of attending this conference I became excited and curious about the possibilities of integrating computer technology within VA classes.

Consequently I began to search the Internet and VAE journals for related information and examples of how VA educators were using TECH-TOOLS in their TRAD-PROG. However, I was not able to find many relevant examples as the majority of the literature was based in the USA or UK in high school contexts.

The next step I undertook was to find a suitable software program that I could use to enhance my TRAD-PROG. I visited many educational suppliers, experimented with several software programs, such as *Kid-Pix deluxe,* and read many software reviews on various software programs in order to find suitable software programs that primary school aged children could use to develop pieces of artwork. *Kid-Pix deluxe* was the most advertised software program that was marketed as being *suitable* for VAE in primary schools due to the fact that the students can use virtual paintbrushes, pencils and charcoal etc… to colour-in templates that the program provides. I was not convinced or satisfied with the options that *Kid-Pix delux*e provided as the software does not allow students to enhance or manipulate their own images and I did not feel that being able to add colour to a picture was a worthwhile or creative activity for primary school students.

As a result of my disappointment at *Kid-Pix deluxe* my search for a suitable software program that I could use in my VA classes with year 5 and 7 boys became more refined and I discovered that I was looking for a program with two specific criteria.

Firstly, the software program must provide students with opportunities to edit, manipulate and experiment with their own images - whether they be sketches, paintings or photographs of their sculptures or other images that the students have created on the computer using 'drawing' or 'painting' tools.

Secondly, the chosen software program must also be affordable for schools to purchase and run throughout the year. This was an important component when choosing a suitable software program due to the fact that many VA teachers already have difficulties in receiving adequate budgets to purchase TRAD-MEDIA, such as oil pastels and clay.

Keeping the above criteria in mind, I continued to search for suitable software programs and discovered that *Corel Painter* 8 provided excellent opportunities for students to work with their original images and produce interesting and realistic effects similar to TRAD-MEDIA. However, the cost of this program was a concern with one site licence costing between $220 -$300 dollars. This may not be an issue if the school was to purchase a

couple of these programs. Yet it was my hope to be able to have at least 15 computers with the software program installed so that at least half of the class could be working with TECH-TOOLS while the remaining students work with TRAD-MEDIA.

I finally discovered a software program called *Microsoft Photo Editor,* which was suited to my needs and the criteria. I already had experience using *Microsoft Photo Editor* as I used the simple functions to download, store, and copy and paste digital photographs that I had taken of my students working in different learning areas. I then began to experiment with this simple and inexpensive software program with my year 7 students to determine whether this program would be beneficial to integrate into my TRAD-PROG.

After spending some time manipulating images, I began to take digital photographs of the students' artwork and then demonstrate a few simple ways that the students could manipulate their images as part of the creative process. The students became very excited and highly motivated to discover the different effects and different images that they could produce from a digital photo of their original sketch, painting or clay model. (See Appendix A, p.103, for student examples).

It was at this stage that I decided to conduct my own research to determine the effect of combining both TRAD-MEDIA and TECH-TOOLS upon Year Seven boys' expressive outcomes in VAE.

1.2   The Significance of the Study

This particular study is significant because it is being conducted in Western Australia with primary school aged children and therefore it will be directly related to the Western Australian Curriculum Council's Curriculum Framework (CCWA, 1998).

> There have been all sorts of arguments denying a connection between 'computer' and [visual] 'art'. Because it is relatively new this [visual] art form is still being developed in Secondary schools and it is virtually unheard of in Primary schools in Western Australia, other than 'free' drawing time on the computer (Davis-Law, 1997, on-line article).

It is for this reason that this research has focussed on a group of Year Seven students in a Western Australian school. All of the participants are boys due to the fact that the Researcher currently teaches in a boys' school and therefore has access to these students through her regular VA classes.

Given that this investigation focuses on Year Seven boys, the outcomes of the study will also be of interest to teachers and Researchers who are interested in gender differences in VAE. Duncum (1997), Imms (2003) and Speck (1995) will be referred to with regards to gender differences in children's visual expressive outcomes as their work has impacted many aspects of this study. However, it is important to reiterate that the primary focus for this research is to determine whether the combination of TECH-TOOLS and TRAD-MEDIA in VA creative tasks impact the creative outcomes of students' artwork in primary school aged children.

This study is particularly relevant to Western Australian VA teachers as they are now required to integrate technologies into their VAP. All schools in Western Australia must now be fully implementing, planning and assessing using the Curriculum Framework document (CCWA, 1988). It is therefore necessary that VA educators can assess whether the integration of TECH-TOOLS into their VAP is beneficial in enhancing their students' expressive outcomes.

The Researcher suggests that this comparative case study will assist primary VA teachers to make informed decisions when deciding whether to combine TRAD-MEDIA and TECH-TOOLS in their VAP and whether they feel that it is really worth it in terms of enhancing students' creative products.

1.3   Purpose

The purpose of this study is to determine the effectiveness of integrating TECH-TOOLS into primary school VA classes. This topic is important, but often controversial, because these technologies (scanners, printers, digital cameras and software programs) are

relatively expensive yet they are increasingly becoming integral to our work, education and private lives.

During the period from 1998-2002 the Western Australian State Government allocated The Department of Education and Training (formerly EDWA) a sum of $80 million dollars to spend on miscellaneous computer technologies (Trimmer, 2002, on-line article). With such an enormous amount of money being spent on various items of technology in Western Australian schools, educators, politicians and parents should be enquiring as to whether these technologies are enhancing students' learning. If it is deemed that these technology tools are not improving students' learning and performance schools could be using this money in ways that would benefit the students such as; buying books, employing extra teaching support staff or even buying more TRAD-MEDIA, such as clay and paint.

1.4   Research Questions

1. How does the inclusion of TECH-TOOLS in a VA-PROG enhance learning for Year Seven boys?
2. Does the cost of purchasing TECH-TOOLS for a VA-PROG outweigh the benefits of learning?

1.5   Definition of Terms

It is important to define the word *technology* as it will be used during this investigation. For the purpose of this research the word *technology* refers to the use of computer based interactive tools that enable students to work with greater flexibility, thus extending TRAD-PROG. Examples of the types of technology (TECH-TOOLS) that will be referred to include: computers; scanners; digital cameras and software programs that allow one to create, manipulate and store visual images and/or visual concepts.   This contextual definition of technology supports the seven learning area outcomes of the *Technology and Enterprise* learning area as found in the Curriculum Framework. (CCWA, 1998, pp. 292-300)

Chapter Two

2.0   CONCEPTUAL FRAMEWORK

This Researcher has chosen to link four related conceptual frameworks. This linking provides a multiplicity of important references essential for positioning this study. These related frameworks also contextually link relevant literature in the area of VAE. The various frameworks form the basis of this investigation and provide an organisational structure linked to the literature review. The four frameworks are as follows: (1) A Developmental Framework which outlines the creative stages of development for children in VA as stated by Viktor Lowenfeld; (2) Important factors to consider when integrating TECH-TOOLS into TRAD-PROG which identifies the important factors raised in the literature for schools to consider when they attempt to integrate TECH-TOOLS into TRAD-PROG and still address each of *The Arts* learning area outcomes as stated in the Western Australian Curriculum Framework; (3) A Gender Framework which identifies differences found in boys and girls artwork as outlined by Cathy Speck (1995); (4) A Drawing Framework which states the three dichotomies that can be found when analysing children's drawings as stated by Duncum (1992).

2.1   Developmental framework

This first framework outlines the relevant stages of development of children in two related areas (1) *Graphic Creative Growth* and (2) *Cognitive Development.* This pedagogical framework positions a holistic approach. The shaded area of Table 1 highlights the anticipated characteristics of the Year Seven male participants in this study. It is important to acknowledge that some of the boys' development characteristics may fall on either side of the shaded area due to varying individual differences in their growth.

Table 1   Developmental Framework

Age	Lowenfeld's Stages of Graphic Creative Growth (Lowenfeld & Brittain, 1987)	Piaget's Theory of Cognitive Development (Piaget, 1971)
	Schematic Stage • Base line is evident • Sky line is evident • X-Ray pictures are common • Human figures are usually looking forward • Sequential drawings are common. • Discover that there is a relationship between colour and an object.	**Preoperational** • Develop and use language • Recognise symbols- pictures, words and numbers • Classify object on basis of one distinguishing feature.
11-13	**Dawning Realism** • Children want their drawings to look more realistic. • Gain an understanding of detail, but lose their sense of action and movement. • Girls focus on drawing horses and animals • Boys focus more on cars and machinery. • A growing awareness of themselves	**Concrete Operational** • Solving problems through a 'hands on' approach. • Thinking and working through a sequence
	Pseudo-naturalistic Stage • Developing the ability to think abstractly • This stage marks the end of spontaneous artwork • Students become highly self-critical • Attempts at naturalism – to express in more adult terms • Focus on the end product • Increased awareness of the human figure and how to portray it in their artwork.	**Formal Operations** • Use logic to think abstractly • Use scientific thought in terms of suggesting and testing hypotheses.

2.2 Important factors to consider when integrating TECH-TOOLS into TRAD-PROG

The basis for this framework has been created by using the four learning area outcomes from *The Arts* learning area in the Curriculum Framework. (CCWA, 1998) The four learning area outcomes have then been linked to several theoretical underpinnings from the relevant literature with a particular focus on the role of the VA teacher (Duncum, 1997; Frost, 2002: Kuntyj, 2002; Matthews, 1997; Sinker, 2001; Smith & Coyle, 2000; Wang, 2002). Therefore, this conceptual framework links the most important factors which have been identified in the literature as being important in order to provide a VAP where TECH TOOLS can be successfully integrated.

Figure 1   Important factors for VA teachers integrating TECH-TOOLS

in TRAD-PROG

ARTS IDEAS

Students generate artworks that
communicate ideas.

ARTS SKILLS& PROCESSES

Students use the skills, techniques,
conventions and technologies of the arts.

VA teachers must:

- Be given sufficient funding to purchase TRAD-MEDIA & TECH-TOOLS
- Be given adequate time to attend professional development to improve their skills and knowledge of using TECH-TOOLS
- Find a suitable software program for their students that suit the school's and students' needs.
- Be given support from administration staff with regards to timetabling of VA classes and access to TECH-TOOLS during scheduled VA classes
- Acknowledge the skills that their students may bring with them regarding the use of TECH-TOOLS and feel confident to let the students play the 'teaching' role at times.

ARTS RESPONSES

Students use their aesthetic understanding
to respond to, reflect and evaluate the arts.

ARTS IN SOCIETY

Students understand the role of the arts in
society.

2.3   Gender framework

The third framework underscores the importance of the differences in children's drawings associated with gender (Speck, 1995). This framework is essential to this Researcher's investigation, due to the fact that the participants are Year Seven boys. This Researcher anticipates that the visual products created by Year Seven boys will reflect some of the themes and findings outlined in the table below.

Table 2   Gender Framework

	Boys	Girls
Findings from the literature regarding the differences in boys and girls drawing.	• Notion of contest between opposing forces • Presence of aggression • Mechanical and scientific themes • Boys are better at drawing the human figure in proportion and showing the figure in motion. • Boys have a better understanding of perspective	• Emphasis on nurturance, tranquility and beauty. • Aesthetic intention • Girls are better than boys at drawing elements of detail – eyelashes, curls, cheeks. • Girls tend to use a lot more symmetry in their drawings than boys
Topics and Themes displayed in Spontaneous Drawing.	• War • Dinosaurs • Monsters • Space ships • Vehicles	• Figures of royalty • Kings, queens • Princes, Princesses • Horses • Landscape • People • Animals • Domestic scenes

2.4   Drawing framework

The fourth framework includes Duncum's (1992) research on children's spontaneous drawing. It is anticipated that the Year Seven boys' VA products will demonstrate in part the six categories identified by Duncum. The following diagram was taken directly from Duncum's research (1992, p.5).

Figure 2   Drawing framework

Narrative

Imagination

Fact   Fiction

Copied

Separate Object

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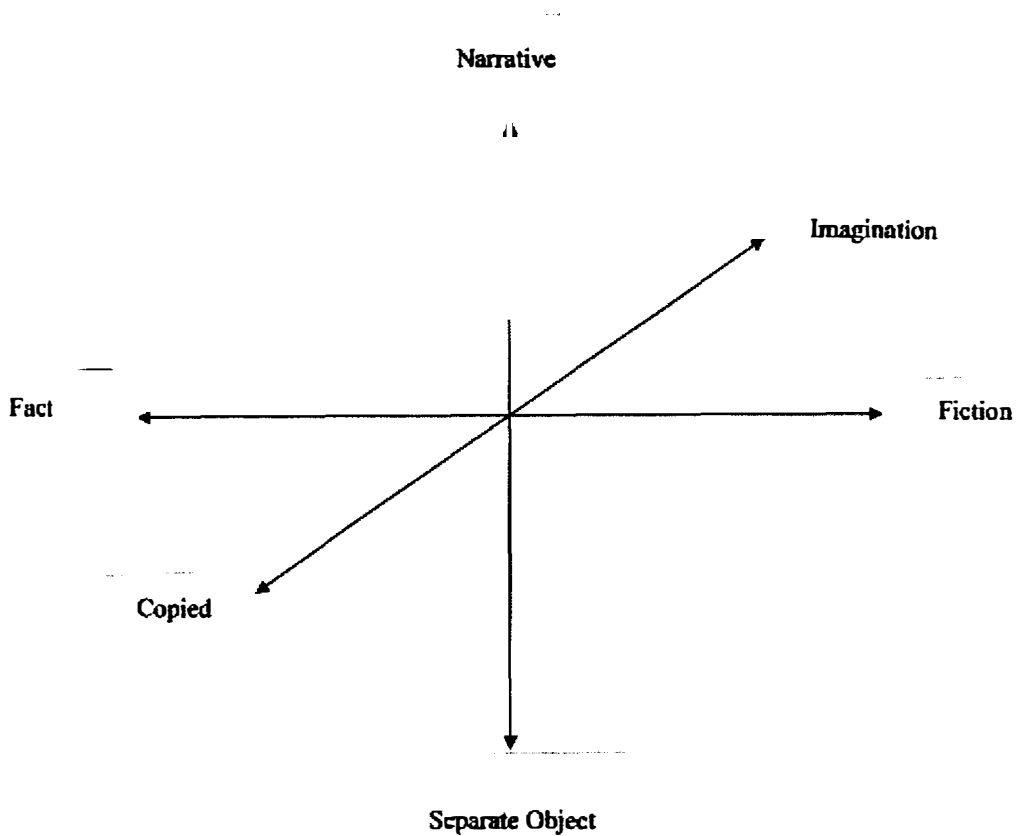
Chapter Three
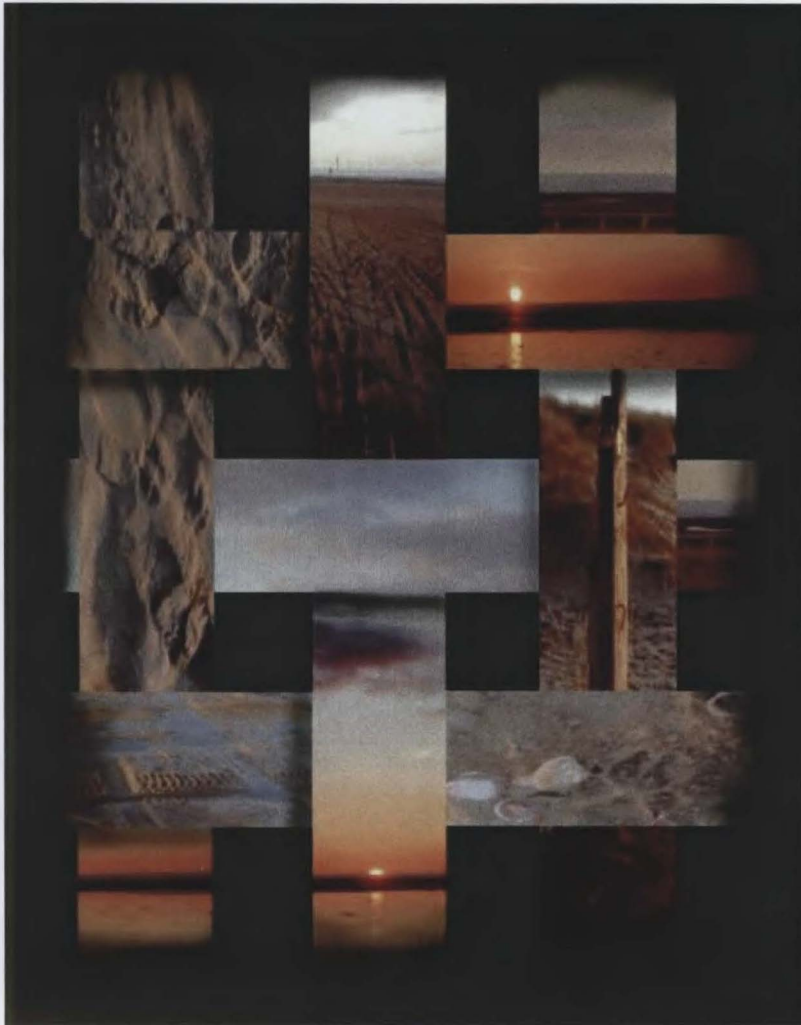
Figure 3   Example of student's artwork using TECH-TOOLS

http://www.pcallow.freeserve.co.uk/Helen%20Thornber.htm

Title: Layered Beach

Student: Helen Thornber, Year 12.

3.0 LITERATURE REVIEW

3.1 Introduction

The literature review has two major aims: (1) to relate the relevant research to this Researcher's investigation; and (2) to place the investigation into a VAE context for Western Australian primary schools.

This Researcher will:

- Examine the benefits of integrating TECH-TOOLS into TRAD-PROG

- Discuss the impact and relevance of integrating TECH-TOOLS for students

- Explore the role of the teacher, their attitudes and values towards accommodating TECH-TOOLS into VAP

- Outline the creative stages of development that the participants of this study will be performing at in order to place their outcomes in a relevant context

- Briefly discuss the influence of gender in VAE and then link the expected visual outcomes from the participants in this study

- Review specific examples of TECH-TOOLS being used in TRAD-PROG and address the questions and concerns raised by the Researchers/teachers

- Link the relevant literature and discuss the implications for this study in a Western Australian Primary School VA context.

It is very important to note that a lot of research, on the topic of integrating technology in VAE has been based upon the use of the Internet, CD-ROMS or animation software programs. For the purpose of this study, these articles have not been reviewed as they were deemed to be irrelevant. The literature that is reviewed in this chapter has been chosen as it is seen to be directly related to this study. Therefore, any articles that discuss the use of the Internet (as a research tool) in VAE, the use of VA CD-ROMS or the use of animation programs have not been included.

Throughout this literature review one particular researcher by the name of Mathieson (1993) has been referred to the most. Although it has been over 10 years since Mathieson's (1993) writings, this Researcher has found his work the most relevant, honest, and practical information. He appears to have been an innovative thinker in this area of integrating TECH-TOOLS with TRAD-MEDIA and consequently many examples in this literature review have been taken from his book, 'Children's art and the computer'.

3.2   REASONS FOR INTEGRATING TECH-TOOLS WITH TRAD-PROG

There are many reasons for integrating TECH-TOOLS in our TRAD-PROG and these issues will be discussed below. All of these issues have been raised in the relevant research and fall under the subheadings of: TECH-TOOLS and its relevance for students, a key to future employment and curriculum demands.

3.21   TECH-TOOLS and its relevance for students

The following statistics have all been taken from the Australian Bureau of Statistics 2003 Year Book. Although most of the data is over four years old (due to the census being taken every 4 years) the statistics from 2000 can still provide an insight into the number of people that are accessing computers and the Internet in the year 2004. These figures are a sound indication that the use of computers is becoming more prevalent in our homes, particularly by children. The statistics have been included to demonstrate that computers are an integral part of children's lives and therefore that it could be beneficial to integrate them into VAP within our Western Australian primary schools.

In 2000, 53% or 3.8 million households in Australia had access to a computer at home. The report continued to state that of the households with a computer, 2.7 million or 33% had Internet access. Figure 4 (p. 16), demonstrates the predicted data for household computer and Internet access by people in Australia in 2001. By studying this graph we may consider/predict what these figures may look like in 2004. This Researcher anticipates

that the amount of households that have a computer may have increased to possibly 80%. (Australian Bureau of Statistics, 2003, p.756)

24.12   HOUSEHOLD COMPUTER AND INTERNET ACCESS(a)

■ Internet access
■ Computer access

(a) Projected data for 2001.
Source: Household Use of Information Technology, Australia, 2000 (8146.0).
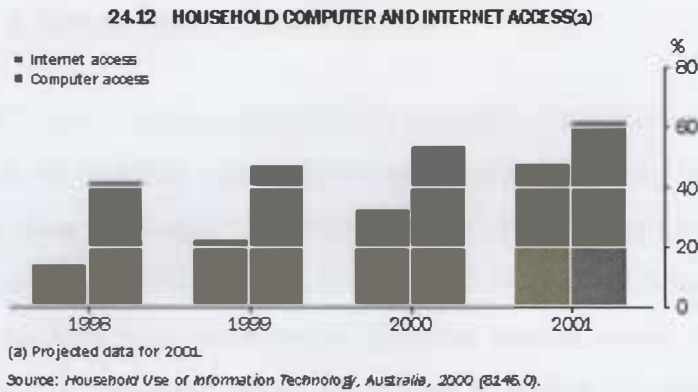
Figure 4   Household Computer and Internet Access

In a special report by the Australian Bureau of Statistics titled 'Australian Children log on to information technology' the following statistic was revealed which is of particular interest to this study. In the year 2000, 95% of children aged 5-14 had used a computer in the previous 12 months to the study with 83% using the computer and the Internet for educational activities. Of this same group of children nearly half of them had accessed the Internet at either home or school. (Australian Bureau of Statistics, 2003, p.759)

As we can see from the statistics in Figure 4, even though they are four year olds, children in today's world have grown up in a society where computers are an integral part of life. Computers, and related technology tools (scanners, digital cameras, and game consoles) are an accessible part of students' lives and most students are interested in computers and what they can offer. Therefore it seems logical that educators should begin to realise the potential of these technology tools in our TRAD-PROG to attract students to the VA and to maintain the students' interest in the possibilities that these tools offer in VA creative projects (Callow, 2001; Duncum, 1997; Mathieson, 1993: Matthews, 1997, Tomaskiewicz, 1997). The following quote from Mathews (1997) captures this sentiment succinctly:

> [Visual]Art educators who teach computer art may therefore attract many students who otherwise might never discover [visual] art's riches.

Computers might be the enticing door that delivers students into a world of aesthetic possibility.

3.22 A key to future employment

Matthews (1997) used a similar subheading in his article 'Computers and Art Education' in order to discuss the fact that many careers now involve the daily use of the technology tools that have been discussed. The following list of careers is testament to Matthews' view that by teaching children the possibilities that TECH-TOOLS have to offer educators are providing students with the essential skills for several career paths in their future. Careers include: (1) illustration artists; (2) product designers; (3) architects; (4) industrial designers; (5) advertising; (6) publishing; and, (7) animation artists. These all complete several of their tasks, if not all, on computers.

Kuntyj (2002) also reinforced that it is important for VA teachers to equip their students with the relevant skills in computer graphics in order for them to become employable in a competitive work force where many careers, such as the ones mentioned above, require them to be computer literate.

Therefore, it is the responsibility of VA educators to allow their students to experiment with and create pieces of artwork using the latest technology that is also being used by professional artists. This enables the students to see that the processes that they are using to create artworks are similar, or the same, as some professional artists use to create their artworks. This provides the student-artists with more meaningful and authentic practical experiences in VAE.

> With pressure from industry and the increasing demand for computer literacy in the [visual] arts it seems a disservice not to give students the opportunity to experience the array of tools available to them digitally (Kuntyj, 2002, p.4).

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3.23 Curriculum demands

The statistics clearly demonstrate that we live in a world where technology and computers are an integral part of our everyday lives. Therefore curricula have adapted, to embrace this change in the students' lives, to incorporate technology into their learning at school.

The Curriculum Framework is a Western Australian document which was introduced in 1998 by the *Curriculum Council of Western Australia* (CCWA).   The Curriculum Framework is based on the philosophy of *Outcomes Based Education* (OBE) which is a pedagogical shift that occurred during the late 1980's in Western education (Barry & King, 2003).

OBE places the emphasis "on what is actually learnt by each student" (CCWA, 1998, p.14) whereas other approaches to education focus on what students *should* achieve and the content that teachers should be teaching their students.

The Curriculum Framework identifies 13 overarching statements, eight learning areas and learning area outcomes for students to work towards from Kindergarten through until Year 12.

> The Curriculum Framework sets out what all students should know, understand, value and be able to do as a result of the programs they undertake in Western Australia...It is neither a curriculum nor a syllabus, but a framework identifying common learning outcomes for all students... It is intended to give schools and teachers' flexibility and ownership over curriculum in a dynamic and rapidly-changing world environment. (CCWA, 1998, p.6)

After a five year phase in period, 2004 was the first year that all schools in Western Australia fully implemented the Curriculum Framework document in their teaching, planning and assessing of students. (CCWA, 1998)   Therefore, to be meeting curriculum needs, it is essential that VA teachers are integrating TECH-TOOLS into their VAP.

The Western Australian Curriculum Framework has accommodated the changing needs of today's students with regards to technology in one of the seven principles that underpin the Curriculum Framework under the heading of *flexibility:*

> ...it must be responsive to social and technological change and meet students' needs arising from that change process. In particular, it must encourage effective use of new technologies as tools for learning. (CCWA, 1998, p.17)

This in turn, makes it the responsibility of the teachers to be integrating technology into all of the learning areas, including VA. The Western Australian curriculum and more specifically, the VA curriculum, is discussed in more detail in the following section.

3.3   WESTERN AUSTRALIA'S VA CONTEXT

It is important to gain an understanding of the Western Australian VA context so that this study and the consequent research findings can be interpreted in the relevant context to which they were intended for. Two areas of the Western Australian VA context will be closely examined and related to this particularly study: the Western Australian Curriculum Framework (1998) and the Western Australian Progress Maps and Curriculum Guides (CCWA, 2005).

3.31 Curriculum Framework

As mentioned previously the Western Australian Curriculum Framework is a Federal Government initiative which assists teachers in their planning and delivery of OBE in the eight learning areas. "This focus on outcomes represents a major shift in school curriculum from a focus on educational inputs and time allocation toward one that emphasizes the desired results of schooling." (CCWA, 1998, p.6)

> The Curriculum Framework establishes learning outcomes for all students, regardless of who they are, which school they attend, where they are from, or what approach their school takes to help them achieve those outcomes.

These learning outcomes are set out in this document within the Overarching and eight Learning Area Statements. (CCWA, 1998, p.6)

Within the thirteen overarching statements there are three that directly relate to the focus of this research.

The fourth overarching statement clearly relates to this study "students select, use and adapt technology" (CCWA, 1998, p.18). Students in the Experimental group will be using technology tools (*Microsoft Photo Editor*, digital cameras, printers, photocopiers) as well as TRAD-MEDIA to create an interesting piece of artwork based on the theme of *Character Cars*. In this process they will also be critically reflecting on their use of TECH-TOOLS through their written responses after they have finished creating their piece of artwork.

The seventh overarching statement refers to students being able to "understand and appreciate the physical, biological and technological world and have the knowledge and skills to make decisions in relation to it." (CCWA, 1998, p.18) The students in this study will have the choice of TECH-TOOLS to use and also how they use them in order to create their visual product.

The tenth overarching statement relates to the active participation of the students in this study through the creation of their artwork and also through their discussion and reflection of their peers' artwork. "Students participate in creative activity of their own and understand and engage with the artistic, cultural and intellectual work of others." (CCWA, 1998, p.19)

The Curriculum Framework identifies students between years 3 -7 as being in the *Middle Childhood* stage of development. (CCWA, 1998, p.30) Therefore, the students in this study should:

Explore a wider range of technologies and forms of communication and representation, and experiment with them to investigate the advantages of

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different representation forms and technologies for different materials, purposes and situations. (CCWA, 1998, p.30)

3.31.1 The Arts learning area

The Arts learning area is one of the eight learning areas and encompasses dance, drama, music, media and the visual arts. There are four learning area outcomes within *The Arts* learning area and it is important to note that each of the outcome areas are interrelated and of equal importance. (CCWA, 1998, p.53)

1. **Arts Ideas** (visual inquiry and design work)
2. **Arts Skills and Processes** (diverse studio work)
3. **Arts Responses** (VA criticism/ personal and critical response)
4. **Arts in Society** (VA history/ study of visual culture)

It clearly states in *The Arts* learning area 'Scope of the Arts' section of the Curriculum Framework that students in VA should be combining traditional VA practices and use of TRAD-MEDIA with software programs to design and create their pieces of artwork (CCWA, 1998). This concept clearly links with the purpose of this study – to allow students to incorporate TRAD-MEDIA and traditional VA skills with TECH-TOOLS to create their artwork. The focus of this study is whether this integration of TECH-TOOLS affects the expressive outcomes, in terms of AI and ASP, of the participants' artwork. By researching the impact or effect of TECH-TOOLS in the VA we are directly addressing, in part, some of the Curriculum Framework's stated and intended outcomes for students in Western Australian schools in *The Arts* learning area.

3.31.2 The VA Progress Maps

The Curriculum Framework Progress Maps "provide a common language that can be used throughout Western Australia to describe progressive levels of student achievement and support improvements in student learning" (CCWA, 2005, p 1). *The Arts* Progress Maps

have recently been published and distributed in Western Australian schools since April 2005 (CCWA, 2005).

Due to the age of the participants in this study and the Researcher's knowledge of her students' abilities, it is anticipated that the majority of the students will be performing at level two in each of the four learning area outcomes. The following levels of student achievement, from the Progress Maps, have been included in order to provide a reference point in which the participants' skills and artworks in VA could be placed for assessment purposes. However, it is important to note that these levels from the Progress Maps will not be used as the assessment criteria for the data analysis in this study due to the fact that assigning each of the artworks a particular level, in the Progress Maps, will not provide a broad enough area of comparison between the Control group's artwork and the Experimental group's artwork, as students generally can stay at the same level for quite a long time. It is also important to highlight the fact that one of the outcome areas, Arts in Society, will not be addressed in this study.

Figure 5   Western Australia's Curriculum Council's Progress Map Levels

ARTS IDEAS

Level 2:
"The student uses own ideas, experiences and observations in the making of arts works through structured activities."
(CCWA, 2005, p.20)

ARTS SKILLS & PROCESSES

Level 2:
"Students identify a range of visual art technologies and can follow directions about their appropriate use."
(CCWA, 2005, p.41)

Level 3:
"Students select, adapt and use a range of arts materials, skills, processes and techniques to create their artworks."
(CCWA, 2005, p.43)

Students select and use a limited range of materials and technologies such as photocopying or scanning and computer manipulation to develop their artworks: for

example, scanning images from magazines
or own drawings…" (CCWA, 2005, p.43)

ARTS RESPONSES	ARTS IN SOCIETY

Level 1:
"Students reflect on their own visual art experiences. They describe how they made their art works, talking about the techniques, processes and materials they have used."
(CCWA, 2005, p.59)

Level 2:
"Students reflect on the processes they use and observe, describing their feelings about their work and giving reasons for their choices."
(CCWA, 2005, p.61)

This outcome area is not addressed in this study.

3.4   BENEFITS OF INTEGRATING TECH-TOOLS WITH TRAD-PROG

3.41   Introduction

In the 1800's, an English mathematician by the name of Charles Babbage coined the term 'computer' to identify people who performed calculations. He is now credited with the term 'computer' and inventing the basic idea for the machine that we know today, yet it wasn't until 1944 that the world's first programmable computer was completed by Howard Aitken, from Harvard University. This computer was known as the *Mark 1* (Mathieson, 1993).

> Eighteen years later Ivan Sutherland, a young graduate at Massachusetts University, demonstrated a program called sketchpad. Sutherland used a light pen to draw circles or different sizes on a small screen and was able to cut them out and paste them in just the same way as we might do on a modern computer drawing package. The first graphics program had been invented and it offered a glimpse of what modern computers would become.
> (Mathieson, 1993, p.13)

It is difficult for us to imagine how large these first computers were and the fact that they could only be found in universities, military establishments or large industries. Although these early computers were large in size, they were not powerful machines and were very slow to process information. However by the mid 1970's computers were becoming more accessible and they started to appear in expensive retail stores alongside televisions (Mathieson, 1993).

It is important for us to consider the influence of computers on our lives and how these machines have changed so rapidly over the last sixty years as it enables us to imagine and ponder our future and our use of these developing technologies. It is hard to contemplate that we now have access to computers that can fit into the palm of someone's hand or fridges that have in-built computers in them so that you can 'talk' to someone over the other side of the world, via email and the Internet.

If education is about life skills and preparing students to take their place in the world, educators must incorporate the relevant technology into the area of creative endeavour in schools.

3.42 The computer as a creative tool

There are many advantages to using TECH-TOOLS in VA programs including; saving students'/artist time, increasing students' enjoyment and confidence levels, increasing students' risk taking; collaboration between teachers and visual artists across the world; collaboration between students across the world and using the computer as an experimental medium.

Probably the biggest benefit of integrating TECH-TOOLS with TRAD-PROG is that it can save the student time during the creative process, *Arts Ideas* (AI), especially when using a digital camera. For example, the student/artist is able to use the digital camera in a variety of ways and then instantly download and view the images. Students are then able to delete the non- preferred images and save the preferred images, which is far less expensive and

faster than the traditional methods of photography (Callow, 2001). The student then has the option of manipulating the image until they reach their desired expressive outcome. Once again this process allows the artist to experiment with different changes in the image without destroying the original photo. In the traditional methods of photography this would simply not be possible. The use of digital cameras allows the artist to work freely and not feel restricted to make changes to the original image.

> The computer is a great place to try out artistic ideas. An original sketch can be saved, and then limitless additional copies of that sketch can be altered and saved. One can then easily view each of these variations in succession, or display reduced copies simultaneously on the same screen. To accomplish this same sort of artistic deliberation in traditional media might take weeks (Matthews, 1997, on-line article).

Computers and many software programs are relatively easy to use, even for young children. With the click of a mouse, young artists are able to change the appearance of their artwork on screen with a choice of media such as charcoal, watercolour, paint, oil pastels, or pencil. They can then simply 'undo' their choice within a few seconds if they don't like their choice or the chosen effect (Law-Davis, 1997; Mathieson, 1993; Matthews, 1997).

A VA teacher at John Forrest Senior High School in Western Australia commented on the aspect of time saving when integrating TECH-TOOLS in traditional VAP, "the computer is used more as a tool to accelerate the exploration of images around a theme" (Frost, 2002). Many VA teachers will have observed that students can take a very long time to experiment with different images and that often, because it is so time consuming they will not explore and experiment to the extent that they could. For those impatient and reluctant students the integration of TECH-TOOLS into TRAD-PROG could provide faster and possibly more motivational tools for further exploration of their images. The question raised in this study is whether or not this integration of TECH-TOOLS improves or affects the expressive outcomes of the students.

Working with computers and different software packages in VAE allows student-artists to 'take risks' artistically without the possibility of 'ruining' their original piece of artwork.

The use of the 'undo' button allows student-artists to explore many possibilities and then quickly 'undo' the effect or change within a few seconds. This was an important aspect that many teacher/Researchers mentioned as being a valuable aspect of using computers in VAE as students/artists felt more relaxed and more willing to experiment with different techniques and ideas (Matthews, 1997).

> The computer is a wonderfully versatile and effective medium for [VA]. Computers aid drawing and design by allowing images to be easily moved, repeated or enlarged and any mistakes can be easily erased without any loss of face (Mathieson, 1993, p.34).

Scanners are also a valuable addition to a VA class. Students can create their own sketches, paintings or collages and then scan them into the computer. Their image can then be manipulated at any stage without destroying the original piece of artwork. This allows the artist to feel 'safe' about experimenting with their image, whereas traditionally they might be less inclined to do so, in fear of ruining their image. Therefore the use of scanners encourages and allows artists to 'push the boundaries of their work' (Callow, 2001).

3.43 Increasing students' enjoyment of VA

> Unfortunately, some young students eventually become turned off to art-making by their perceived lack of success with traditional art media. They often get discouraged when their initial attempts at representational drawings seem to be visually unrewarding. For elementary teachers who are sensitive to this problem, the computer offers a possible solution. By using computers and other new technologies to expand the range of possibilities for creative expression in the classroom, each student has a better chance of finding a medium that works well for him or her (Herberholz & Herberholz, 2002, p.132).

Using TECH-TOOLS in VAE may allow students who may not be 'talented' in TRAD-MEDIA the opportunity to possibly display a 'talent' for designing pieces of artwork using computers and associated technologies. VA educators may find that if they do use technology in their classes they might attract more students (Matthews, 1997).

Long (2001) found that his students started to see each other as all having the same potential to produce an interesting and powerful piece of artwork, whereas in traditional VA classrooms the students tended to view some students as the ones who are 'good at art'. The use of TECH-TOOLS allowed for all of the students to create a piece of artwork that looked professional and complete. The use of technologies in VA allows many students to achieve success, which they might not have achieved through traditional art making practices. These observations were also made by Matthews (1997), Smith & Coyle (2000) and Wang (2002).

Mathieson (1993) observed that primary school aged children who were using computers in their VA projects enjoyed the immediate feedback from their computer generated images and were therefore able to assess and develop their work more independently. He reflected that children's natural curiosity, eagerness to experiment and investigate on the computer allows them to learn and work through the steps that can be taken to generate computer images.

3.44 Collaboration

Many teacher/Researchers, Callow (2001), Hennig (2000), Long (2001) and Mathieson (1993) found that when they integrated TECH-TOOLS into their VAP the level of peer collaboration increased. Long (2001) and Hennig (2000) both found that students who used various technologies to create their piece of artwork were more open to share their ideas and thoughts about their work with their peers. The classroom environment allowed the students to openly discuss their ideas and assist each other with any technical problems that they may have encountered. They both noted that this was quite different from the traditional VA classes where students often felt that their ideas were 'secret'. Another observation by both teacher/Researchers was that their students were asking their peers for their opinions and help before asking the teacher and this was seen as a positive change to the VA classroom environment.

Callow (2001) and Herberholz & Herberholz (2002) wrote about the possibilities of students sending digital images to other students anywhere in the world and working

collaboratively with another student during the creative stages to work towards the final product. Herberholz & Herberholz (2002) particularly emphasized the important VA dialogue that could occur regarding particular images and ideas between students in different parts of the world. At the time of writing the article Callow had set up a joint VA project with students from his school, Christ the King, England, with students from Fort Mill High School, South Carolina. He stated that the head VA teacher at Fort Mill High School was very enthusiastic to trial this idea of students working collaboratively on a piece of artwork using TECH-TOOLS. The students would be sending the images back and forward during the creative process using the Internet and email.

Rick Vermey, an established artist who works with a variety of traditional and technology media, also found that the Internet and email could provide him with opportunities to communicate with 'like minded creative individuals', stating that this communication with other artists has been very beneficial to him (Rowlands, 2002).

Another aspect of collaboration raised by Matthews (1997) was the possible collaboration between teachers in the school when VA educators integrate TECH-TOOLS into VAP.

> A [VA] educator who runs a computer lab will find that educators from other curricular areas may express increased interest in interdisciplinary collaboration. In short, the possibilities for professional growth are tremendous for computer –active art educators (Matthews, 1997, on-line article).

3.5 SOFTWARE CONSIDERATIONS

3.51 Introduction

There are a lot of software programs available that claim to be suitable for integrating into TRAD-PROG. However, many teacher/Researchers stress that great care and caution must be taken when choosing a software package for VAP.

All of the software programs, even the most basic editing software programs, enable the student artist to copy, manipulate, cut, enlarge, diminish and change the colours at the simple 'click' of a button at a virtual level. However, the Researcher feels that it is important to note that any software package is only as good as the teacher/school providing a suitable learning environment, adequate instruction (skills) and meaningful visual projects.

3.52   Choosing the right software

How should a VA teacher choose a 'suitable' software program so that TECH-TOOLS can be successfully integrated with TRAD-PROG?

> Firstly, reviewing software is of vital importance. Each school has its own needs according to the computers available and software available for those computers (Law-Davis, 1997, on-line article).

The teacher must review the software choices available and decide whether any of the programs suit the needs of their students, taking into account the age of the students, their technical skills and compatibility of the program with the school computers (Law-Davis, 1997; Mathieson, 1993).

Mathieson (1993, p. 31) suggests that VA teachers consider the following questions when they are choosing a software program for integration with their VAP.

1. Is the computer the most suitable medium for the activities you wish to undertake?
2. Is the program appropriate to children's needs?
3. Is the program open-ended, allowing for full creative activities and development?
4. Is the program easy to use?
5. Is the screen presentation clear?
6. Will all children find it interesting?

The cost of the program, including multiple site licenses, will also be a major issue for many schools.   For example the cost of an academic version of the program *Corel Painter*

8 currently costs between $220 - 300 for one program. This could become a very costly exercise for a school to purchase enough licenses for even a small computer lab. The VA teacher has to know whether this is the most suitable and cost effective program for their students or whether there is a cheaper alternative that will produce similar results.

> [VA] teachers know that access to the best tools for art do not necessarily guarantee a good art product....Without the best brushes students can still produce some respectable, if not highly professional results, and it is the same with computer technology. If new hardware is not an option, the point is to get in there and grab the equipment, no matter how old! (Hennig, 2000, p.38)

3.53   Software reviews

A VA teacher in England reviewed several software packages before choosing the most suitable for his secondary students. He chose to use *Paint Shop Pro 5, Painter and Bryce* because these programs allow images to be layered easily and the technical level and skills required to operate the programs would be suitable for his students' abilities and needs. He chose not use *Adobe Photoshop* as he found that it was not as 'user friendly' as the other chosen programs (Callow, 2001).

However, many other VA teachers are in favour of using *Adobe Photoshop* as they feel that the layering and digital imaging possibilities are useful and motivate middle school and High School students (Frost, 2002, and Rowlands, 2002).

Law-Davis (1997 reviewed four software drawing packages as part of her quest to find a suitable program to use with her primary school aged children in a school in Perth, Western Australia. After reviewing *Crayola Art Studio, Fine Artist, Art for Kids and Kid- Pix Studio* she felt that *Kid- Pix Studio* was the best choice as it offered "a flexible and creative program which would be most suitable for use in an Art program for a range of age levels" (Law-Davis, 1997, on-line article).

In Law-Davis' (1997) report she stated that at Leeming Primary School, Ian Thompson was using the software program, *Deluxe Paint 4* in order to create computer art. Thompson explained how his students were able to use *Deluxe Paint 4,* saying:

> Through exploration and play the students were able to 'accidentally' discover how to create a particular effect. They experimented with the manipulation of graphics where they imported clip art and then digitalized parts of it and replaced it with photos. They used different materials to print out designs e.g. plastic ink, heat ribbons etc. These different materials opened the possibilities of what can be printed e.g. t-shirts, postcards. *Deluxe Paint 4* also allowed the students to create animation and their own productions using the art they had produced (on-line article).

3.54   A caution about software programs

Hudson (2002) states that caution must be used when students are using software programs, such as *Adobe Photoshop* to create and edit images. She states that TECH-TOOLS should only be seen as tools to explore their ideas and that the students should not let their artwork be determined by the software's capabilities.

> I cannot stress enough, the fact that students need to work on ideas first and foremost, and then see what practical procedures need to be used to realise the idea. Too often students let a procedure dictate the path the artwork/design is to take, and somewhere along the way they lose their creativity and originality. However, design-based software programmes are a must to have in schools. These programmes are an amazing tool to utilise in the development of an idea, but it is necessary to provide a learning environment that privileges ideas over the glitzy effects often benignly generated by these programmes (Hudson, 2002, p.11).

She also mentions that the students can be amazed at the glitzy and slick images that they are able to produce using different software programs and that teachers must impart to the students that their ideas are first and foremost in any image making (Hudson, 2002). In other words, the teachers must encourage students to develop their own ideas rather than let the software dictate which images they produce.

3.55 Conclusion

After reviewing several computer programs, such as *Kid-Pix, Adobe Photoshop, Microsoft Photo Editor, Painter 8* and *Photo Impressions* this Researcher believes that teachers need to be clear about their reasons for wanting to use TECH-TOOLS in their VAP. *Kid-Pix, and Kid-Pix Deluxe* does not offer students any artistic challenges or tools to explore images. These programs simply allow students to use an existing image, colour it in and then add set stamps over the image. In the Researcher's opinion this is not enhancing creativity and it is understandable why many VA teachers are hesitant to use TECH-TOOLS when they see programs that claim to be suitable for integration with VAE.

3.6 THE VA TEACHER

3.61 Introduction

Many VA teachers appear to be hesitant when it comes to integrating TECH-TOOLS into their TRAD-PROG (Duncum, 1997; Frost, 2002: Kuntyj, 2002; Matthews, 1997; Sinker, 2001; Smith & Coyle, 2000; Wang, 2002). The research suggests that there are several reasons why VA teachers are reluctant to include TECH-TOOLS in their VAP. It is important to discuss these reasons in the context of this study in order to be able to dispel any misconceptions about the inclusion of TECH-TOOLS into VAP and suggest relevant and practical suggestions on how this can be done without compromising the traditional aspects of a VAP.

3.62 Reasons why VA teachers are reluctant to integrate TECH-TOOLS

Matthews (1997) discusses a possible reason why VA educators have not been keen to integrate computers into their teaching, suggesting that computers are often seen as quantitative tools for numbers and mathematical functions. This being the case, many VA educators do not see that computers possess the ability to be used for qualitative processes, such as creating pieces of artwork. "As long as the computer is seen primarily as a tool of

the quantitative realm, it is likely to be regarded by [visual] art educators as alien". (Matthews, 1997, on-line article)

Frost (2002) a Senior High School VA teacher in Perth began his article 'Using Computers in the Art Room' with the following paragraph which provides an honest insight into some of the possible reasons why VA teachers may not be integrating TECH-TOOLS in their TRAD-PROG, noting:

> Often there are limited resources and small numbers of machines and scanners to use. Maybe you don't really want the students to completely lose contact with traditional methods and media anyway. How many of us have access to a computer lab with enough software licenses and the hardware/peripherals needed to run an effective program with the whole class? And what about when the server is down or the network won't let the kids log in? You're at the mercy of the technology and that's pretty scary. If you're like me and appreciate the benefits of computers in the art room and what they can do, you probably wouldn't want to be without them. However, you recognise their shortcomings. You understand what they can't do, and how important it is for computer based artists to have a solid grounding in the use of more conventional media and most of all, learn drawing and designing hand skills (Frost, 2002, p.14).

Frost's (2002) statement reinforces what the literature states. Matthews (1997), Sinker (2001), Smith & Coyle (2000) and Wang (2002) reported that there were many reasons contributing to teachers' reluctance when it comes to integrating TECH-TOOLS in their TRAD-PROG.

Sinker (2001) acknowledges that there is increasing pressure in education to keep up with the changing technology and that many teachers are often not equipped with the necessary skills, information or equipment to implement these changes. Teachers often feel uncomfortable using computers as they often lack the skills or knowledge to use them effectively (Duncum, 1997). Part of the reluctance of teachers can be put down to the fact that they are probably uncomfortable with the prospect that their students may know more about the technology than they do. According to Kuntyj (2002, p.4):

> For most of us just the sound of the word 'computer' sends chills up the spine... In the face of rapid technological change, it is difficult to find the time and energy to familiarize, train and keep abreast with what is needed to survive within the technological wave of the new millennium.

Mathieson (1993) a primary school VA teacher clearly identified that while he acknowledged the potential of using TECH-TOOLS, he was initially wary due to his feelings that it might stifle the children's creativity which he saw as the core of VAE and design education.

Traditional VA teachers do not want to lose the traditional skills and processes or teaching principles in their programs so that they can integrate TECH-TOOLS. Frost (2001), Hennig (2000) and Mathieson (1993) address this issue in their research by stating the importance of teachers continuing to teach the principles and elements of VA as well as the skills involved in using the different technologies. Each Researcher identified that a solid background, particularly in drawing and design, are imperative for successful use of TECH-TOOLS and traditional methods of VA making. The use of technology in our VA classes should not replace or outweigh the teaching of the traditional VA practices and VA art history. Matthews (1997) clearly stated that it is important for VA teachers to remember that by embracing TECH-TOOLS they are not rejecting the traditional VA practices, they are simply adding to their use of creative tools. According to Kuntyj (2002, p.5):

> Teachers should continue to stress the importance of strong drawing skills, which need to be practiced and mastered. Old age techniques and the use of tools such as the airbrush and hand rendering skills are still important to a young artist, as is the need to be exposed to modern technology.

VA teachers must be confident and clear about the educational reasons and benefits for integrating TECH-TOOLS into their regular teaching program before they will feel comfortable using them in their classrooms Mathieson, 1993 and Wang, 2002). It is therefore imperative that teachers are given the time, resources and support from staff at their schools in order for them to explore the potential, possibilities and benefits of implementing TECH-TOOLS into their VAP. According to Mathieson (1993) and Matthews (1997) if the teachers are given the time and support to experiment with the

software packages, digital cameras and scanners most teachers will find that they are relatively easy to use.

3.63   The changing role of the VA teacher

Frost (2002), Long (2001), Matthews (1997) and Prater (2001) all acknowledged that the integration of TECH-TOOLS into TRAD-PROG brings new challenges for the teacher. Therefore, the role of the teacher must change to accommodate the new demands of integrating TECH-TOOLS into their TRAD-PROG. There are several ways that the VA teacher's role will change.

Davis and Daniel (1994) suggest that general classroom teachers must assume several roles in the process of integrating technology tools in their subject or learning areas. One role is that of the *instructor* where the teacher must play an active role in assisting children with the new software or process (scanners, digital cameras etc.). They must be familiar with the package or process themselves and be able to instruct the students in the initial stages of the activity (Davis & Daniel, 1994).

The role of *coach* involves the teacher becoming the facilitator and guiding their students through the tasks, but not giving them all of the information required.   This creates opportunities for peer tutoring and for the students to experiment with the new software processes and learn as they explore (Davis & Daniel, 1994 and Prater, 2001). Similarly, Hennig (2000) acknowledges the role of the teacher as a learner and that they must be open to allow the students to discover the capabilities of the technology for themselves. "The students do not need to know just how ignorant you think yourself to be, but they do need to know that you are not the sole source of knowledge" (Hennig, 2000, p.40).

The teacher also takes on the role of *model* by showing the students that they also use computers for meaningful work and as a learning tool. This allows the students to view computers and technology as an integral part of learning (Davis & Daniel, 1994). Prater (2001) acknowledges the fact that teachers must continue to demonstrate how to use

specific tools and how to use different media safely. In these aspects the teacher must remain as the source of knowledge and authority.

The last role of the teacher is that of *critic*. It is vital that the teacher spends time selecting the appropriate software that will meet the needs of the activity (Davis & Daniel, 1994). It is not worthwhile choosing a piece of software simply because it was the least expensive or because you think that it will do what you want it to do. It is very important that the right software is chosen in order for it to be effective and enjoyable for the students.

In terms of managing a VA classroom where students are using TECH-TOOLS there are certain issues to consider. For example, the teacher must decide whether the whole class will work in a computer laboratory (during the design or exploration stage) and then move to the VA studio, or whether it is easier to manage and/or more beneficial to have several computers, printers, scanners and digital cameras in their VA studio so that some students can be working with the TECH-TOOLS while others are working with traditional media (Frost, 2002; Hennig, 2000; Law-Davis, 1997). VA teachers must also decide whether it is suitable to have expensive technology hardware sitting in an art room where it will be in close contact with paint and clay.

3.64   Conclusions

"Technology development seems to require the teaching profession to make changes at an unprecedented rate" (Wang, 2002, p.154). For VA teachers to use TECH-TOOLS in their teaching they must be given support from administrators and colleagues, including time, funding for professional development and IT support so that the hardware and software can be maintained (Wang, 2002).

VA teachers must also be clear about the educational benefits of integrating TECH-TOOLS in their TRAD-PROG before they will make changes. Therefore, more research is possibly needed that provides practical classroom examples with educational outcomes before more teachers will be willing to experiment with this new addition to VAE.

VA teachers integrating TECH-TOOLS must also acknowledge and value the enthusiasm and knowledge that students bring to school about the technological world and recognise that they can learn from them as well as teaching them (Duncum, 1997; Hennig, 2000; Kuntyj, 2002 and Wang, 2002).

"In the environment of a [VA] classroom where everyone is discovering the possibilities offered by the tools of technology, all participants, including the teacher, are learners." (Hennig, 2000, p.37)

3.7 *EXAMPLES OF TECH-TOOLS IN TRAD-PROG*

3.71 Introduction

It is important to report on the methods that Researchers/teachers have used when they have integrated TECH-TOOLS into their VAP as these examples have played a significant role in determining the methodology for this research project. The most relevant examples have been discussed under two subheadings; TECH-TOOLS in VAP in Primary Schools (K-7) and TECH-TOOLS in VAP in Senior High Schools (years 8-12).

3.72 TECH-TOOLS in VAP in Primary Schools

'Year One Weather Posters' – A Western Australian example

Sabitay (2002), a VA specialist at Scotch College, Perth, explained one way that she has integrated TECH-TOOLS in her VAP using a combination of traditional printmaking methods, drawings, scanners, coloured printers and a software program called *Photo Impressions.*

The Year One students were asked to decide on a particular type of weather background and then to print it onto an A4 piece of fabric, using a variety of printing materials. The next stage was for them to draw and colour, with pencils, a picture of themselves with their

friends doing something that was appropriate for their printed background. Sabitay (2002) provided the example of being on the beach in bathers building a sandcastle with a sunset in the background. The students' drawings and their backgrounds were then scanned into the computer and then the students experimented with the different effects that *Photo Impressions* could produce. When the students were finally happy with the effect they printed the image off on a colour photocopier, using glossy paper. Sabitay (2002) said that the best part about this integrating of TECH-TOOLS in her VAP was that the students' work all looked very different to how they had imagined it and that the work was varied, from looking like an etched print or a painting.

The Researcher was intrigued to learn that students in Year One were using the software program *Photo Impressions* successfully and this article was the stimulus for the basic idea of this study where students work with images on a computer, print them out, either manipulating the image again, or then add paint to the image. The Researcher contacted the author, Karen Sabitay and discussed her thoughts, ideas and recommendations for this study in which her project was taken a step further with the addition of painting back into the printed image.

A drawing project: exploring line'

Mathieson (1993) described a project that he had used with junior primary students in conjunction with their classroom teacher. The activity focus was 'exploring line' and the students were introduced to drawings by Van Gogh and Seurat so that they could see the different marks made by different artists. The students were then given time to explore freely using pencil and charcoal.

The next stage in the activity involved the students experimenting with line on a computer. Due to the young age of the students, Mathieson and the classroom teacher spent time explaining the basic drawing tools and functions that the computer program offered (Mathieson did not state the program name that was used for this particular activity).

The students were then encouraged to express themselves with the computer drawing tools in the same manner that they had using the traditional drawing media.

> The children's excitement was evident as their tentative first movements were replaced by sweeping gestures. It wasn't long before they wanted to extend their scribble drawings by filling in areas with the fill tool (Mathieson, 1993, p.60).

The classroom teacher noted that all of the students worked enthusiastically and enjoyed the colours that they could use easily on the computer to colour their images.

The computer images were then printed out and used as the starting point for some simple relief printmaking. The students then examined some prints from artists such as Klee and Warhol. The students had experimented with monoprinting so the link between relief printmaking was made easier. The next step involved the students translating their computer generated images onto a piece of card, gluing on pieces of string where the lines were in their image. The children then printed many images from their relief block and then pressed their relief block into a piece of clay.

> Finally the blocks were assembled together, complete with ink and clay deposit and this was displayed with the prints, drawings, computer printouts and clay tiles. Together they demonstrated the full range of processes that we had been through (Mathieson, 1993, p.63).

Mathieson (1993) clearly listed the advantages and limitations of using the computer in this project which was a unique element of his research. He found that although the computer imaging was fun and easy for the students the mouse was still harder to control than a pencil or a piece of charcoal. He also commented that by using 'virtual charcoal' the students lose the tactile sensation of actually holding a piece of charcoal and experiencing the noise, texture and feel that someone experiences when making marks on a piece of paper. This is an important point to make, especially with regards to Howard Gardner's multiple intelligence theory (Gardner, 1999), as kinesthetic intelligence is at the heart of VAE.

He also noted that the computer allowed the different stages of the image making to be saved and the images changed quickly and easily using the cut and past option.

This example provided by Mathieson (1993) is an excellent example of TECH-TOOLS being used as a drawing tool in VAE rather than simply a research tool or a vehicle for watching VA CD-ROM's. As mentioned previously, many VAE texts often suggest integrating TECH-TOOLS into VAP (Duncum, 2003) however it is often simply suggesting the inclusion of using a software program to 'colour in' a template image or using 'stamping tools', such as in *Kid-Pix*, to add detail to an image in the software program. Mathieson's (1993) example was a refreshing change from reading about VA teachers simply including TECH-TOOLS by using them for VA research or through using them for 'colouring in' activities which the Researcher feels are not effective ways to enhance student's VA learning in terms of their AI and ASP. This was one of the research questions for this study which questions whether the inclusion of TECH-TOOLS in VAP enhances the boys' learning in terms of AI and ASP.

However, it must be noted that the use of the Internet and CD-ROMS can play a very useful part in the learning of various artists, art movements, the economic significance of VA in society and the historical and cultural significance of VA - which is all included in one of the four *Arts* learning are outcomes, Arts in Society. This outcome area was not addressed during this study due to time restrictions, although this outcome could have been included through the discussion of the history of car designs and industrial designers in our society.

3.73   TECH-TOOLS in VAP in Senior High Schools

'44 Views of Penrhos': A Western Australian example

The following example has been included as it provides many starting points for VA teachers that are keen to integrate TECH-TOOLS into their VAP and are unsure about how to do this effectively. This was one of the few examples in the review of the related literature that suggested the link between using the process of lino printing with the

inclusion of manipulating student's photographs using *Microsoft Photo Editor* (which the participants used in this study) to create unique and interesting colour lino prints. The Researcher met one of the teachers, Leslee Rowlands, that were involved in this innovative project and the discussions that we had, regarding the success of the project and the girls' enjoyment, were very helpful for the preparation of this research study.

Middle school students at Penrhos College, a girl's school in Perth, Western Australia had the task of creating two albums of colour lino prints to celebrate the school's 50th Anniversary. The students took several photos on a basic digital camera of different images from around the school. They then downloaded the images and edited them using a basic editing software program, *Microsoft Photo Editor*. Each student then chose an image and used this as the basis for their three colour lino print. Three pictures are included which demonstrate the process that a year eight student, Cara Kimpton from Penrhos College went through before proceeding with the lino print process. (No author, *Art Education Association of WA*, 2002, pp.18-19)

Figure 6   Year 7 student example of artwork using Microsoft Photo Editor

1. The first digital image taken by Cara Kimpton.
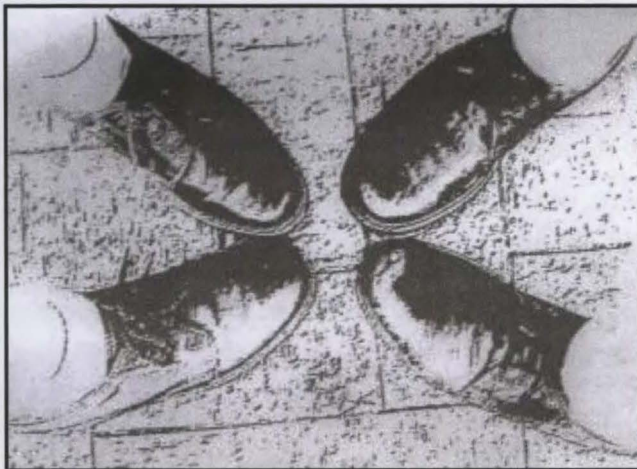
2. The edited image using *Microsoft Photo Editor*

3. Another edited image using the 'embossing' tool in *Microsoft Photo Editor*.

'One teacher's thoughts' - A Western Australian example

Frost (2002) a VA teacher at John Forrest Senior High School in Perth gave a brief overview of how he integrates TECH-TOOLS into his VAP. Due to the fact that he only has four computers in his room he never runs programs that are completely based around TECH-TOOLS. Instead he creates tasks that allow the student to determine which tools that they can use, including TECH-TOOLS, to create their artwork. He's found that out of a class of 20 students only a handful of students really want to spend a lot of time on the computers developing their images. By allowing students to determine the extent to which they use TECH-TOOLS he is accommodating for different learners and their interests/strengths. Frost's (2002) view regarding accommodating different learning styles is reflected in the work of Howard Gardner's (1999) Multiple Intelligences and their links to VAE later in this chapter.

Frost usually begins a project by introducing a theme or concept and then visual inquiry (sketching, research and exploration) follow from this initial theme. He always tries to provide examples of the "the type of art to be created and give them the opportunity to respond verbally to each other..." (Frost, 2002, p.14)

Before Frost's students begin developing their ideas and images he demonstrates a few methods to the whole class which usually sparks a lot of interest and enthusiasm! He then hands out an instructional handout which provides useful steps and information on how to use the software. He has also created a PowerPoint presentation with the same information for students to access. The development of the images begins at this stage. "This is where the power of *Photoshop* and digital montaging can become really exciting" (Frost, 2002, p.15). According to Frost (2002, p.15):

> Scanning and layering, working with layer blending modes, using and fading filters, cloning, working with text layers and layer effects, creating layer masks, understanding the history palette and learning a range of different methods for selecting parts of an image, cutting and pasting are all techniques that most kids can learn to use given time and a little bit of help.

This example has been included as the Researcher felt that Frost (2002) approached the inclusion of TECH-TOOLS with enthusiasm and excitement and that he was keen to encourage all of his students to succeed at creating unique and interesting images. However, this example of using *Photoshop* was thought to be more suitable to Senior High School students. It was still a valuable example to include due to the fact that he discusses the practicalities of integrating TECH-TOOLS into a VA classroom as he outlined the logistics of computers in classrooms as well as the instructional side of explaining the software program.

'Digital Design'

In another study, the students of a Year Ten class in Queensland, Australia, were given the opportunity to participate in a nine week unit called 'Digital Design'. The students were given a task of designing an imaginary publicity campaign for a Youth Convention. The students worked in groups of two to four and they were asked to hand in at least one piece of artwork for each member of the group. They were told that it did not matter how they solved their design problem. To solve this problem, the teacher presented them with a design brief and then demonstrated a variety of ways to solve the design problem – one of these methods was using technology. The students had the choice of using *PhotoShop*, the Internet, a scanner, 7 iMacs, an old Power Macintosh, one old laser printer, a colour inkjet printer and a digital camera (Hennig, 2000).

Hennig (2000) felt that the she learnt a lot from the students in this environment. In addition, the students did a lot of peer tutoring as far as teaching each other about the software programs. An interesting point that was raised was that some students found it difficult to share their ideas and therefore isolated themselves from the rest of the group. Isolated students also then found it difficult to ask their peers questions about the technology and relied on the teacher's instructions and information. Hennig stated that the students were motivated and enjoyed working together and integrating technology and traditional VA making practices to produce interesting pieces of artwork. In this unit there

didn't appear to be any difference between the girls' and the boys' use of the TECHTOOLS.

Hennig's (2000) example of including TECH-TOOLS into her VAP is of particular importance to this study due to the emphasis of increased peer collaboration and peer tutoring during the use of working on the software programs. The Researcher felt that this was an important benefit of integrating TECH-TOOLS into VAP and Hennig's (2000) example reinforces this important benefit clearly.

It's all about design!

Hudson (2002), a lecturer at Curtin University in Western Australia, revealed some interesting ways to integrate TECH-TOOLS into Senior High school VAP. She suggests thinking about scanning everyday objects such as soft drink cans, toys or household objects to create interesting designs using *Adobe Photoshop*. Hudson (2002, p.11) explains that:

> Once this is done, you can print them out onto a number of different papers, plastics and materials. Calico, silk, cotton and other light weight fabrics can be used to print onto as long as you attach them to a piece of normal computer paper. Printers...now have 1.5m printers capable of printing onto canvas, super-gloss card as well as normal computer paper.

Once the images have been edited and printed they can be projected onto objects or used to do a photographic silkscreen, or they could be cut and manipulated again.

> Quite a few local contemporary portrait painters are now using *Adobe Photoshop* to manipulate images taken of people, and then using these manipulations as a reference to paint from (Hudson, 2002, p.11).

There are endless possibilities for creating, designing, editing and using images when TECH-TOOLS are integrated in VAP as long as students work on their ideas first and then experiment with the TECH-TOOLS to achieve their desired image (Hudson, 2002).

Hudson's (2002) article clearly outlines the many possibilities that students, adults and artists can pursue when integrating TECH-TOOLS into their VA practices. Her example has been included as her suggests of scanning everyday/real objects into the computer and then manipulating these images was very different to the rest of the research reviewed for this study.

The Inner Self and digital portraiture

Callow (2001) explored the potential of the following software programs: *Paint shop Pro; Painter* and *Bryce* in conjunction with digital cameras and scanners in VA classes in a Secondary Catholic College in England. One component of this process involved, Dorrie Halliday, a multimedia artist from Liverpool, running a Digital Art Workshop at the school over a two-day period.

The theme for the workshop was *The Inner Self* and the stimulus for the activities was digital portraiture. The students had their picture taken using a digital camera and then they collected images that were important to them. They then used scanners to record all of their images, ready to use during the workshop. During the first day of the workshop the teacher was very busy with all the scanning that was needed and the students had several questions about the program, *Paint Shop Pro*. However the second day was far more productive as the students' skills and confidence had improved whilst experimenting with the software program. Many of the students layered a variety of images to create their digital portrait as well as utilising text, pictures from the Internet, photographs (personal and general) and/ or scanned images of personal belongings. The students created some very creative and original artworks that sparked discussions amongst the students regarding their values, beliefs and feelings about popular culture and the power of advertising as well as the influence that it has on their lives (Callow, 2001). Several of these unique digital portraits can be accessed on the Internet at www.pcallow.freeserve.co.uk/Treacleart.htm (Callow, 2001). The two images that follow are examples of students' work from the workshop with Dorrie Halliday and provide interesting examples of how software programs can be used to develop images in VAE.

Figure 7   Student example using TECH -TOOLS

http://www.pcallow.freeserve.co.uk/Senan%20Lee.htm

Senan Lee, Year 11.

The image above was created collaboratively by Senan and an artist, Bob Slider, from Santa Cruz California. Senan created the basic image and then Bob Slider added the swirl designs to the face and then returned the image as an e-mail attachment.

Callow's (2001) example of taking a popular VA subject or 'portraits' and making it more stimulating, motivating and relevant to the students was a clever and unique way of integrating TECH-TOOLS. As you can see from the two student examples the work is fascinating and truly reflects the students' ideas and individuality. Callow's (2001) examples can provide stimulus for many similar projects in which the students can truly develop their AI and ASP through the use of TECH-TOOLS.

Figure 8   Student example using TECH-TOOLS

http://www.pcallow.freeserve.co.uk/MichaelMawdsley.htm

Title: *777*

Michael Mawdsley, Year 12.

'The Andy Warhol Project'

In a high school in America one teacher designed a task based on the work of Andy Warhol. The first stage involved the students creating a portrait. The students then learnt about Warhol's artistic style, and the Pop Art movement. In the next stage the students scanned their portraits into the computer and then edited it using *Photoshop* so that they could create a Warhol series of portraits, similar to the Marilyn Monroe series. When the work was printed out the teacher helped the students to decide on the most interesting ways

of displaying the work, for example, printing the image on different sized paper, or on different textured paper (Wang, 2002).

Wang's (2002) example was quite similar to many suggestions made in the reviewed literature with regards to integrating TECH-TOOLS into VAP. VA educators repeatedly suggested the link between the art movement, Pop Art and the use of software programs to add the bright colours used by Pop Art artists in the well known portraits. This example has been included to demonstrate one of the most popular ways of integrating TECH-TOOLS into VAP and the Researcher feels that although this may be a worthwhile introductory activity to using TECH-TOOLS, the students may not be benefiting much in terms of their ASP learning. The Researcher suggests that to enhance learning further the students would learn more about the use of colours, the skills of mixing colours and improve their fine motor skills from the students actually applying the colours themselves. This activity could further be extended by any of the methods mentioned in the previous examples, such as coloured lino prints or screen prints.

3.75   Conclusions

It is clear from the literature that there many different ways of integrating TECH-TOOLS into VAP in both Senior High schools and Primary schools. It is the VA teacher's role to read the relevant studies, choose the appropriate software and experiment with the different possibilities that TECH-TOOLS can bring to a TRAD-PROG. It is very important that VA teachers choose suitable software programs and TECH-TOOLS that will suit their students' needs, abilities, interest and desired outcomes. It is also important to consider that this idea of integrating TECH-TOOLS into our VAP is still a relatively new idea and that the teachers which have been referred to in the literature are still experimenting themselves.

It is important to recognise that this study is based on a combination of the information (and use of TECH-TOOLS in VAP) by teachers at Penrhos College and the Researcher's own use of TECH-TOOLS in her VAP with Year Seven students. The Researcher has been in contact with Leslee Rowlands, the Head of the Art Department, at Penrhos College

to discuss and see examples of her students' work that has involved the use of TECH-TOOLS and TRAD-MEDIA and her suggestions have been invaluable to the planning of this research.

3.8   QUESTIONS RAISED IN THE RESEARCH

Although the majority of the relevant research was positive about the integration of TECH-TOOLS into our TRAD-PROG there were a few questions and concerns that were raised.

3.81   Assessment

The integration and use of TECH-TOOLS in VA does raise the issue of assessment. How do we assess digital art and artwork that has used a combination of TECH-TOOLS and TRAD-MEDIA?   The current working version of the Western Australian Curriculum Council's Progress Maps provide frameworks for assessing students' achievements and abilities in *The Arts* learning area. The inclusion of TECH-TOOLS in VAE has been stated in the Progress Maps and the relevant levels of achievement, so the way that we assess artworks that have been created using a combination of TRAD-MEDIA and TECH-TOOLS should still be assessed using the Progress Maps.   For example in the Progress Maps for Arts Skills & Processes it states:

ASP 1

"Students use visual art technologies with assistance and may explore new technologies, such as appropriate 'graphics' software" (CCWA, 2005, p.39).

ASP 2

"Students identify a range of visual arts technologies and can follow directions about their appropriate use"(CCWA, 2005, p.41).

ASP 3

"Students select and use a limited range of technologies such as photocopying or scanning

and computer manipulation to develop their arts works: for example, scanning images from magazines or own drawings for poster design" (CCWA, 2005, p.43).

Traditionally the visual diary is an essential part of being able to track a student's creative journey and it allows the student to be able to map their progress and ideas. Perhaps we should speculate whether the visual diary will become obsolete through the integration of TECH-TOOLS (Long, 2002). Or, will computers and associated software programs become a 'virtual sketchbook'? (Prater, 2001)

Hennig (2000) found that she did not need to print all of the students' work for assessment purposes, instead she discovered that assessing the students' work on screen, or via electronic mail and attachments, was far more practical. However she did suggest that the students keep a record of their creative journey in the form of a journal (an electronic version of the traditional visual diary) which allows the teacher to look back at the students' ideas, thoughts, research and creative process.

Similarly, Long (2002) noted how the creative journey that the students undertake with digital work is not easy to establish as in the traditional VA making methods of using a visual diary. In the digital process the unwanted images are erased quickly and neatly which leaves no track of the students' decisions or development of their ideas. He suggests that for the teacher to overcome this issue they must learn to become aware of the technical skills and processes that the students are using to create their images.

3.82   Does the integration of TECH-TOOLS really save students' time?

Many of the teacher/Researchers who have been integrating TECH-TOOLS into their TRAD-PROG stated that the use of TECH-TOOLS often saved students time in the development and creating stages of image making (Callow, 2001; Frost, 2002; and Matthews, 1997). However, Mathieson (1993) cautions that the integration of TECH-TOOLS will not necessarily save students time. He stated that he could "not justify

children spending many hours on a computer creating images which could have been produced in minutes with a stencil and some coloured pencils" (p.14).

Mathieson (1993) clearly defines what many VA teachers may be feeling towards the integration of TECH-TOOLS. It is interesting to note that Mathieson was the only Researcher to state this 'common sense attitude' towards his feelings of when and where it is appropriate to use TECH-TOOLS. This Researcher feels that Mathieson's statement should be a reminder to all VA teachers who are using TECH-TOOLS in their VAP to think carefully before getting students to use TECH-TOOLS when a traditional media or technique may be more appropriate and save the students' time.

3.83   Comparing TRAD-MEDIA to their 'virtual' counterparts

Mathieson (1993) directly compares the difference of traditional drawing tools, such as pencils, charcoal, paint, watercolours, wax crayons, chalk and pastels to their computer equivalent tools. He demonstrates the difference through photographs of which two examples are included in Appendix C, p. 110, where a six year old has drawn a cat using TRAD-MEDIA, (oil pastels) and then 'drawn' a cat using the computer. Mathieson (1993, pp.39-40) describes some of the differences between the traditional graphic tools and their computer counterparts noting:

> Each has its own particular quality which in no way undermines those of the other…When using paint, pencil, charcoal or any other graphic tool the user has direct tactile contact with the material. The mouse on a computer is insensitive to pressure so that lines tend to be the same strength unless the tone is changed. Likewise the speed at which a graphic tool is used effects the marks it makes. To reproduce this effect, rapid movement of the mouse results in a dotted line on screen, rather than a continuous one …As the computer image is made up of pixels or squares which cannot recreate a curved line, curved and diagonal lines appear to be stepped. This is particularly evident on printouts.

It is interesting to note that in the research collected for this study Mathieson's article was the only researcher to clearly state the differences between the traditional art tools and their equivalent tools on software programs.

3.9   CREATIVE STAGES OF DEVELOPMENT

The participants in this study are Year Seven boys and it is important to have an understanding about their stage of creative development in order for their expected performances to be placed in the correct context. According to Mathieson (1993, p.52):

> Our expectations of children's imagery should not differ from the norm just because a computer is being used rather than a graphic tool. It is therefore important that we know something of the normal developmental stages in a child's use of imagery.

According to Lowenfeld & Brittain (1975), the boys in this study will be expected to be performing at the 'Dawning Realism' stage of creative development as their age falls between the 9-12 age brackets. Mathieson (1993) labels this stage of development of children's imagery as 'Analytic' and includes children above the age of seven.

As outlined in the conceptual framework, students at the period of Dawning Realism become more conscious of how they represent real objects and they want their representations to be look realistic, particularly when drawing human figures. They become critical of their work and try hard to include more detail in their drawings, such as eyelashes in a portrait (Lowenfeld & Brittain, 1975).

Mathieson (1993) also notes that students in the Analytic stage are critical of their work and their peers' work. They constantly compare their work and they strive for visual realism. He states that to assist students' creative development it is vital that the VA teacher plans for challenging and interesting activities where the students are encouraged to 'look' carefully for details and differences in objects to develop their perceptual awareness.

Lowenfeld & Brittain (1975) and Mathieson (1993) stress the fact that not all students will pass through these creative stages of development at the same time. Therefore it is important that the VA teacher is aware of each student's use of different tools and media and that they plan suitable activities that will encourage their creative development. "This

applies to the use of computers as it does to the use of any other tools" (Mathieson, 1993, p.53).

3.10 PIAGET'S STAGES OF DEVELOPMENT

Jean Piaget's theories of cognitive development are important to discuss with regards to the context of this study so that the cognitive abilities and skills of the participants were considered and recognised during the planning, teaching and analysis of their artwork, attitudes and skills. Piaget (1971, p.17-18) proposed that there are four stages of cognitive development in children; sensorimotor (0-2 years), preoperational (2-7 years), concrete-operational (7-12 years) and formal-operational (12 years to adulthood). These different stages of cognitive development are important for VA educators to keep in mind when they are planning their students' activities and the media that the students are going to use.

Due to the age of the students in this study it is anticipated that the participants will be at Piaget's *concrete operational* stage of cognitive development. The characteristics of students who are performing at the concrete operational stage of development have been catered for and considered in this study in many ways, from the appropriateness of the topic, the fine and gross motor skills needed to complete the activity and the language used in the Arts Responses framework. Therefore, the participants' cognitive stage of development was taken into consideration with regards to the planning, teaching and assessing of the VAP for this study and hence the inclusion of Piaget's cognitive development theory in the first conceptual framework.

Piaget (as cited in McInerney & McInerney, 2002) states that students at the concrete operational stage of development should be given opportunities to experiment and play with different technologies to allow them to develop their ideas and their thoughts in a variety of ways. "The role of information technology as a tool for symbolic representation and exploration and for the development of higher-order mental processes through play should not be overlooked" (McInerney & McInerney, 2002, p.35). This statement is particularly relevant to this study as the students in the Experimental group will have the opportunity to express their ideas using TECH-TOOLS and TRAD-MEDIA in order to

create images which describe their thoughts and their interpretations of the theme *Character Cars*. This idea directly relates to two of *The Arts* learning area outcomes; AI and ASP. (CCWA, 1998)

VA teachers should also provide many learning activities where the students are engaged in concrete and hands-on learning experiences as this is an important part of students discovering important concepts and developing their fine and gross motor skills. Therefore the fact that students 'learn by doing' is particularly relevant to the ASP learning area outcome in *The Arts* learning area where concepts, skills, attitudes and knowledge are developed through the interaction and manipulation of concrete materials (CCWA, 1998). VAE provides opportunities for students to develop cognitively through their experiences of actively holding and manipulating a variety of tools and media, including TECH-TOOLS. Consequently their fine and gross motor skills develop as a direct result of these experiences in VA classes.

Students in the concrete operational phase of development also need opportunities to record their ideas as they begin to understand that symbols represent and record stories and messages (McInerney & McInerney, 2002, p.35). VAE provides many opportunities for students to develop cognitively as they learn and understand that symbols and pictures tell visual stories. They also learn that they can express their ideas, emotions, feelings and attitudes through the use of symbols and pictures. This directly relates to the AI learning area outcome of *The Arts* learning area. (CCWA, 1998) With regards to this particular study the integration of TECH-TOOLS into TRAD-PROG allows students to develop their symbolic development and their ability to think about an idea or concept in a variety of ways and in a variety of different media, including TECH-TOOLS and TRAD-MEDIA.

Students in VA are also developing cognitively, particularly with regards to language development, through their discussion of; different artworks, their reflection of their own artworks, and their peers' artwork. This is reflected in one of *The Arts* learning area outcomes, *Arts Responses* in the Curriculum Framework (CCWA, 1998) as well as being a part of this study where the participants will respond to their completed artwork by

answering seven questions where they describe and outline their artwork, their success and the steps that they undertook to create it.

3.11 GARDNER'S MULTIPLE INTELLIGENCES

VAE provides opportunities for students to develop, express and represent their ideas using a variety of media and techniques. VA activities also allow students opportunities to develop their fine motor skills through their use and control of paintbrushes, pencils, charcoal and clay. A student who displays ability in VA may not demonstrate the same ability in Mathematics or English as the same opportunities are not given. Therefore, VAE is very important in the holistic development of the student.

During the last two centuries the concept and definition of the term 'intelligence' has changed and been challenged by several psychologists, scientists and educational theorists, such as Francis Galton, Alfred Binet and Robert Sternberg (Gardner, 1999). However in the late 1980's Howard Gardner, proposed that there were *many* forms of intelligence rather than just one 'score' which determined a person's intelligence through a standardized test. He suggested that these tests were only measuring a very narrow part of a person's intelligence and that they did not take into consideration or measure a person's cultural and social context and experiences (Gardner, 1999). Subsequently he proposed a theory of multiple intelligences of which there are currently nine. The nine intelligences are; (1) Visual-Spatial; (2) Bodily-Kinaesthetic; (3) Musical; (4) Linguistic; (5) Logical-Mathematical; (6) Interpersonal; (7) Intrapersonal; (8) Naturalistic, and, (9) Existential (Gardner, 1999). Three of the nine intelligences indicated by Howard Gardner directly relate to the opportunities provided for students in VAE developing AI through specific kinesthetic experiences found in traditional studios. Gardner (1999, p.42) defines *spatial* intelligence as "the potential to recognise and manipulate the patterns of wide space as well as the patterns of more confined areas (such as those of importance to sculptors, surgeons, chess players, graphic artists, or architects). *Bodily kinesthetic* is the intelligence which is responsible for the control of body parts to solve problems or create products (Gardner, 1999). This is particularly relevant to the VA as students must develop their fine motor skills to be able to effectively control a paint brush, pencils and clay tools when creating

different pieces of artwork. *Linguistic* intelligence is having the ability to understand and use spoken and written language to convey one's ideas and thoughts clearly (Gardner, 1999). This is directly linked to one of the four *Arts* learning area outcomes, *Arts Responses* in *The Arts* learning area where students are encouraged to use VA terminology to respond to a variety of visual artworks. (CCWA, 1998) The students can also display their *linguistic* intelligence through their discussion and written knowledge of different artists, their work and the role that Visual Artists play in our society. This is directly related to the *Arts in Society* learning area outcome and the annotation/written component of AI in the Curriculum Framework in *The Arts* learning area. (CCWA, 1998)

Gardner (1999) proposed that each person will be more developed in one or more of the intelligences and that we will perform differently in each of the nine intelligences. The Researcher designed this project so that the students utilize or exercise mainly three intelligences being the visual-spatial, bodily-kinaesthetic, and linguistic intelligences. The participants will also draw on their other intelligences as well in this study as they all have their own unique profile of intelligences in which they have their own areas of strengths/preferences for learning.

3.12   THE INFLUENCE OF GENDER

The fact that the participants in this study are all boys, will influence the type of creative outcomes, therefore it is necessary to review the relevant literature on gender differences in children's drawings and artwork. The literature in this area clearly defines the differences in boys' drawings in terms of the content. Speck (1995) found that boys were more likely to draw vehicles, machinery, violence or people in some type of confrontation. Speck also found that girls are much better at capturing detail while boys appear to be more skilled at representing objects in a defined space. Boys approach their drawing tasks from a scientific point of view, hence the recurring images of machinery and vehicles, as they are interested in how these things work. Whereas girls tend to produce drawings that are more concerned with the aesthetics, such as the beauty of a flower, or they draw from a domestic point of view, for example pictures of houses or people drinking tea around a table (Speck, 1995).

Due to the nature of the theme, *Character Cars* for the VA activities, it is anticipated that the boys will produce pieces of artwork which depict cars and different parts of the cars or associated imagery such as roads, traffic signs or number plates. Some of the students may even choose to depict car crashes or people racing in cars due to their interest in speeding and violent scenes.

3.12.1 Reasons why boys engage in Visual Arts

Imms (2003) explored the many reasons why boys participate in VA at school. The findings were interesting and suggested that the boys felt that they could truly express themselves in VA activities. The comments from the boys in the study suggested that, "[VA] is not only a form of 'release' to these boys; it also acts as a tool for exploring personal attributes and interests" (p31). It was also noted that there were two major themes that underpinned the reasons for boys wanting to do VA, the first reason relates to this study and is an important factor for all VA teachers to realise.

"It is something you can see and hold, as compared to writing an English essay which you can read but it isn't really there. I like pottery because it's using your hands to make something from nothing" (Imms, 2003, p.31). This statement was the response from a boy when asked why he liked VA. This information provides an interesting insight for teachers who can use this information to encourage other boys, who may not be performing well academically, to participate in VA.

Boys who choose to study VA also felt that in the VA classroom environment they were on a more even playing field with the other boys and girls in the class, which is often in stark contrast to the other subject areas which they study, such as Mathematics where each student is directly compared on academic performance. They appreciated that in VA each product or piece of artwork is valued and accepted for its uniqueness and that being in a VA class allowed them to truly express their ideas and emotions without being judged by their peers or teachers (Imms, 2003).

All of these points raised in the literature on gender are related to this study and they have been taken into account when planning the VAP.

3.13   CONCLUSIONS

It is important to note that the integration of TECH-TOOLS into TRAD-PROG is relatively new and VA teachers must be given adequate time, resources, support and training if they are to embrace this change in the curriculum.   Those VA teachers who are hesitant to implement TECH-TOOLS into their programs must remember that VA teachers who are currently integrating TECH-TOOLS are still experimenting with different software programs, tools and VA projects themselves!   It is a challenging time for VA teachers as they must acknowledge that they may play a dual role in their classes, that of teacher and that of student as well as accepting that their role will change in many ways.

It is also an exciting time in VAE where the integration of TECH-TOOLS could possibly; increase students' motivation and enjoyment, encourage new students to VA and allow opportunities for students to collaborate on pieces of artwork like never before!

In conclusion, the most important issue raised in the research was that VA teachers must remember that by integrating TECH-TOOLS into their TRAD-PROG they are not disregarding the traditional media, skills or techniques, but they are simply adding more 'tools' (TECH-TOOLS) and allowing their students the chance to choose which medium suits their purpose.   VA teachers must provide opportunities for their students to experiment with and use TECH-TOOLS in their VAP as the Curriculum Framework mandates that technology tools must be integrated into the eight learning areas.   Therefore, this study fulfils the requirements of the Curriculum Framework with regards to embracing technology and providing opportunities for students to use the different tools in a variety of different ways and different contexts (CCWA, 1998).

Chapter Four

4.0 METHODOLOGY

4.1   Target Population

The purpose of this study is to determine whether the integration of TECH-TOOLS into VA TRAD-PROG enhances Year Seven boys' expressive outcomes. The Researcher chose to focus this study on boys due to the fact that this is where her current teaching experience lies. Her observations of boys working with technology in other learning areas has also led her to believe that technology may be a powerful motivating factor if integrated into a VA TRAD-PROG.

The participants were taken from two Year Seven boys' classes from an independent school in Perth, Western Australia. The Researcher was restricted to using the pre-existing classes due to timetabling issues; however it is important to note that the classes were not comprised on the basis of ability or behavioural issues so it was assumed for the purpose of this study that the classes were relatively similar in terms of the boys' abilities in VA. This is an important factor when discussing controlling all of the variables as it is extremely difficult to try and obtain two 'exact' sample sizes when you are studying the habits, behaviour and learning of children in school classrooms where it is not always possible to run the classes at exactly the same time or ensure that the classes are evenly matched.

The sample size, of 47 students overall, ended up being markedly smaller than first anticipated due to some students not being able to participate in the study. In the Control group, three students were absent during the three weeks that the study was conducted. In addition another four students did not complete the tasks due to attending specialist lessons in English, Mathematics and instrumental music lessons during some or all of the lessons. Therefore, the sample size was 47 students (23 students in the Control group, and 24 students in the Experimental group), however only 37 pieces of artwork were collected at the end of the study (16 pieces from the Control group, and 21 pieces from the Experimental group).

Figure 9   Summary of the sample size

Number of	Control	Experimental	Total
▪ Students	23	24	47
▪ Artworks completed	16	21	37

4.2   Design

The comparative case study method was chosen as the most suitable method for conducting this research as it allowed the Researcher to have a manageable sample. This research method also lends itself towards analysing the effect of one variable, in this case TECH-TOOLS, against a constant, which is TRAD-MEDIA. The data collected from the boys' artwork was analysed using the statistic computer program *SPSS*. The results have provided a quantitative measure of the effectiveness and impact that integrating TECH-TOOLS and TRAD-MEDIA has on the boys' artwork within the limitations disclosed. The first research question poses the question of whether the integration of TECH-TOOLS enhances the learning of AI and ASP on Year Seven boys' artwork and the quantitative data will provide part of this answer.

For the qualitative research component of this study, the participants were asked to provide feedback by completing a four-part form as follows: (1) seven questions about their artworks; (2) the steps that they took to complete their artworks; (3) the media that they used; and, (4) their enjoyment of this VA activity. This part of the research is directly linked to the Western Australian Curriculum Framework and one of *The Arts* learning area outcomes, *Arts Responses* (CCWA, 1998). The students' responses have been used to comment upon their thoughts about using TECH-TOOLS in combination with TRAD-MEDIA. These comments as well as anecdotal comments provided by an independent VAE expert present at the lessons and the Researcher's observations which were recorded

after watching the video, have been included in the Data Analysis section in Chapter 6. All of these responses will also enable the first research question to be answered.

Therefore, this study has a triangulation of data collection; (1) the quantitative data obtained from the t-test analysis; (2) the qualitative comments from the participant feedback forms (Arts Responses); and, (3) anecdotal comments from the Researcher and the VAE expert who was present during the lessons.

4.3 Procedure

In order to collect data which will assist in determining the impact of integrating TECH-TOOLS with TRAD-MEDIA in TRAD-PROG the Researcher conducted the same VAP with the Control group and the Experimental group. The theme for the VAP was chosen as a direct result of the Researcher asking three classes of Year Seven boys what they prefer to draw in their spare time. The majority of boys reported that machinery, such as motor-bikes, army tanks, and robots, and more specifically cars, were their favourite objects to draw. Consequently the theme of cars was chosen as the topic for this study as this also supported Speck's (1995) research into gender differences in children's drawing in which she states that boys enjoy and draw machinery and action objects more often than girls.

The participants in both groups had the same activities to complete, with the exception of the media that was used to complete the second activity. As well as using TRAD-MEDIA, the Experimental group also had the opportunity to use TECH-TOOLS to complete their artwork/s. The students in the Control group were only given TRAD-MEDIA to complete their artworks and the specific media and materials that both groups used are listed in Appendix E, p. 118. The VAP details have been included so that other researchers may be able to replicate the study. This will assist further research to be conducted in this area.

To stimulate the boys' interest each group of students visited the Fremantle Motor Museum. Upon arrival at the museum, each group was guided through the museum for approximately five minutes to explain the set-up of the museum and the conduct for

behaviour. The students were then given 45 minutes to take digital photographs and sketch at least two of the cars on display. The students were asked to make their sketches interesting by drawing sections of the car, instead of the whole car. We discussed the term 'viewfinder' when discussing how to take interesting photographs and then linked this term into their drawings and how they must use a viewfinder to capture an interesting part to sketch in the same manner.

Before the students' next VA lesson they sent me their digital photographs or gave them to me on a disk and I printed off over 150 images total for the students in both groups to use for the next activity (some of the examples are included in Appendix H, p. 131). Their sketches and digital images provided the students with a meaningful and interesting starting point for developing their images in order to create an artwork in which the car reflects a famous character's personality. The Researcher gave the following explicit instruction to the students in each group:

> Using your sketches and photos from the excursion to the Fremantle Motor Museum, create a piece of artwork where the focus is a car. This car must reflect the personality of a particular character (for example: book character, famous personality or musician). (The Researcher)

All of the participants were then asked the following question to demonstrate the task:

> If you were designing a car that reflected Harry Potter's personality, what could you include on the car? (The Researcher)

The students then answered this question with comments such as, "you could add a pair of glasses like his", or "you could add the lightning bolt to the bonnet".

The Control group was given the choice of completing their artwork with acrylic paint, glue, scissors and coloured cardboard. These students looked at the many photographs of the cars from the Fremantle Motor Museum as well as their drawings to begin their work.

The Experimental groups (TRAD-MEDIA & TECH-TOOLS) were given exactly the same materials to choose from acrylic paint, scissors, glue and coloured cardboard, however they were also asked to use TECH-TOOLS. The Researcher spent approximately ten minutes at the beginning of the lesson with the boys in this group (in a computer laboratory adjacent to the VA studio) in order to quickly identify some of the simple TECH-TOOLS and processes that they may think about using when creating their artwork. The boys were given the instructions on how to use *Microsoft Photo Editor*, such as cropping, cutting and pasting and changing the finishing textures on a digital image, as well as a brief introduction on how to use the scanner and printer in the room. Before the lesson, all of the digital photographs were stored on the 'share drive' on the computers at school in a labeled folder so that the students in this group could access these photographs quickly and easily. They were also told that they could use a photocopier, scissors, glue and acrylic paint to complete their artwork. All of the tools were extremely accessible during the lessons as the scanners were in the computer laboratory and the photocopier was in the next room.

The Researcher anticipated that some of the boys would 'edit' their digital images, print them out and then 're-work' their images by applying TRAD-MEDIA such as paint and coloured cardboard. This was certainly the case as all of the boys in the Experimental group used paint on their images.

After finishing their artwork each student was then asked to complete a short feedback form (Arts Responses) where they were asked to answer seven questions which related to their artwork and the process that they went through to create it (Appendix F, p. 125). By collecting information about each participant's creative process, for example materials used and steps taken, the Researcher was able to comment and reflect upon the impact of combining TECH-TOOLS with TRAD-MEDIA from the perspective of the students. This information provided interesting insights into whether students enjoyed using TECH-TOOLS to create their artworks and whether they felt that combining TECH-TOOLS with TRAD-MEDIA improves the quality of their artwork.

Each of the lessons was video recorded to enable the Researcher and a VAE expert to observe the students' interactions carefully and report on the processes that they went through while creating their artwork. The video was simply used as another observational tool for the Researcher so that more accurate anecdotal observations could be included as part of the qualitative analysis for this study. Parent permission was sought before any students were videoed (Appendix D, p. 112).

4.4 Materials

Table 3   Outline of Rooms and Materials

Control Group	Experimental Group
Art room	Computer lab
	Art room
Visual diary	Visual diary
Lead pencils	Lead pencils
Erasers	Erasers
Sharpeners	Sharpeners
Acrylic paint	Acrylic paint
Paint brushes	Paint brushes
Glue	Glue
Scissors	Scissors
Coloured cardboard	Coloured cardboard
Digital camera (excursion)	Computer
	Microsoft Photo Editor
	Printer (black and white)
	Scanner
	Photo copier
	Digital camera (excursion)

The students in each of the groups were asked to bring a digital camera along to the excursion to the Fremantle Motor Museum so that they could have some images to work with when they returned to school.

The Control group worked in the art room whereas the Experimental group worked in a computer laboratory for the second activity of creating their image of the car with personality. The students in the Experimental group had access to a scanner and a printer in this room and a photocopier was in the next room. The computers were all loaded with the software program, *Microsoft Photo Editor* so that the students were able to create and edit their images.

4.5   Data Analysis

The pieces of artwork that the students created during the lessons were collected and analysed as the primary data source for this study. Three VAE experts, each with over 20 years teaching experience as a VA specialist in primary schools in Western Australia, assessed each piece of artwork using the following two categories which are two of *The Arts* learning area outcomes from the Western Australian Curriculum Framework; AI and ASP. The VAE experts assessed each piece of artwork using the above categories and a rating scale of 1-4 for performance in each category. The descriptors and specific pointers for each category and level of performance are outlined in Appendix I, p. 141. It is important to note that the scale of 1-4 does not relate to the Western Australian Curriculum Council Progress Maps (CCWA, 2004) in any way due to the slow movement of learning seen between these levels and the short period of time that this study was conducted during. Therefore, each piece of artwork was given a mark (whole numbers only) for AI and ASP.

Once the VAE experts assessed each piece of artwork, using the data analysis criteria specified in Appendix I, p. 141, the data was analysed to determine the average mark given to the artwork of the students in the Control and Experimental group, to compare whether the use of TECH-TOOLS and TRAD-MEDIA had affected the students' AI and ASP as perceived by the three VAE experts.

By comparing the average marks of the artwork in both groups the Researcher is able to report in quantitative terms whether the students' artwork in the Experimental group (TRAD-MEDIA and TECH-TOOLS) was perceived more expressive than the students' artwork in the Control group which only used TRAD-MEDIA in terms of AI and ASP. This allows one of the Researcher's questions to be answered, which is whether the integration of TECH-TOOLS into VAP enhances the boys learning in terms of AI and ASP.

4.6   Validity

The Researcher took several steps in order to protect the validity of this study. To improve internal validity of the study a VAE expert was present during the lessons as well the fact that each of the lessons was video recorded. These steps were taken in order to minimize any of the Researcher's potential biases or assumptions. This allowed the Researcher and the VA expert to compare their observations of the students during the lessons in order to gain a more objective interpretation of the behaviours and interactions, particularly of the students in the Experimental group.

During the lessons the VAE expert took anecdotal records which focused on the following points which were recurring themes from the reviewed literature:

- The students' enjoyment of the lesson
- The interactions between the students
- Whether there is more interaction between the students at any given time
- The confidence level of students using technology as a tool to create their artwork
- The amount of peer tutoring going on during the lesson and when it occurred
- The types of questions asked by the students, both to the Researcher and to other students
- Whether the students enjoyed having the choice of which media to use

Various pieces of data were collected during the study as another way to maintain validity. The students' pieces of artwork, their answers from the written feedback (Arts Responses), the anecdotal records taken by the VAE expert and the analysis of the students' artwork all contribute to the overall validity of this study.

4.7 Limitations

The amount of time that the students were given to complete the tasks was a limitation to this research. The boys may have been able to produce different pieces of artwork of a more creative nature if they were given more time to experiment and develop their ideas and images, particularly the participants in the Experimental group.

Another limitation in this study relates to the fact that VAE is very subjective, particularly when it comes to analysing and appreciating personal choices in artworks. Therefore, to maintain validity and minimize the subjective element, it was important in this study that the three VAE experts met before they assessed the pieces of artwork and discussed the two categories and descriptors in each category to agree on the characteristics that they would be looking for when they give each student a mark out of four for each category. They were informed before hand to only award whole numbers for each category to make the decision process easier.

The fact that the case study approach is based on conducting research on fairly small groups of people is a limitation to this research. According to Hamel, Dufour & Fortin, (1993, p. 34):

> The case study appears inadequate... because it is based on only one particular case. The scope of the study is thus only relative to that case, and accordingly, can only be considered microscopic.

However, the procedures have been clearly outlined so it is expected that another researcher could replicate the study, on another group or a much larger sample size of students, in order to effectively compare the findings and then begin to generalize the study's findings.

4.8 Ethical considerations

Any research that involves humans, especially children requires the Researcher to be sensitive and aware of special considerations in order to protect the children's confidentiality and anonymity. The participants in this study have remained anonymous in the research findings and they have only be identified by a letter, to determine whether they are in the Control or Experimental group and a number in order to establish their work, their written feedback answers and any anecdotal observations taken while they were working.

Before any research was conducted, the Researcher obtained written consent from each of the students' parents or guardians and the student (Appendix D, p. 112). A letter explaining the research study and a brief outline of the study was also sent to the Principal in order to seek permission to collect the data from students in their school (Appendix G, p. 128).

4.9 Summary

This research is a mixed methods study as both quantitative and qualitative data have been collected in order to answer both of the research questions. The comparative case study method was chosen due to the fact that one variable could be analysed, which was the inclusion of TECH-TOOLS with the students in the Experimental group to determine whether this enhanced the boys' learning in terms of AI and ASP. It is important to note that the findings of this study can not be generalized to other studies due to the small sample size and the fact that this research was conducted in an affluent boys' independent school with excellent technology facilities.

Chapter Five

5.0 DATA ANALYSIS (PART 1: QUANTITATIVE DATA)

5.1 Introduction

Quantitative data was collected to answer the first research question which posed the question of whether the integration of TECH-TOOLS into TRAD-PROG affected the students' artwork in terms of AI and ASP. To obtain this data each piece of artwork was assessed by three VAE experts using a marking criteria (see Appendix I, p. 141) which required each piece of artwork to be awarded a mark between 1-4 (whole number only) in each category (AI and ASP). It is important to note here that the levels of 1-4, are not related to levels stated in the Western Australian Curriculum Council's Progress Maps.

Once the data was collected from the VAE experts an average mark was calculated for each piece of artwork for each of the categories, AI and ASP. This process was considered to be important as it was hoped that this would minimize the subjective nature of assessing students' artwork.

The Control group originally consisted of 23 students, however only 16 students completed the activity. The Experimental group originally consisted of 24 students, however only 20 students completed the activity with one student (E6) creating two pieces of artwork, which are differentiated by E6(A) and E6(B), using TECH-TOOLS and TRAD-MEDIA. Therefore there are 21 pieces of artwork that were analysed from the Experimental group.

5.2 Analysis of the quantitative data

To analyse the data, the average marks for each piece of artwork were entered into the computer software package, *SPSS*, in order to calculate some basic descriptive analysis of the data. "Descriptive statistical analysis limits generalization to the particular group of individuals observed. No conclusions are extended beyond this group, and any similarity to those outside the group cannot be assumed. The data describes one group and that group

only" (Best & Kahn, 2003, p.343). It is important to note that the artworks that were not finished were not included in the data input. The data tables which were produced by SPSS are in Appendix J, p. 143 and provide the data which have enabled the first research question to be answered in terms of quantitative data.

The t-test data, which states the mean for each group in terms of AI, demonstrated that the Control group's average mark for AI was 2.5 and the average mark for the Experimental group was 2.7. This indicates that the students in the Experimental group were able to express and create more interesting ideas based on the given theme. In terms of answering the research question of whether the use of TECH-TOOLS affects the expressive outcomes of the students' artwork the answer is yes, in terms of AI, however the difference is very small. This small difference needs to be considered when answering the second research question which raises the question of whether the use and purchase of TECH-TOOLS is a cost effective option for Western Australian primary schools when you consider the small difference in the learning.
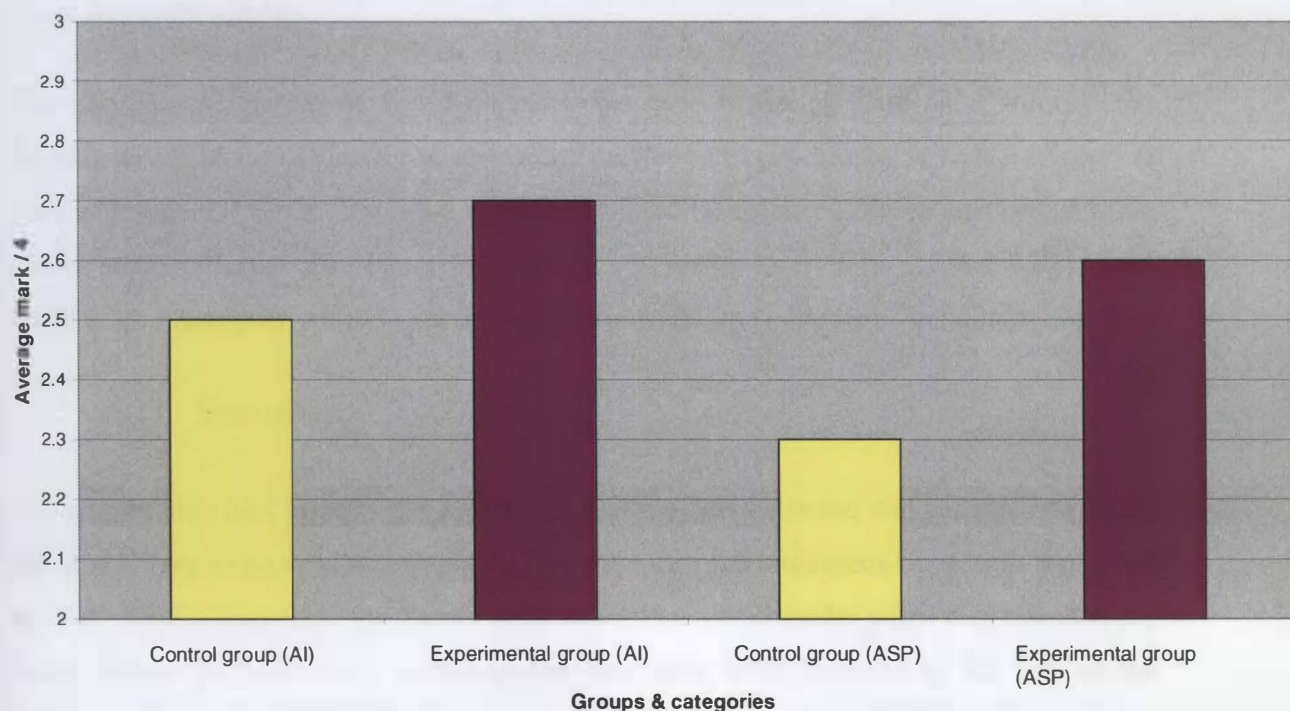

Table 4   Comparisons of the average marks awarded to the students' artwork in each group

The standard deviation for each group, and the different categories, indicates the spread of the marks awarded to each piece of artwork in a set of data and how far apart they are from the mean (Best & Kahn, 2003). The standard deviation for both the Control group and Experimental group in terms of AI were very similar with 0.4 and 0.6 respectively. These statistics indicate that overall the marks awarded to the artwork in terms of the ideas expressed in the artwork were all fairly similar.

Similar results were calculated for the standard deviation with regards to ASP. The Control group had a standard deviation of 0.5 and the Experimental group had a standard deviation of 0.7. Once again, this indicates that the spread of the scores in each group was minimal and that there is a small margin of error in the data collected.

All of the standard deviation scores fall below 1.0 which indicates that if we were to conduct this same study again approximately 68% of the data would fall very close to the mean in each group and in each category. This means that overall the data collected in this study was quite reliable.

The confidence interval of the difference provides interesting data as it informs the Researcher about the difference in the means between the two groups in each category. A very wide interval can indicate that more data should be collected before anything definite can be stated in terms of results. However the confidence interval for AI and ASP is very small in each category which suggests that the research data collected is reliable.

5.3   Summary

The quantitative data informs the Researcher that the data collected was reliable and that if the study were to be conducted again under the same circumstances the results would be similar. This is important for teachers and Researchers to consider when they are thinking about which TECH-TOOLS to incorporate into their VAP in terms of the cost of the TECH-TOOLS and the logistics of organizing these different technologies within a class of students when compared with the small difference in the students' artwork in terms of AI and ASP.

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Chapter Six

6.0   DATA ANALYSIS (PART 2: QUALITATIVE DATA)

6.1   Introduction

When all the students completed their artworks, they were asked to answer seven questions with regard to the process of creating their artworks and personal responses. The answers are summarised in the paragraphs below as well as anecdotal records taken by a VAE expert present during the lessons and observations from the Researcher which were taken during watching the video recordings of the students working. Both of these types of qualitative data are important insights into whether it is worth implementing in VAP in Western Australian primary schools with regards to the quality of the students' art work, the cost of purchasing and running these TECH-TOOLS and the students' enjoyment during these tasks.

To ensure anonymity, each student is only identified throughout the research by a letter, either C (Control) or E (Experimental), followed by a number which identifies the number of their artwork. For example the first student in the Control group is identified as C1.

6.2   Arts Responses (Experimental group)

In the Researcher's experience with teaching boys, she was aware of boys' dislike for writing and the fact that they often don't elaborate on their answers. The participants in each group were asked to answer the questions to the best of their ability and the boys weren't given any extra 'coaching' or feedback on their answers while they were answering the questions. The Arts Responses worksheet can be viewed in Appendix F, p. 125.

The student's responses to the third question which asked them to explain the steps that they took to create their artwork gave an interesting insight into the creative process and the answers were obviously quite different from the students in each group. Questions 6 and 7

provided the most interesting information with regards to the students' enjoyment of the activities.

Question 6: "What did you think about this art project?"

Question 7: "What would you change about this project?"

Student **E15** responded to question three regarding the steps he took, in the following manner:

1. I edited the car picture on the computer
2. Ripped the picture
3. Put it over the Tom Cruise picture and scanned it
4. Painted it

Interestingly, he responded that he thought that the project was good, but it took too long! He also stated that he would change this project by including more sketching! The Researcher was very surprised by his answers as he appeared to be very engaged in the creative process and was quick to come up with his idea of printing an image and then ripping it up. He was adamant that he wanted to get a picture of Tom Cruise from the Internet, so the Researcher allowed this as she felt that it was a clever idea. The title of his artwork was 'Days of Thunder' after the Tom Cruise movie about car racing!
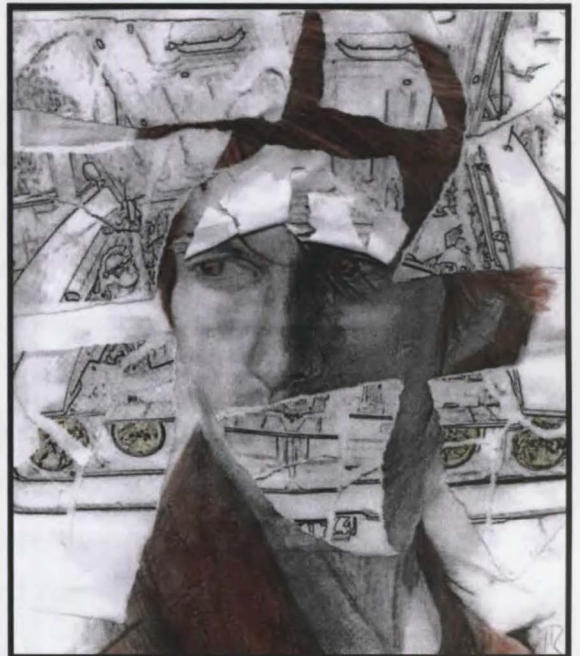
Student **E2** created the 'Christmas Cadillac' and answered honestly to each of the questions. He explains the steps he took below.

1. I chose the two pictures I was going to mix together

2. I decided to rip the paper and get a picture of a car and put it through the hole
3. I scanned the two pictures to form one
4. I painted the car and finished the painting

He also enjoyed the activity. "I thought it was interesting going to the car expo and seeing all of the old style cars. It was fun using the computers for art and then painting our pictures." He said that he didn't know if he would change anything.

One student, **E6,** was very enthusiastic about the project and actually created two finished images which are identified as **E6(A)** and **E6(B)**. "I think the idea of using computer

programs to design your vehicle, printing and painting it was fun, new and a unique idea which worked well for the finishing image. I would probably change the size of the artwork, probably using an A3 sheet of paper instead of an A4 sheet." He called this image **'The Atom Bomb'** **E6(A)**. "My artwork focuses on the character of Saddam Hussein. The car has a nuclear symbol on the back window, a bomb for a wheel and a missile on the side. It only has dark, murky shades to symbolize the dark character of Saddam." The painting below is called '**Homer's car**' and was created by student **E6(B)** who was adamant that he wanted to use images from the Internet as well as the photographs taken from the Fremantle Motor Museum. He also felt more comfortable using the program, *Microsoft Paint* as he had used software program many times before. He said that he could get the effects
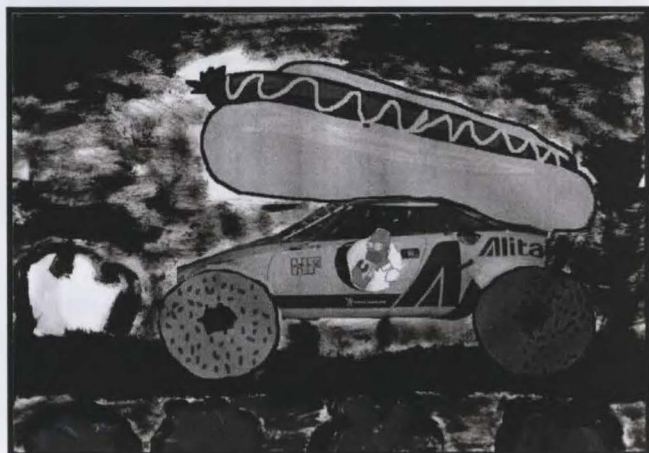
that he wanted using *Microsoft Paint* so the Researcher allowed him to use this program. During the painting stage of the process student **E6** was very confident that he was only going to use black, white and grey to create the effect that he had in mind, particularly for the first painting which was about nuclear war. He told the Researcher that any colour would look really stupid and wouldn't go with the theme at all! He explained the steps that he took to create his first piece, '**The Atom Bomb**'.

1.   Chose a piece of artwork to modify
2.   Applied changes using Microsoft Paint, including a bomb for a tyre and a nuclear symbol on the window
3.   Printed it in A4 size
4.   Made a black and white background by painting it

One, student, **E18,** commented, "I thought the art project was OK, but I thought it would have been easier by hand. It was quite fun at the Motor Museum." He said that he would change the project by doing it "by hand".

Student **E10** stated that "it was pretty fun and easy." This student took a different approach from all of the other students in the Experimental group as he drew his car first and then added the smoke and other features to the car using both *Microsoft Photo Editor,* and *Microsoft Paint* as he couldn't do what he wanted to do just using the specified software program, and he really liked using *Microsoft Paint.*   He called this painting '**The Batmobile'.** He stated that the project "would be better if we could use pictures from the Internet". This student didn't ask the Researcher if he could use any pictures from the Internet.

Student **E11** called his piece 'Superman Car' and he commented that he "would change the fact that you have to use computers". He also stated that he didn't enjoy the art project much "because we had to use the computers". His feelings are reflected in his artwork as he chose a simple image from the photographs and only changed a couple of things. He then painted it very simply with no reflection of the theme, *Character Cars*.

Student **E5** stated that he thought it was a good test of all of his skills, computing, painting and his imagination. "I don't think I would change anything because it was just how I liked it." The steps that he took to create his image 'The Spidey Car' were as follows:

1. Choose a car picture
2. 'Disform' (student's own word) it on Photo Editor
3. Then use paint to get the colour
4. Print it out
5. Then paint over it

This student was particularly pleased with his work and this was evident during the painting stage.

Only one student chose to include one car and a motorbike in their final image, student **E9**, with interesting results. He explained the steps he took:

1. Finding cars: I tried to find two cars going the same way but I couldn't so I chose a motor bike.

2. Adding stuff: Two cars racing each other – isn't it interesting! I wanted two cars trying to stop each other from winning using (indecipherable) and hammers.
3. Painting: I used different colours

This student also commented that they liked using computers and paints, rather than just using paints. He said that the only thing he would change would be the fact that he wanted another topic rather than cars.

One student, **E20,** created **'Dorothy on Wheels'** after the Wiggles' character, Dorothy the Dinosaur. This student also took a slightly different approach as he chose to draw the car in *Microsoft Paint* rather than *Microsoft Photo Editor* as he couldn't do what he wanted to do in that program. He said that he "really enjoyed it!" and that he would change "absolutely nothing".

Student **E16** created this **'Matrix Car'** "because it is self explanatory and the movie itself was good." He explained the steps very simply, "we changed the picture in Microsoft Photo Editor, and then we printed it and painted it." He enjoyed this project stating, "it was fun and you had to use your imagination."

Student **E8** created the **'Schwarzenegger Muscle Mobile'** which included lots of blood and violence which is stereotypically seen in boys' artwork of this age (Speck, 1995). "I first cut two cars apart on the computer and put them together, and then I did things to them on paint to make them look better. After that I cut them out and painted them." This student also used a combination of *Microsoft Photo Editor* and *Microsoft Paint*.

Student **E14** decided to create something completely different from the rest of the students. He chose a simple image, the Bentley Motif, from the photographs that were taken at the Fremantle Motor Museum. He then used *Microsoft Photo Editor* to create a series of images using the same photograph but changing the amount of detail as the image progresses. He chose to only use one colour, yellow, to add colour to his series of images. Unfortunately, this boy did not complete an Arts Response feedback sheet as he was working very slowly and he ran out of time. It was evident from his body language and enthusiasm whilst working that he found this activity very stimulating and challenging.

6.1 Arts Responses (Control Group)

The Researcher was interested to compare the students' enjoyment of this project to the students in the Experimental Group and therefore their responses to questions 6 and 7 were also the most important to gain this insight into their enjoyment levels.
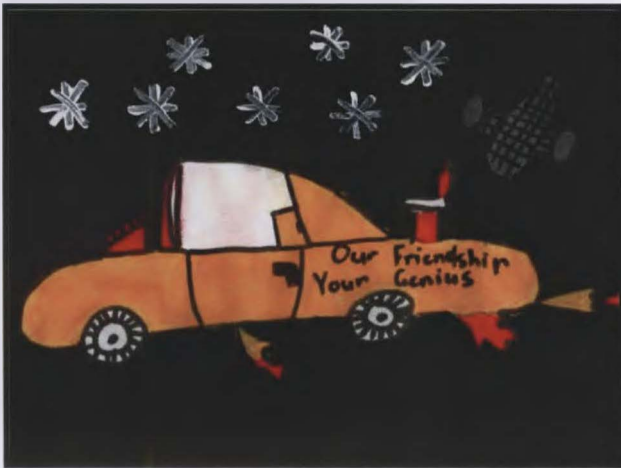
Student **C2**, called his painting **'Thunderpants'** after the movie 'Thunderpants –Our Friendship Your Genius'. He stated that "a lot of the project was interesting. I would not change anything because I love my work."

Student **C16** stated that "it was very fun, especially the excursion." He also commented that he would prefer it to be just a "photography project".

Student **C12** "felt that the project was interesting and educationally worthwhile." The title of his painting was **'The Land Drover'** (opposite). Three students in this group, including **C12** all said that they would have preferred to create a sculpture rather than a painting on this topic.

Student **C10** (below) stated, "I would change it to a sculpture" while student **C4** said "if given the chance I would try and sculpt it out of clay."

Student **C11** (below) called his painting **'Starcar'** as he felt his car represented Tom Cruise. "I really liked working on this art project since I really like cars a lot. I enjoyed it!" He also said that he "would change the topic to planes, because I like planes more than cars though. I would also change the amount of time to work on this project."

Student **C7** called his painting, **'Four Wheel Drive'**. Many of his responses were interesting, for example his he outlined the steps that he took to create his painting.

1. Firstly I sketched a car at the motor museum
2. Then I added the background
3. Back at school I drew it again
4. Then I painted it

His responses to this question highlight the impact of the excursion to the Fremantle Motor Museum and that many of the drawings and photographs that the students took during the visit were interesting and useful for them when they started to create their

desired image. He explained that his artwork "is about someone in the outback who is wounded and is driving to the nearest hospital." He explained that he enjoyed the project except for the writing part! "It was lots of fun because we got to draw and paint and there was no writing involved, besides this!"

Student **C13** chose the title '**The Music Car**' and explained that he chose this title "because I like music and I had things like CD's and instruments which are apart of my music." He really enjoyed this activity and this was reflected in his responses to questions six and seven. "I thought that it was fun and it could show something that you like or someone you admire. I would not change anything about the project because I thought it was fun and great!"

Student **C5** (below) called his painting '**The DOGmobile!**' He said that he "wouldn't change anything, but if I had to I would change the background." This boy appeared enthusiastic throughout the process and this is reflected in his comments. "I think the art project was good as it encouraged us to use our imagination. I also enjoy drawing."

Student **C15** created a painting where the tree and car becomes one object. He called his painting '**The Tree Car**'. "It's about a car that is made out of a tree. You use foot power to push it. I thought it's a great idea

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to have a project on." When asked what he would change about the project in question 7, he responded with, "a different topic". This is funny response and I assume that what he meant is that although he enjoyed the activity he would have preferred a different topic!

Student **C3** painted **'The Tiger Car'** and stated that "it was very fun and interesting". He wrote that he wouldn't change anything.

Unfortunately, two of the students, **C6** (below left) and **C14** (below right) did not complete an Arts Response sheet however their work is included below as their work really captured the theme, *Character Cars*.

6.3   Observations (Experimental Group)

Once the Researcher had explained the task the students were keen to share their ideas with their peers. The Researcher then demonstrated the simple functions on *Microsoft Photo Editor* and how the boys could access the photographs from the Fremantle Motor Museum on the share drive of the school computers. The boys were extremely keen to start and there were a lot "Wow!" comments as they saw how easily they could manipulate the

photographs using *Microsoft Photo Editor*. The students were very focused on the instructions and they couldn't wait to start the activity of using TECH-TOOLS to create an interesting image of a car that reflected someone's personality.

To begin with there was little interaction between the boys as they were all very engrossed in finding the pictures and experimenting with the different functions on the software program. After approximately five minutes the students began to interact a little, however it was mainly to help each other out or quickly give their advice or approval on what the student next to them was doing. None of the boys got out of their seats for the first half an hour as they were all engaged in the task and they only appeared to be interested in the screens on either side of them! After this the only movement around the room was boys getting up to use the scanner, printer and photocopier or students moving their screens to show someone else their work that was in close proximity.

Peer tutoring did occur throughout the lesson, however most of the time the interaction was brief and the students stayed on task. For example student, **E11** was heard saying "Do you want me to show you how to…" throughout the lesson to the boys that were sitting on either side of him. One student, **E5** became a 'technician' during the first lesson as he knew how to use the scanner and he was sitting next to it. He helped each boy who came to use the scanner and this was a little disruptive to his work, however he appeared to really enjoy this peer recognition. Long (2001) and Hennig (2000) also observed that when TECH-TOOLS are used in VAP the students assist each other with any technical problems that they may have encounter and that instead of asking the teacher for help or their opinion the students in this environment asked their peers for their help or opinion before asking the teacher.

There was an element of frustration from a few students who weren't having much success with the software program and a few comments were heard from students such as when student **E3** said to the student sitting next to him, "Like, you said, this cropping sucks!" Some students, **E6, E10** and **E1** decided that they weren't able to do what they wanted to using *Microsoft Photo Editor* so they asked the Researcher if they could use *Microsoft*

Paint to make some changes. The Researcher gave permission for them to use *Microsoft Paint* as long as they also tried to use *Microsoft Photo Editor* as well.

Throughout the lesson boys could be heard talking quietly, however it was all about the task and mostly the boys appeared to be talking to themselves, either asking themselves questions or general comments about their image. Many times the boys on either side would answer their questions or give their opinion without even looking away from their screen!

Boys on side, "Oh, cool" produced an image and immediately called the boys on either side of him to show them – they ignored him though because they were looking at their own screens. They tried to get student **E9** to have a look and they called him 6 times but he only responded briefly with a "yeah" and a quick look and then he went back to his own screen!

An hour into the first lesson, the Researcher asked the students to have a quick walk around the room and look at the work that their peers are doing. This was very interesting as only half of the boys were interested! They were so involved in what they were doing they didn't want to have a look at anyone else's work, particularly students **E2, E14** and **E15**. Possibly it was because these students were very confident with their images. These three boys had already decided what they were going to do and their images were very creative and original. The boys that did have a look at their peers' artwork were impressed "wow, whose is that?" Other comments such as the ones below were also heard during this time.

'That's cool!'
'How awesome is that car?'

In the last half an hour of the lesson the boys became more interactive with their peers and there was a bit more movement around the room as boys had a look at what everyone else was doing. Some students decided to use the scanner after they'd seen what some of the other boys had done. In total, eight students during the first lesson used the scanner.

Towards the end of the lesson there was a lot of frustration with regards to saving their images, so the immediate solution was to save the image to the desktop. However, this meant that the students must sit at the same computer the next lesson.

At the closing of the lesson the Researcher asked the boys for any comments or feedback about the activity and the responses were very interesting. Student **E8** replied with the following comment, "We need more time and I wasn't sure about what to do with the background." He also stated that he found the task "annoying" at times because he is used to working with his hands in Visual Arts and he felt that the computer didn't let him do the same things! Student **E1** suggested that the task would be easier if they could just use *Microsoft Paint*. Two students said that the task was too open-ended and that they needed more guidelines on what to create. Student **E17** said that he would have liked more help with the IT side of things as he's not an "IT genius!"

The second lesson the majority of the students were still working in the computer laboratory still developing their images. The Researcher observed and felt that a handful of students were simply 'playing' around with their images rather than getting serious about one idea and sticking to it. Towards the end of the lesson there were a handful of students that began painting in the art room.

During the third and final lesson, the students were working in the art room and adding acrylic paint to their designs. Many students, such as **E3, E4, E11, E14, E18** and student **E19** were reluctant to add paint to their images as they felt that the paint would ruin it! The Researcher stated that some acrylic paint must be added to their image, even if it was only a small amount. Some of these students then became quite 'sloppy' with their application of the paint as if in defiance! This can be seen clearly in some of these students' artwork as the painting is not up to the student's usual standards. The Researcher was able to notice this as she teaches these students in her regular VA lessons.

Callow (2001), Hennig (2000), Long (2001) and Mathieson (1993) found that when they integrated TECH-TOOLS into their VAP the level of peer collaboration increased. The

Researcher felt that peer collaboration increased slightly during the use of TECH-TOOLS however, not a significant amount to really comment upon.

6.4   Observations (Control Group)

After the Researcher had explained the task, there were lots of comments from the boys such as "this is cool" and the boys were eager to start. There was a lot of excitement about looking through all of the photographs, especially to see how their photographs turned out. Most of the students spent nearly 9 minutes looking at all of the photographs and showing the other students which photographs were theirs. There as a lot of excitement from the boys at this stage.

Despite this excitement at the front of the room over the photographs, three students, **C7, C9** and **C12** started sketching immediately without even looking at any of the photographs. However, throughout the lesson these boys did go and have a look at the photographs for additional ideas.

Throughout the lesson the peer interaction was brief as the students were all involved the task. The talking was more 'self talk' as the students were thinking out aloud regarding the decisions they were making, for example student **C5** was talking to himself and said, "I know this'll be the bonnet". The students were also asking their peers questions as confirmation of their ideas, "what are you doing?"

There was also a lot of advice giving, such as when student **C8** said to student **C4**, "just draw one wheel there", or when another student, **C11,** said "there's an easier way to do that..." The students were keen to see what their peers were doing and a lot of them were giving their opinion, such as "that looks like that car has those eyes", or "I've got a better one than that!"

Student **C2** had trouble getting started and so he just kept on looking through the photos and checking to see what the other students were doing for confirmation of his own ideas. He asked the Researcher for help and was encouraged to keep on looking for ideas in the

different photographs. Later he was still having trouble making a decision and he was doing a lot of 'self talk' as well as asking other students:

"This is hard –what are you doing?"
"I just can't decide"
"I can't think of any car that is easy to do"

Students **C3** and **C7** and **C9** were helping each other to choose photographs and were talking to each other about their ideas, especially during the initial stages of their drawings.

When the students were talking the discussions were about cars as the boys were talking about what car their dad has and which model and make of car is better. "Holdens are better than Fords", "No way, Ford's are much better!" These comments were typical comments heard throughout the first lesson as the students were drawing.

At the end of the first lesson the boys were very keen to share their ideas and their plans for how they were going to paint their sketches in the next lesson.

During the second lesson the students were on task and enjoyed painting their sketches. The students worked quietly and once again, a lot of the interaction was about cars and which ones they like and why. They also discussed their favourite cars from the Fremantle Motor Museum.

6.5   Conclusion

It is clear from the qualitative evidence collected (VAE expert's observations, Researcher's observations and the Arts Responses feedback sheet) that the majority of the participants enjoyed the activity. It was also evident that the majority of the boys in the Experimental group really enjoyed the chance to experiment with using a variety of TECH-TOOLS to create an image which they could then use TRAD-MEDIA (acrylic paint, glue, and scissors) to complete.

The Researcher felt that the little peer interaction between the participants in the Experimental group, whilst they were working in the computer laboratory, was disappointing and that it was very strange for a VA lesson. She feels that a major contributing factor to students' enjoyment of VA is the amount of discussion and the relaxed atmosphere of the classroom environment.

The artwork produced by the students in the Experimental group overall was awarded higher in both of the categories, AI and ASP by three VAE experts which indicates that the boys' artwork was affected by them using TECH-TOOLS such as *Microsoft Photo Editor*, the scanner, photocopier and printer.

Chapter Seven

7.0 SUMMARY, DISCUSSION & IMPLICATIONS

7.1 Introduction

Upon completing this study the Researcher is able to answer the two research questions and link the findings to the relevant literature. The results will also be discussed in a Western Australian VAE primary school context as well as comments pertaining to further related research.

7.2 Summary of the results

The results, both quantitative and qualitative, have been discussed and summarised in chapters five and six. The findings will now be directly related to the two research questions.

Research question 1

How does the inclusion of TECH-TOOLS in a VA-PROG enhance learning (in terms of AI and ASP) for Year Seven boys?

The Year Seven boys, who used TECH-TOOLS for creating their artworks, appeared to have enhanced learning in terms of AI and ASP. This is evident in the quantitative data as the artwork produced from the students in the Experimental group scored higher than the artwork from the students in the Control group. Although the difference was only marginal in the boys' artwork, statistically the difference was significant; it is still an interesting discovery to make.

Overall the students' artwork from the Experimental group showed more attempts at movement and realism than the students from the Control group and these are characteristics of Lowenfeld & Brittain (1987) 'Dawning Realism' stage of creative development as shown in the Developmental Framework in Chapter Two. However, the

artwork from the boys in the Control group demonstrated that overall they had more of an understanding of the task which was to create an image where the car reflected the personality of someone such as a book character, a movie star, a sportsman or musician. Of the 16 pieces of artwork from this group only two students (**C5, C16**) presented a car which didn't show any signs of person's personality traits. Whereas five students from the Experimental group, (**E3, E4, E11, E12,** and **E19**) didn't show any attempts at reflecting a person's characteristics or personality traits.

Although the average mark, awarded by the VAE experts, for ASP in the Experimental group was higher (2.6) than the average mark for ASP in the Control group (2.3), the Researcher feels that the quality of the painting skills are better from the students in the Control group. This raises a very valid and controversial issue in VAE concerning the subjectivity of judgement on students' artwork. The Researcher was very aware of this aspect through her own teaching and research so in an attempt to overcome this subjectivity three VAE experts were asked to rate each piece of artwork using a set criteria.

The fact that the boys in the Experimental group also scored a higher average mark for AI is also interesting, however it must be recognised that the difference was only 0.1 which isn't a significant difference for teachers to drastically change their budget allocations, timetabling requirements etc…to include the use of TECH-TOOLS on a regular basis. Instead, teachers could use this information in order to justify the use of TECH-TOOLS into their TRAD-PROG as it appears to promote/encourage *some* students to think more creatively.

Research question 2

Does the cost of purchasing TECH-TOOLS for a VA-PROG outweigh the benefits of learning?

Considering the small improvement in the AI and ASP from the students in the Experimental group the VA teacher would have to seriously consider whether to purchase

TECH-TOOLS or whether this money could and would be better spent on purchasing other TRAD-MEDIA, such as more clay or a potter's wheel. However, as discussed previously the Western Australian Curriculum Framework states that VA students should have experiences which include the use of technology tools such as scanners, printers, and editing software (CCWA, 1998).

The Researcher purposefully chose *Microsoft Photo Editor,* with the students in the Experimental group, due to the fact that it was a part of the *Microsoft Office* package, which meant that there was no additional cost to VA teachers. This is important for schools with small VA or technology budgets to remember when considering purchasing these expensive tools. However if more advanced and expensive programs were to be used in primary school VAP, such as *Corel Painter* or *Paint Shop Pro* (which can cost between $500-800 per site licence) this would significantly affect the year's budget and purchase of TRAD-MEDIA.

Therefore, on the basis of these research findings the Researcher suggests that VA teachers in Western Australian primary schools include TECH-TOOLS in their VAP but not at the expense of other TRAD-MEDIA activities. As stated in the literature review it is important that students are given the opportunities to experiment with TECH-TOOLS as many of today's careers require skills in the use of these tools (Kuntyj, 2002; Matthews, 1997).

7.3   Linking the findings to the literature

In the conceptual frameworks the research of Lowenfeld & Brittain (1987), Piaget (1971), Duncum (1992) and Speck (1995) were discussed as providing a framework for this study. Consequently it is important to discuss the results of this research in relation to the conceptual frameworks.

As anticipated in the first conceptual framework, many of the boys in this study created a piece of artwork which demonstrated that they are in the Dawning Realism stage of graphic growth and development. This was particularly evident while the boys in the Experimental

group were working with the TECH-TOOLS during the initial stages of visual inquiry as they were very concerned about creating a realistic car, not too dissimilar to the original photographs. This can be seen in the following artworks where the student has not changed the photograph much at all for fear of it not looking real; **E2, E11, E12, E13, E17** and **E19.** However, when you look at the final products this may not be apparent as their poor application of paint has almost disguised the original photograph/image underneath. The following boys in the Experimental group used the photographs taken from their visit to the Fremantle Motor Museum and then used many of the TECH-TOOLS to alter the image significantly so that the image became their own. This was done through the addition of; wings, **E10**, different wheels, **E20, E6(A)** and **E6(B)**, different backgrounds **E1, E6(A), E6(B), E2, E10** and **E13** or the addition of words to the bonnet of the car, **E16.**

The boys in the Control group appeared to be less interested with trying to portray realism in their cars, possibly due to the fact that they were not working directly with the photographs. However, four of the students in this group did present fairly realistic cars, **C1, C7, C9** and **C12.**

As Speck (1995) states in her research boys typically produce artworks that feature machinery, violence and action. These themes were certainly prevalent in the boys' artwork produced in this study. In particular, student **E8,** from the Experimental group, created an image which featured the words 'blood' and 'guns', as well as a picture of a gun, bombs and fire in the background. Interestingly three of the pieces of artwork from the Experimental group, **E1, E8** and **E10,** include fire which Speck (1995) also found in her research. Another important finding is that the artwork produced by the boys in the Experimental group show the cars with more action and movement than the artwork from the students in the Control group. This is clearly evident in the artwork of **E2, E9, E10** and **E17** where the students have attempted to portray the car moving in some aspect.

Duncum (1992) suggests that children's drawings always show elements of either narrative or separate object , borrowed or self-generated, or factual or fictional. Therefore a child's piece of artwork can be classified as being narrative, borrowed and fictional. Considering

the fact that the theme for their artwork was *Character Cars* it was not surprising to the Researcher to discover that the majority of the artworks produced had a narrative element where the car tells the viewer a story about the character. The following artworks display narrative elements; **E2, E6(A), E6(B), E8, E9, E15, E17, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C15.**

The following artworks can be classified as factual as the boys have chosen realistic cars to portray their chosen character; **C1, C7, C9, C11, C12, C16, E3, E7, E11, E12, E17.**

The influence of media (films, television, video games, computer games etc...) was evident in several pieces of artwork, particularly in the Experimental group. Student **E16** created the 'Matrix' car after the popular science fiction film trilogy and student **E15** created an image which features the Hollywood actor, Tom Cruise. Student **E6** who produced two pieces of artwork, both feature the character of Homer Simpson from the television series 'The Simpsons'. Student **E20** created Dorothy the Dinosaur's car from the children's entertainment group, 'The Wiggles'. Only one student, **C2** from the Control group chose to base his car on a children's film called 'Our Friendship, Your Genius'.

7.4   Recommendations for the Future

If a similar research project were to be conducted the Researcher suggests that a much larger sample size be used to provide a more accurate result. The number of participants in this study was limited to two Year Seven classes due to time constraints and the Researcher's teaching loads at school. It would be very interesting to repeat the study but use a much larger sample size of perhaps ten Year Seven classes (with five Control groups and five Experimental groups). However, in order to obtain accurate results it would be imperative that exactly the same instructions, resources, time limits and examples were given to all of the students, which would be very difficult to achieve.

Another measurement tool could be used, such as the RASCH measurement model to use a more current research measurement tool. This was initially the Researcher's choice of

measurement model however after the data was collected it was determined that this model would not have been the most suitable model to use in order to provide the Researcher with the best way to present the results within the context and aims of the study.

7.5   Summary

At the conclusion of this study, the Researcher discovered that the inclusion of TECH-TOOLS into TRAD-PROG has a minimal effect on the students' artwork in terms of AI and ASP. Although the quantitative data suggests that there is a significant statistical difference between the artwork in the two groups the Researcher feels that in terms of VA teachers purchasing software or TECH-TOOLS they should consider the small difference in the students' artwork and whether they would be better spending their budget on TRAD-MEDIA, such as charcoal or lino tools.

This is an important result to consider for VA teachers who are considering purchasing or updating their TECH-TOOLS. Each primary school must consider the following when deciding whether to purchase TECH-TOOLS; the possible training required for staff, the associated timetabling issues and whether the use of these tools in an art room is practical at all with regards to protecting the equipment and safety concerns with using water around electrical objects. The last obstacle was avoided in this study by using a computer laboratory and then the students moving to the VA room to complete the activity using the TRAD-MEDIA.

By including TECH-TOOLS in TRAD-PROG the VA teacher will be accommodating for those students who may not succeed using TRAD-MEDIA as well as accommodating for different learning styles. The use of TECH-TOOLS may provide the opportunity for these students to experience success in VA which may improve their enjoyment and subsequent success using TRAD-MEDIA. This was certainly the case for some of the participants in this study.

The inclusion of TECH-TOOLS in TRAD-PROG is, in the Researcher's opinion, necessary and should only be thought of by VAE as including the use of another tool alongside traditional VA tools. This will ensure that students; gain experience in the use of different technologies which may lead them to a career in VA as well as the possibility of improving some student's interest in VA. There are also many benefits for VA teachers including the possibility of capturing students' motivation and interest in TECH-TOOLS as well as keeping 'up- to- date' with the latest TECH-TOOLS that can be used to create interesting affects in a variety of art forms, such as clay, printmaking, painting, textiles and drawing.

In conclusion, the Researcher feels that it is very important that students in primary school VA classes are given the opportunities to experiment with and use these TECH-TOOLS, however not at the expense of traditional VA projects which use TRAD-MEDIA.

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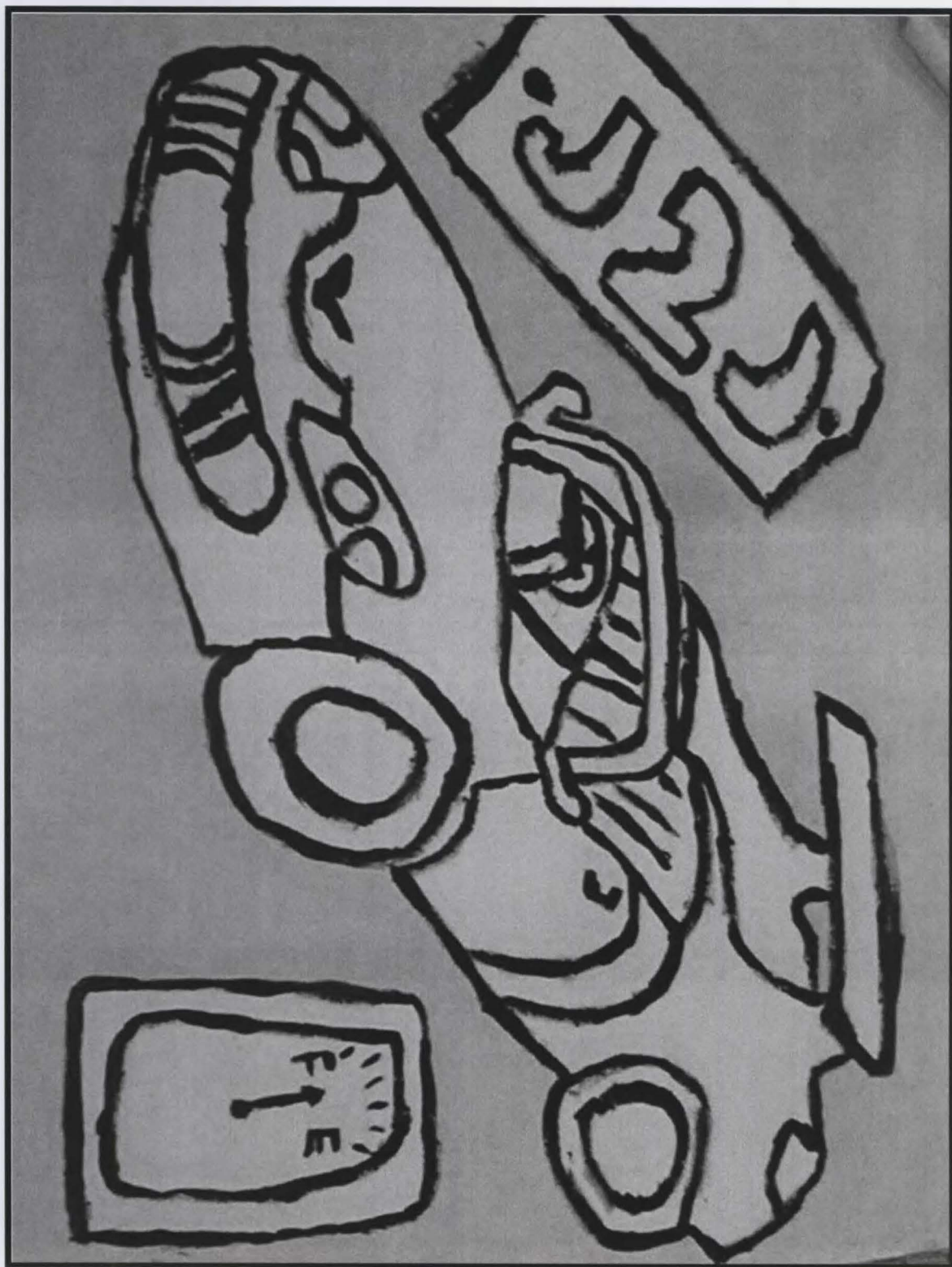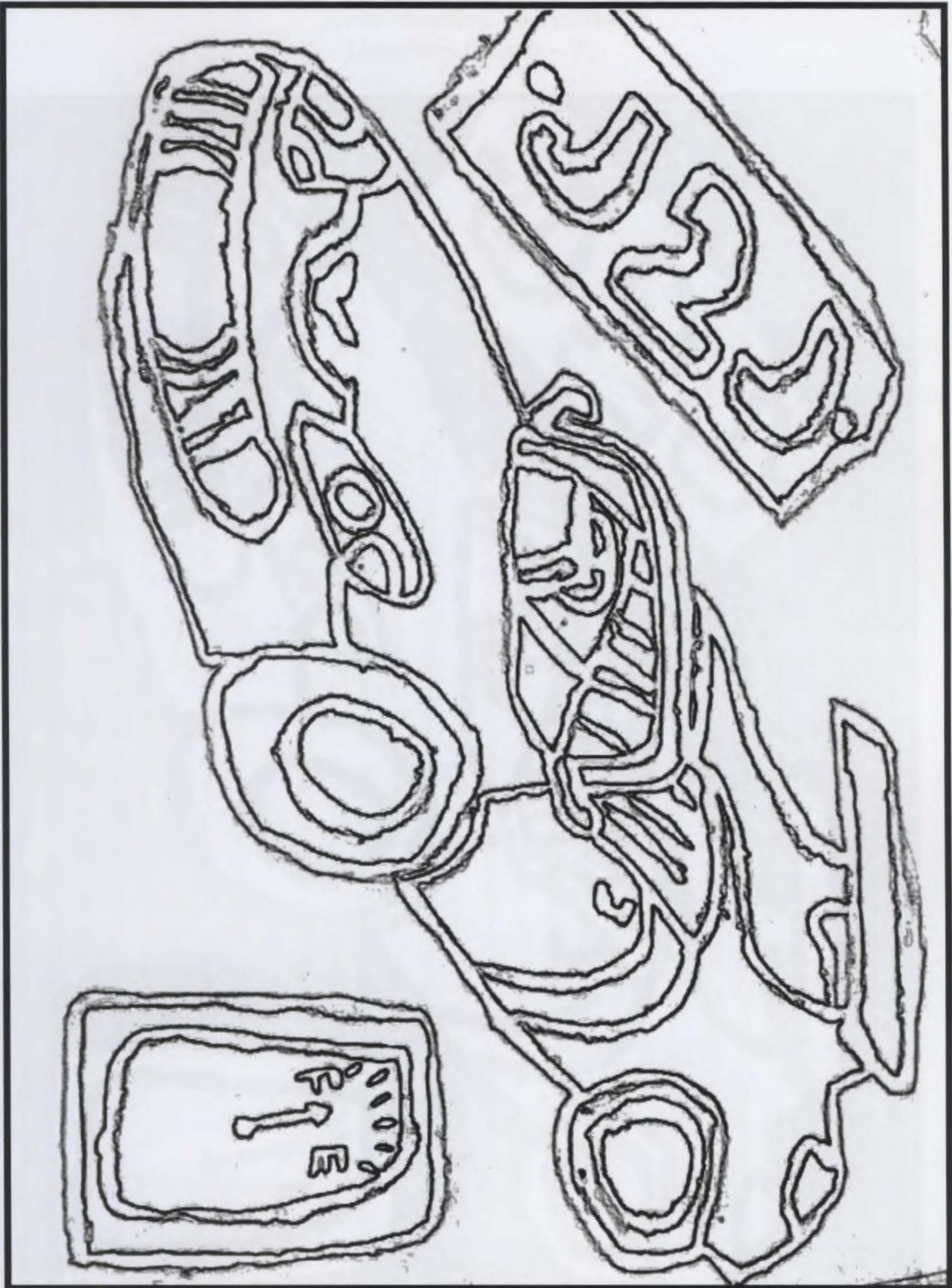
APPENDICES

APPENDIX A

Examples of a year 7 student's edited images using TECH-TOOLS
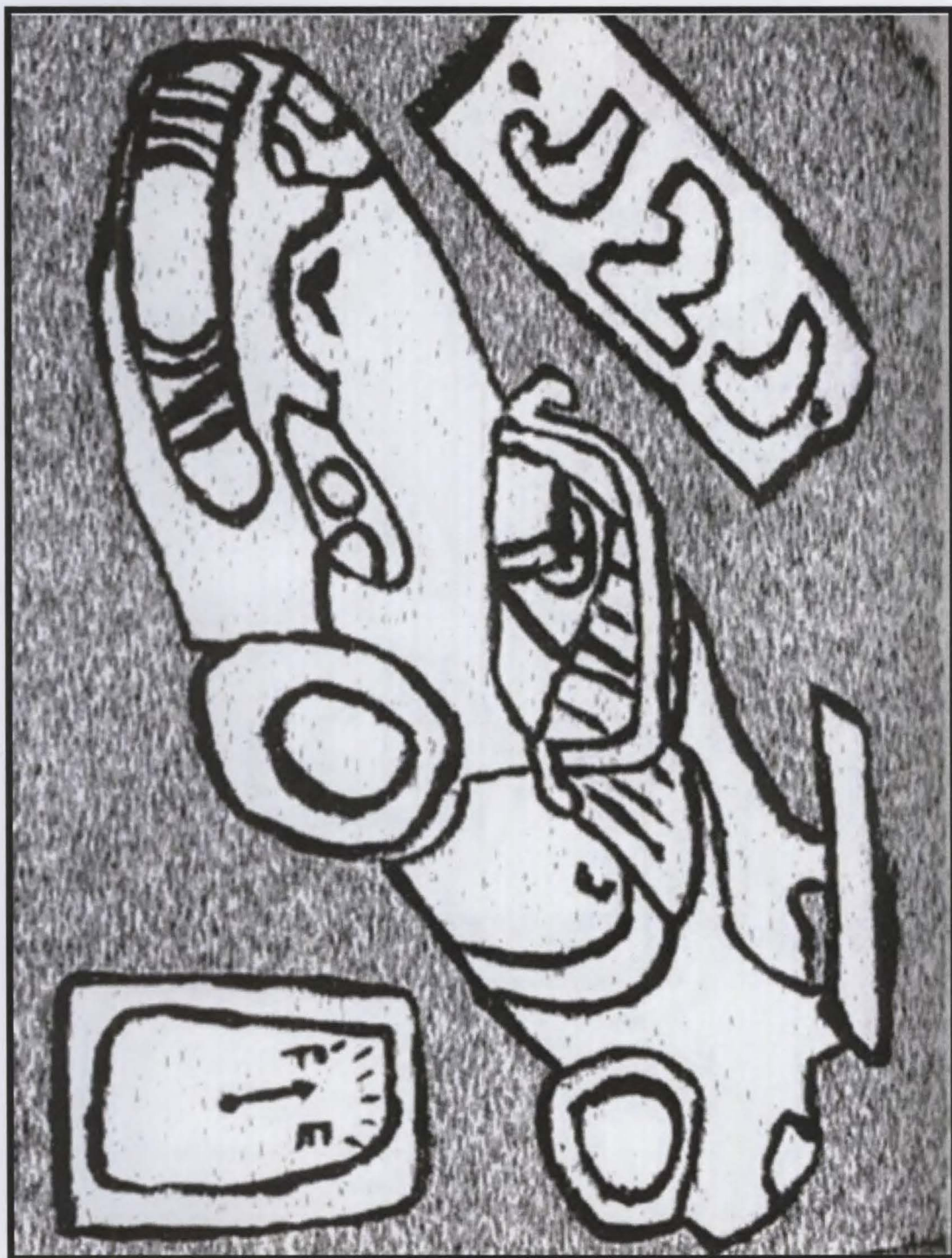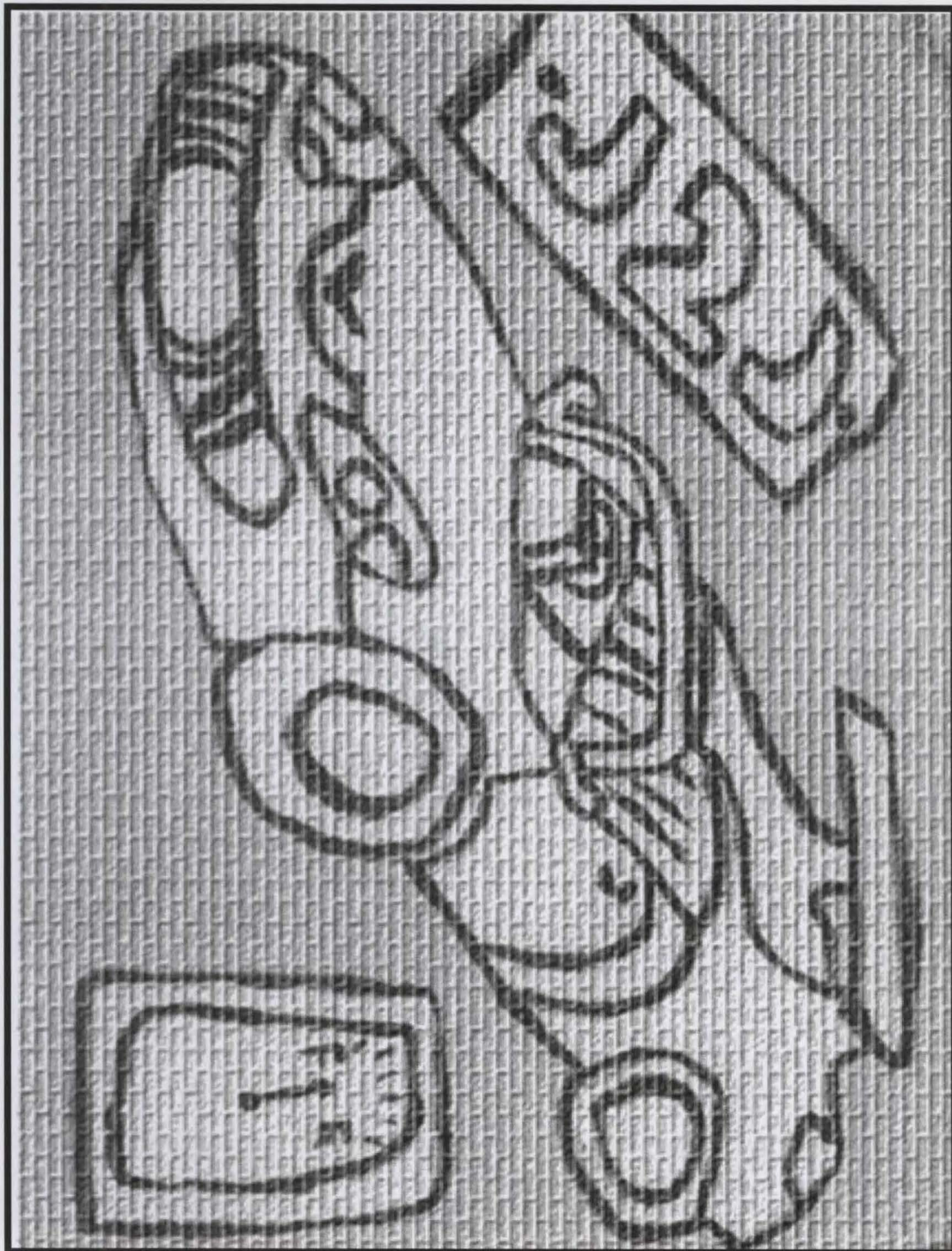(Permission obtained from the student)

Year 7 Student: John Gunawan (2003)
Edited image using *Microsoft Photo Editor* – 'Graphic Pen effect'
Stroke length – 15
Stroke direction – horizontal
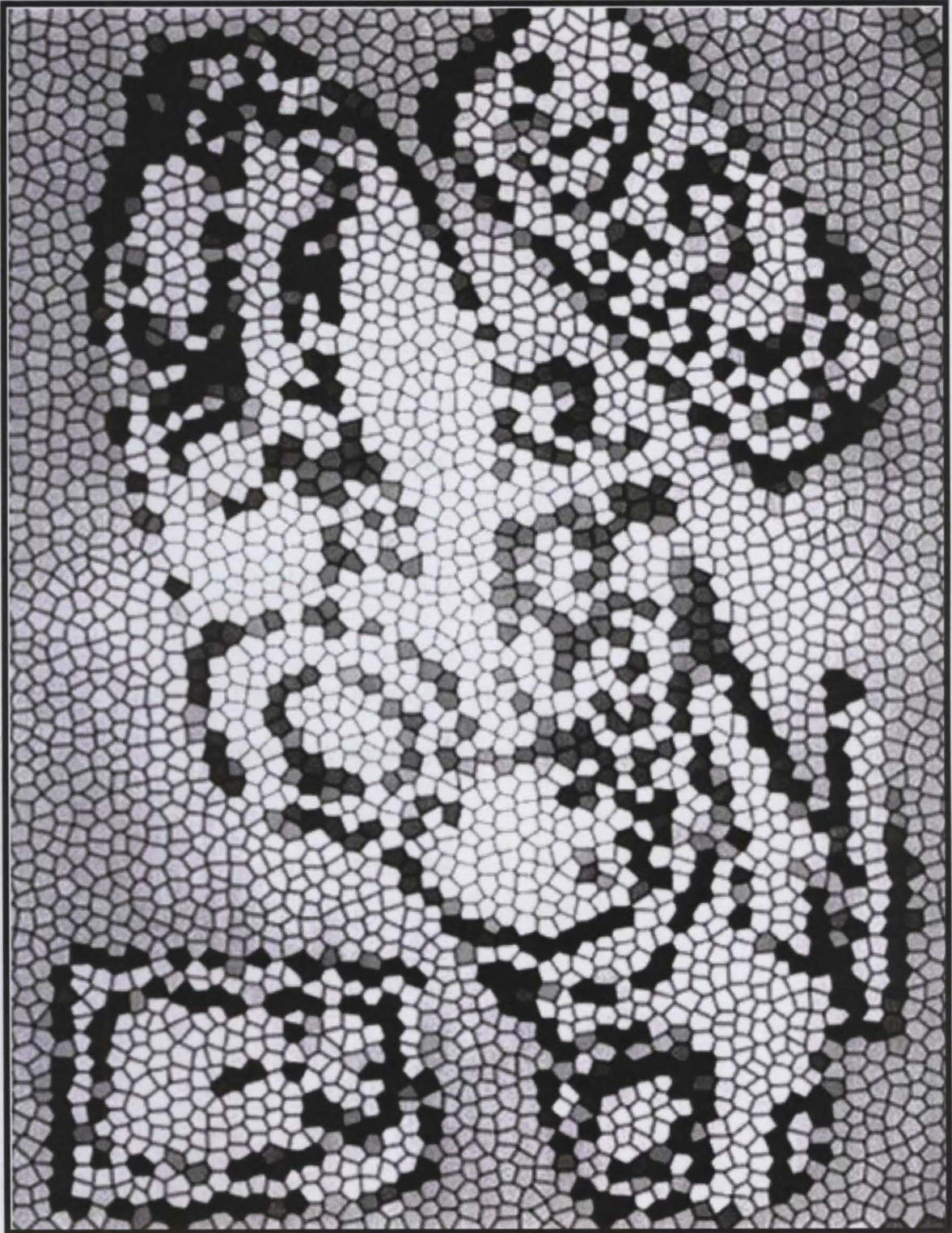Light/dark balance – 50

APPENDIX B

GLOSSARY OF TERMS

TECH-TOOLS: Visual Arts Technology Tools (digital cameras, scanners, photocopiers, printers, computers and software programs)

TRAD-PROG: Traditional Visual Arts Program/s: These traditional Visual Arts Programs include the use of traditional Visual Arts media, such as charcoal, oil pastels, clay, wire etc...

VAP: Visual Arts Programs

VA: Visual Arts

TRAD-MEDIA: Traditional Visual Arts Media
(Charcoal, pencils, paint, pastels, clay, paper, fabric, wool...)

VAE: Visual Arts Education

OBE: Outcomes Based Education

ASP: Arts Skills and Processes

AI: Arts Ideas

APPENDIX C

Comparison of TRAD-MEDIA with their 'virtual' counterparts

A cat drawn in oil pastels (TRAD-MEDIA) by a six year old girl.

(Mathieson, 1993, p.115)

A cat drawn on a computer by the same six year old girl.

(Mathieson, 1993, p.115)

APPENDIX D

Informed Consent Document for Parents of Participants

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Dear Parent /Guardian

This letter is to seek your permission for your son to participate in a research project that is being undertaken as part of a Masters in Education at Edith Cowan University. As you are probably aware the major component of completing this degree is conducting research and writing a thesis. I am currently researching the impact of technology in Visual Art classes in Primary Schools and whether boys' artwork becomes more creative when they are given the opportunity to combine traditional Visual Arts media and technology tools to create a piece of artwork.

The main aim of this research project is to try and establish whether integrating a variety of technology tools, such as scanners, digital cameras and Microsoft Photo Editor affect the quality of Year Seven boys' artwork and whether it is worth spending the money and resources on these technology tools or whether Visual Arts teachers should be spending their budgets on traditional Visual Arts media, such as charcoal and paint. Your son has been chosen to participate in this study due to the fact that the Researcher currently teaches at your son's school.

If you give consent for your son to be a part of this research project he will attend the Fremantle Motor Museum to record many images of different cars by sketching and taking digital photographs. He will then be asked to create an interesting image using the theme of *Character Cars* using a variety of media. As part of this process he may be asked to use scanners, digital cameras and *Microsoft Photo Editor* as tools to complete the artwork. The third part of the project involves the participants reflecting on their artwork and the steps that they undertook to complete their images. It is estimated that your son will be involved in this research project for the duration of three weeks during regular Visual Arts lessons at school.

At the completion of the art activities each piece of artwork will be assessed (using a set of pre-determined criteria and a scale) by two Visual Arts education experts from Edith Cowan University to determine the effect of technology in Visual Arts programs and whether it is really worth spending the money on expensive technology equipment in our schools.

The Researcher is also seeking permission from you for these Visual Art activities to be filmed as this is a useful way of recording the students' interactions and the steps that they undertake to complete their artwork. The only people that will have access to these video recordings will be the Researcher, her supervisor and the two Visual Arts education experts who will be involved in the analysis of the artwork. At the completion of the research project the Researcher will keep the video recording and may show this video to her colleagues at the participating school. Please indicate clearly on the permission slip

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whether you give consent to your son being filmed during the three Visual Arts lessons. Your son may still participate in the study if you do not wish him to be filmed as we will erase his identity in the final video, or alternatively if the majority of parents/guardians do not want their son to be filmed then the Researcher will not film the Visual Arts lessons at all.

If you give permission for your son to participate in this study, he will be learning about the variety of tools that a Visual Artist can use to express an idea or theme. Any of the artworks that he produces or written comments that he provides will remain confidential and his name will not be disclosed during the analysis of the artwork or in the completed thesis. His work will only be identified in the thesis by a letter and a number. All pieces of artwork will be returned to your son upon completion of the thesis. It is important that you know that if you give permission for your son to participate in this study you are free to withdraw your consent to further involvement at any time during the research.

If you would like your son to participate in this study can you please sign the *Informed Consent Document* as soon as possible and return in to the Researcher. If you have any questions or require any further information about the research project, please contact: Gemma Scarparolo on 9371 0768 or 0404 686 620. Alternatively if you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact:

Research Ethics Officer

Human Research Ethics Committee

Edith Cowan University

100 Joondalup Drive

JOONDALUP WA 6027

Phone: (08) 6304 2170

Email: research.ethics@ecu.edu.au

Yours sincerely

Gemma Scarparolo

Researcher's contact details

Gemma Scarparolo

Wesley College
Middle School
PO Box 149 South Perth
Western Australia

██████
██████
g.scarparolo@ecu.edu.au

Supervisor's contact details

Dr. Geoff Lummis

Edith Cowan University
100 Joondalup Drive
Joondalup

(w) 9400 5937
g.lummis@ecu.edu.au

Please circle the appropriate information, fill in your son's full name and sign and date the consent form.

I /we do/don't give permission for our son _____ to participate in Gemma Scarparolo's research project titled 'Character Cars: How Computer Technology Enhances Learning in terms of Arts Ideas and Arts Skills and Processes in a Year 7 Male Visual Arts Program.'

I /we do/ don't give permission for our son to be filmed during the three Visual Arts activities that are part of this research project.

Parent/Guardian's signature/s: _____   Date: _____

Date: _____

Dear Student / Participant

This letter is to ask for your permission to participate in a study that will be conducted by Mrs. Scarparolo at your school during your regular Visual Arts lessons. The research is part of a Masters in Education degree at Edith Cowan University and the title is; Character Cars: How Computer Technology Enhances Learning in terms of Arts Ideas and Arts Skills and Processes in a Year 7 Male Visual Arts Program.

If you agree to participate in this study you will visit the Fremantle Motor Museum and take digital photos of the many cars that are on display there. You will also sketch your favourite cars while you are at the Fremantle Motor Museum as you will use these images during the next activity.

The second task involves you designing an interesting piece of artwork using your digital images and your sketches with the theme being *Character Cars*. You will then be asked to answer seven questions which will ask you to reflect on your pieces of artwork and the steps that you took to complete it.

Your pieces of artwork may be included in the final thesis; however your artwork and your comments will only be identified by a letter and a number. All of your pieces of artwork will be returned to you when the thesis is completed.

I am also asking for your permission to be filmed during the two activities (excursion to the Fremantle Motor Museum and completion of the *Character Cars* piece of artwork). It is important for you to know that this video will only be seen by Mrs. Scarparolo, her supervisor, Dr. Geoff Lummis, two Visual Arts education experts from Edith Cowan University and other teachers at school.

If you have any further questions regarding this letter or the study please do not hesitate to contact Mrs. Scarparolo directly at school or by email at g.scarparolo@ecu.edu.au

Please complete the permission slip below and return it to school as soon as possible.

Yours sincerely

Student's full name

I _____ would like to participate in the study titled 'Technology in Year 7 Visual Arts Programs: Is it *really* worth it?' I **do/don't** give my permission to be filmed during the first two activities.

Student's signature:

Date: _____

APPENDIX E

Visual Arts Programs

VISUAL ARTS PROGRAM: *Character Cars*
THEME: **TECH-TOOLS and TRAD-MEDIA**

Activity 1:	Visual Inquiry

Visual Arts learning

Line: express or evoke different feelings
     : tell visual stories
      : are found or represent lines seen in the man-made environment
      : emphasize shape and form
Shape & Form: are found or represent objects see in the man-made environment
          : express or evoke different feelings
          : tell a visual story
Drawing: observed and contour
Expressive skills: apply observation skills

Materials

- Children's book, 'Car-Rumba' by David Lennie and Peter Kendall.
- Stimulus pictures and photographs of a variety of cars (Appendix H, p. 131).
- A4 cartridge paper
- Graphite pencils
- Erasers

Activity

1. Take the students to the Fremantle Motor Museum so that the students can take digital photos and complete direct observational drawings of various cars.
2. Read the book 'Car-Rumba' to the students and discuss how the cars in the story reflect the characters' personalities.
3. Talk about how people they know may drive cars that reflect their personalities.
4. Students choose an image of a car that they like and then they sketch it as best as they can using only a graphite pencil and an eraser. Students should focus on the detail in their drawings.

Activity 2:	Exploration & Creation

Visual Arts learning

Line & Colour: express or evoke different feelings
       : tell visual stories
       : are found or represent lines seen in the man-made environment
       : emphasize shape and form
Shape & Form: are found or represent objects see in the man-made environment
       : express or evoke different feelings
       : tell a visual story
Drawing: fantasy
Painting: acrylic and textas
Collage: paper
Expressive skills: freely express ideas and feelings in artworks

		: apply imagination skills
Materials		• A3 and A4 white cartridge paper
		• Acrylic paints (red, yellow, blue, white and black)
		• Paintbrushes
		• Water
		• Scissors
		• Digital Cameras
		• Printers (with paper)
		• Access to computers for each student with editing software.
		• Glue sticks
Activity		Review and discuss the last lesson and their sketches.

TASK:

To create an interesting 2D piece of artwork with a car that reflects their personality, a friend or a book character which is presented in an interesting background.

Activity 3:	**Arts Responses**
Arts Responses	Students will be able to use appropriate language to discuss:
	1. the expressive themes and ideas relating to their personal feelings and experiences
	2. their own artistic ideas with others
Materials	• Student response sheets
	• Pencils
	• Erasers
	• Students' finished products
	• Digital camera
Activity	1. Discuss with the students as a group how their piece of artwork progressed from the first stage/activity.
	2. Discuss their ideas and meanings that they wished to convey in their artwork
	3. Hand out the student response sheet and state that they should try and answer the questions to the best of their ability with as much detail as possible.
	4. Take a digital camera of each student's artwork and earlier sketches.
	5. Thank the individual students for their time and express my appreciation for their honesty and the sharing of their ideas.

VISUAL ARTS PROGRAM: *Character Cars*
Art Learning Focus: TECH-TOOLS and TRAD-MEDIA
Year 7 Students

ARTS IDEAS
Students generate artworks that communicate ideas.

- Students will create an expressive 2D piece of artwork featuring a car that reflects their personality or that of a book character, friend or famous person.
- Students will explore and create their designs using a combination of TRAD-MEDIA and TECH-TOOLS.
- Students will present their visual product to their peers and explain the steps that they used to create their artwork.
- Students will be able to express their ideas through their car design that reflects the personality of their chosen character.

ARTS SKILLS& PROCESSES
Students use the skills, techniques, conventions and technologies of the arts.

Students will:

- Develop their drawing skills through direct observational drawing, imaginative drawing and contour drawing.
- Develop their painting skills by experimenting with acrylic paint in the second activity.
- Explore and experiment with the use of TRAD-MEDIA and TECH-TOOLS in order to create their character car.
- Express their imagination and ideas through their designs so that their character car reflects the personality of their chosen character.

ARTS RESPONSES
Students use their aesthetic understanding to respond to, reflect and evaluate the arts.

- Students will discuss their pieces of artwork with their peers with regards to their success and ideas expressed in their artworks.
- Students will respond (verbally and written) to the steps taken in the creative process and their satisfaction /problems that occurred.
- Students will reflect on their success/problems using the combination of TECH-TOOLS and TRAD-MEDIA with their peers and in written response.

Student Feedback Sheet (Appendix F, p. 125)

ARTS IN SOCIETY
Students understand the role of the arts in society.

- Students will discuss and learn about the role of car designers
- Students will discuss the role of illustrators in society
- Students will discuss that their artwork is unique and a valuable contribution to society

VISUAL ARTS PROGRAM:	*Character Cars*
THEME:	**TRAD-MEDIA (Control Group)**

Activity 1:	Visual Inquiry
Visual Arts learning	Line: express or evoke different feelings 　　　: tell visual stories 　　　: are found or represent lines seen in the man-made environment 　　　: emphasize shape and form Shape & Form: are found or represent objects see in the man-made environment 　　　　　: express or evoke different feelings 　　　　　: tell a visual story Drawing: observed and contour Expressive skills: apply observation skills
Materials	• Children's book, 'Car-Rumba' by David Lennie and Peter Kendall. • Stimulus pictures of a variety of cars (Appendix H, p. 131) • A4 cartridge paper • Graphite pencils • Erasers
Activity	1. Take the students to the Fremantle Motor Museum so that the students can take digital photos and complete direct observational drawings of various cars. 2. Read the book 'Car-Rumba' to the students and discuss how the cars in the story reflect the characters' personalities. 3. Talk about how people they know may drive cars that reflect their personalities. 4. Students choose an image of a car that they like and then they sketch it as best as they can using a graphite pencil and an eraser. Students should focus on the detail in their drawings.

Activity 2:	Exploration & Creation
Visual Arts learning	Line & Colour: express or evoke different feelings 　　　　: tell visual stories 　　　　: are found or represent lines seen in the man-made environment 　　　　: emphasize shape and form Shape & Form: are found or represent objects see in the man-made environment 　　　　　: express or evoke different feelings 　　　　　: tell a visual story Drawing: fantasy Painting: acrylic and textas Collage: paper Expressive skills: freely express ideas and feelings in artworks 　　　　　: apply imagination skills

Materials
- A4 and A3 white cartridge paper
- Acrylic paints (red, yellow, blue, white and black)
- Paintbrushes
- Water
- Scissors
- Glue sticks

Activity   Review and discuss the last lesson and their sketches.

TASK:

To create an interesting 2D piece of artwork with a car that reflects their personality, a friend or a book character which is presented in an interesting background.

Activity 3:	Arts Responses

Arts Responses   Students will be able to use appropriate language to discuss:
1. the expressive themes and ideas relating to their personal feelings and experiences
2. their own artistic ideas with others

Materials
- Student response sheets
- Pencils
- Erasers
- Students' finished products
- Digital camera

Activity
1. Discuss with the students as a group how their piece of artwork progressed from the first stage/activity.
2. Discuss their ideas and meanings that they wished to convey in their artwork
3. Hand out the student response sheet and state that they should try and answer the questions to the best of their ability with as much detail as possible.
4. Take a digital photo of each student's artwork and earlier sketches
5. Thank the individual students for their time and express my appreciation for their honesty and the sharing of their ideas.

VISUAL ARTS PROGRAM: *Character Cars*
Art Learning Focus: TRAD-MEDIA (Control Group)
Year 7 Students

ARTS IDEAS Students generate artworks that communicate ideas.	ARTS SKILLS& PROCESSES Students use the skills, techniques, conventions and technologies of the arts.

Students will:

- Students will create an expressive 2D piece of artwork featuring a car that reflects their personality or that of a book character, friend or famous person.
- Students will explore and create their designs using TRAD-MEDIA.
- Students will present their visual product to their peers and explain the steps that they used to create their artwork.
- Students will be able to express their ideas through their car design that reflects the personality of their chosen character.

- Develop their drawing skills through direct observational drawing, imaginative drawing and contour drawing.
- Develop their painting skills by experimenting with acrylic paint in the second activity.
- Explore and experiment with the use of TRAD-MEDIA in order to create their character car.
- Express their imagination and ideas through their designs so that their character car reflects the personality of their chosen character.

| ARTS RESPONSES Students use their aesthetic understanding to respond to, reflect and evaluate the arts.	ARTS IN SOCIETY Students understand the role of the arts in society.

- Students will discuss their pieces of artwork with their peers with regards to their success and ideas expressed in their artworks.
- Students will respond (verbally and written) to the steps taken in the creative process and their satisfaction /problems that occurred.
- Students will reflect on their success/problems using TRAD-MEDIA with their peers and in written response.

Student Feedback Sheet (Appendix F, p. 125)

- Students will discuss and learn about the role of car designers
- Students will discuss the role of illustrators in society
- Students will discuss that their artwork is unique and a valuable contribution to society

APPENDIX F

Student Feedback Forms
(Arts Responses)

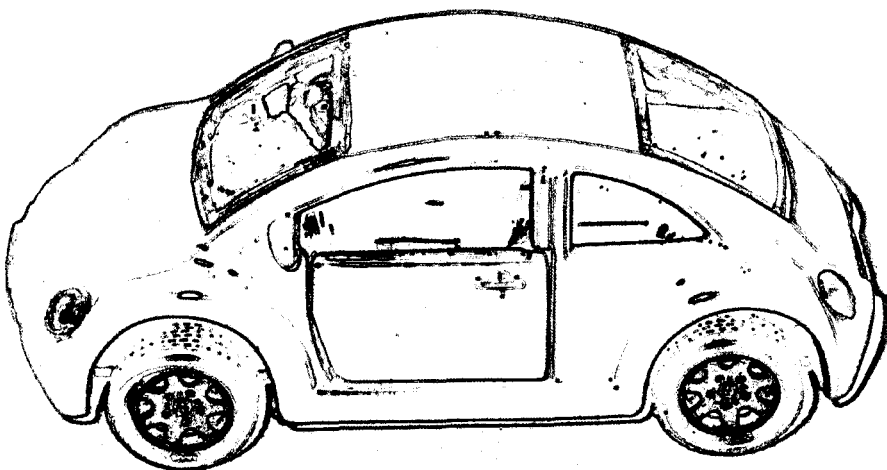CHARACTER CARS

ARTS RESPONSES
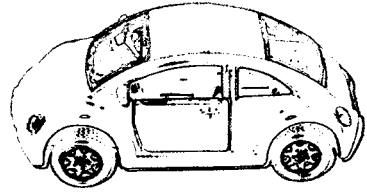
1.   **What is the title of your artwork?**

2.   **Why did you choose this title?**

3.   **Clearly explain in steps how you created this piece of artwork**

4.   **Which materials did you use?**

5. **What is your piece of artwork about? (Tell me about your artwork)**

6. **What did you think about the art project?**

7. **What would you change about this project?**

APPENDIX G

Permission from the School

Dear Headmaster

I am currently undertaking a Masters in Education degree at Edith Cowan University, specialising in Visual Arts Education. As you are aware the major component of completing this degree is writing a thesis. I am currently conducting research into the impact of technology in Visual Art classes in Primary Schools and whether students' artwork becomes more creative and expressive. I am focusing on the impact of this technology on boys as this is where my current teaching experience lies. The title of my thesis is, 'Character Cars: How Computer Technology Enhances Learning in terms of Arts Ideas and Arts Skills and Processes in a Year 7 Male Visual Arts Program.'

I am hoping to carry out this research with two groups of Year Seven boys, with approximately 25 students in each group. The study will involve the students working through three sequenced art activities based around the theme of *Character Cars*. In order to provide a rich background of knowledge and images for the students I am hoping to take all of the students to visit the Fremantle Motor Museum. While the boys are at the museum they will be asked to complete several direct observational drawings as well as taking digital photographs.

The Control group will then complete various pieces of art using traditional visual arts media whereas the Experimental group will complete their pieces of art using a combination of traditional visual arts media and technology tools (such as digital cameras, scanners, computers, Microsoft Photo-Editor, programs, printers and photocopiers). The end results (pieces of artwork) will be assessed to determine whether the integration of technology in Visual Arts affects the expressive outcomes and whether it is really worth spending the money on these expensive technology tools.

The results will be used to determine the impact and effectiveness of using technology in Primary School Visual Arts classes. A quantitative analysis will take place using the Rasch measurement model in order to determine a statistical difference between the students' artwork in the Control and Experimental group. There is also a qualitative element to this study as the boys will be asked to complete a written feedback form which asks them to reflect on their artwork and their experiences during the activities.

The boys' names and identity will be protected throughout the research process (and publication of the findings) as their artwork and answers from the feedback forms will only be identified in the research by a number and a letter. I am also seeking permission from the school and the boys' parents to film the boys during the second art activity.

I will contact you soon to arrange an interview to discuss the possibility of conducting my research at your school with two of the Year Seven classes this term.
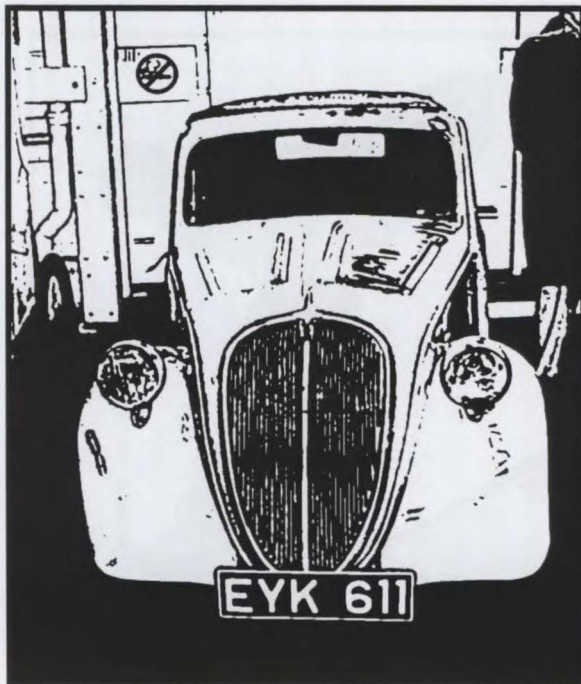
Yours sincerely

Gemma Scarparolo

APPENDIX H

Images used for the VAP

Photograph taken at the Fremantle Motor Museum

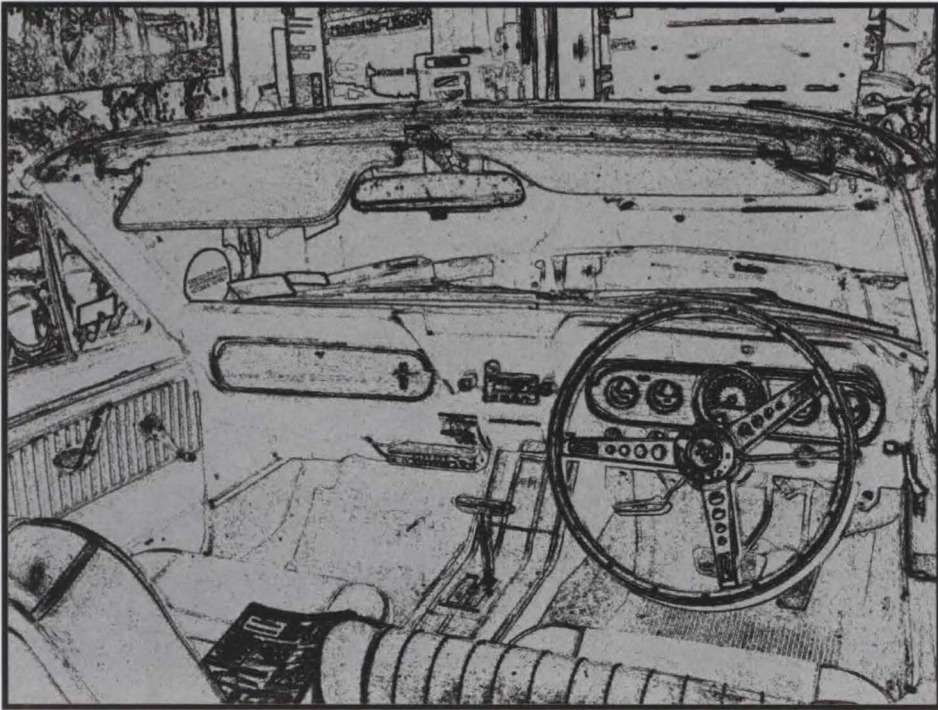*Microsoft Photo Editor* – 'Stamp Effect'

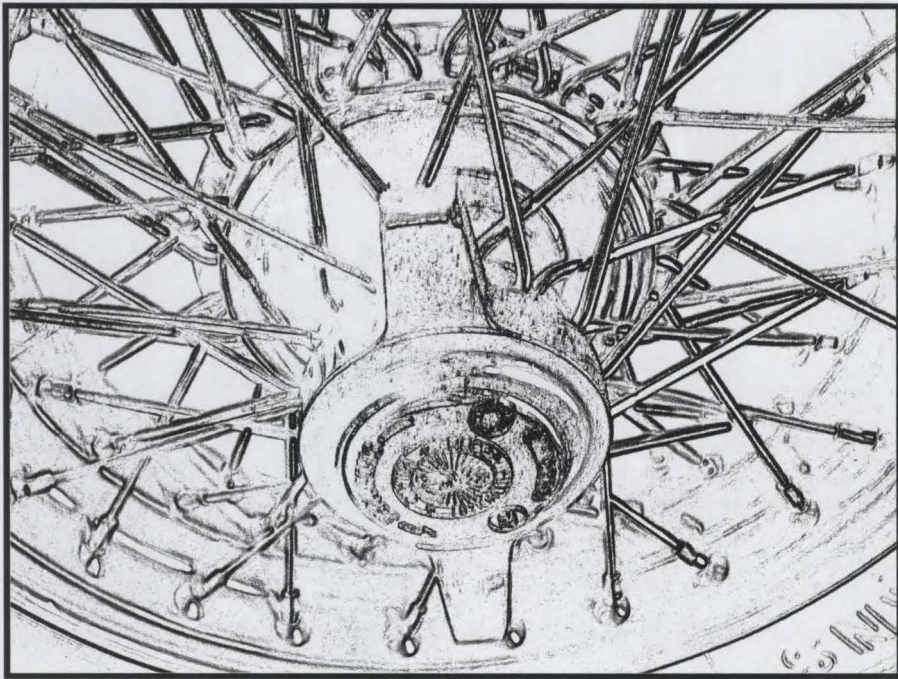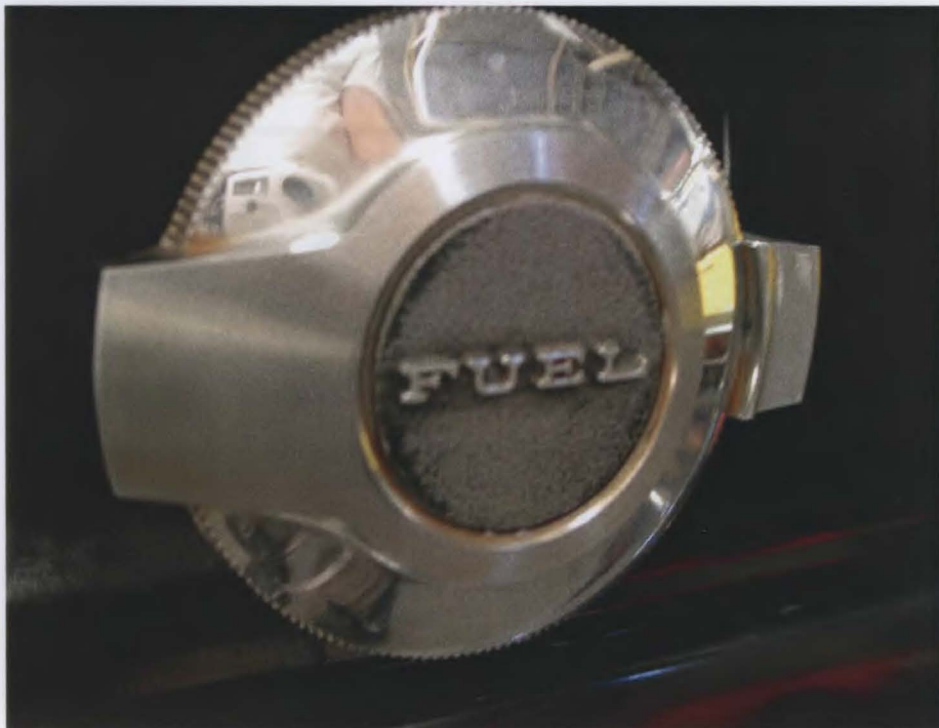*Microsoft Photo Editor* – 'Graphic Pen Effect'

Under Restoration

ArcSoft Photo Impression 3.0 – 'Sketch effect'

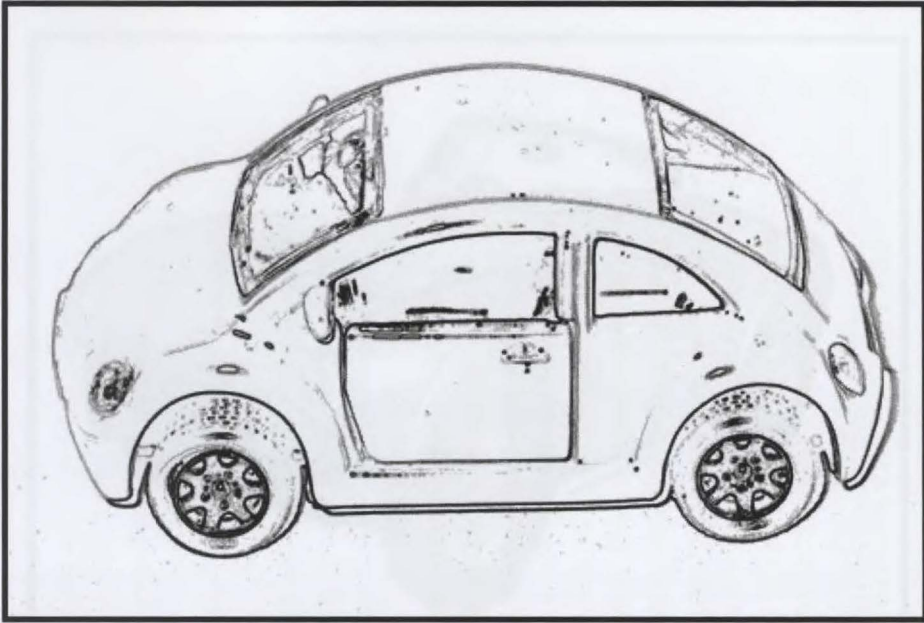*ArcSoft Photo Impression 3.0 – 'Sketch effect*
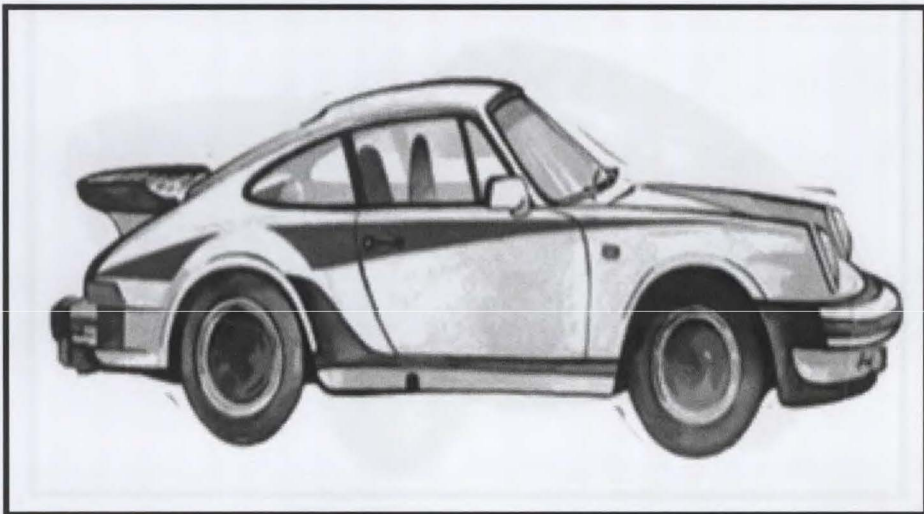
APPENDIX I

Data Analysis Criteria

	1	2	3	4
ARTS IDEAS **Expressive qualities** **Visual Inquiry**	Borrowed images Direct observation images	Borrowed and self-generated ideas	Self-generated ideas	Self-generated or 'original' ideas
	Limited visual ideas	Conveys basic visual ideas	Conveys sound visual ideas	Conveys strong visual ideas
	Basic symbolic representations	Sound Symbolic Representations		
ARTS SKILLS **&** **PROCESSES**	Limited evidence of application of skills and processes	Sound application of skills and processes	Very good application of skills and processes	Excellent application of skills and processes
Manipulative skills	Basic use of media	Sound use of media	Very good use of media	Imaginative use of media
	Drawing	Drawing	Drawing	Drawing
	Preschematic stage of development (Lowenfeld)	Schematic stage of development- 7-9 years (Lowenfeld)	Dawning realism stage of development - 9-11 years. (Lowenfeld)	Pseudo-realistic stage of development – 11-13 years. (Lowenfeld)
	Limited use of elements and principles	Sound use of elements and principles	Competent use of elements and principles	Highly competent use of elements and principles
	No sense of perspective	Basic sense of perspective	Good sense of perspective	Excellent sense of perspective
	Little Control over paintbrush marks	Fair Control over paintbrush marks	Very Good Control over paintbrush marks	Excellent Control over paintbrush marks
	Simple use of colours	Simple use of colours	Good use of colours	Creative use of colours

APPENDIX J

Original Data

CONTROL GROUP'S IDENTIFICATION

ID	AI - average mark	ASP - average mark
C1	1.7	1.7
C2	2.7	2.7
C3	2.7	2.3
C4	2.7	2.3
C5	3.3	3.3
C6	2.7	2.3
C7	2.3	2.3
C8	2.3	2.3
C9	2.3	2.0
C10	2.3	2.0
C11	3.0	2.3
C12	2.0	2.3
C13	2.3	2.0
C14	3.3	3.0
C15	2.3	2.0
C16	2.7	2.0
AVERAGE: CONTROL GROUP	**2.5**	**2.3**

EXPERIMENTALGROUP'S IDENTIFICATION

ID	AI - average mark	ASP - average mark
E1	3.0	3.0
E2	2.7	2.7
E3	2.0	1.7
E4	2.0	1.7
E5	2.7	2.0
E6(A)	4.0	3.7
E6(B)	4.0	4.0
E7	2.3	3.0
E8	2.3	2.3
E9	3.0	2.3
E10	2.0	2.7
E11	1.7	1.7
E12	3.3	3.0
E13	3.0	3.0
E14	3.0	3.0
E15	3.0	2.3
E16	2.0	3.3
E17	2.7	3.0
E18	2.3	2.3
E19	2.7	2.0
E20	2.0	2.0
EXPERIMENTALGROUP: AVERAGE	**2.7**	**2.6**

SPSS Data Output
T-Test

<p align="center">One-Sample Statistics</p>

	N	Mean	Std. Deviation	Std. Error Mean
Control Group (AI)	16	2.5375	.43493	.10873
Experimental Group (AI)	21	2.6524	.63531	.13864

<p align="center">One-Sample Test</p>

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Control Group (AI)	23.337	15	.000	2.5375	2.3057	2.7693
Experimental Group (AI)	19.132	20	.000	2.6524	2.3632	2.9416

	N	Minimum	Maximum	Mean	Std. Deviation
Control Group (AI)	16	1.70	3.30	2.5375	.43493
Experimental Group (AI)	21	1.70	4.00	2.6524	.63531
Valid N (listwise)	16				

T-Test

<p align="center">One-Sample Statistics</p>

	N	Mean	Std. Deviation	Std. Error Mean
Control Group (ASP)	16	2.363	.4759	.1190
Experimental Group (ASP)	21	2.605	.6523	.1423

<p align="center">One-Sample Test</p>

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Control Group (ASP)	19.856	15	.000	2.363	2.109	2.616
Experimental Group (ASP)	18.300	20	.000	2.605	2.308	2.902

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	N	Minimum	Maximum	Mean	Std. Deviation
Control Group (ASP)	16	1.7	3.3	2.363	.4759
Experimental Group (ASP)	21	1.7	4.0	2.605	.6523
Valid N (listwise)	16				