Creating Constructivist Learning Environments with Digital Storytelling

Najat Smeda

College of Engineering and Science

Victoria University

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To my mother, father, husband, mother-in-law and children, with all my love and respect

Abstract

In recent years the use of new technologies in educational systems has increased worldwide, as digital cameras, personal computers, scanners, and easy-to-use software have become available to educators to harness the digital world. The impact of new technologies in educational contexts has been very positive; new technologies have given educators the opportunity to enhance their knowledge, skills, and therefore enhance the standard of education. Researchers have found that student engagement, achievement and motivation are enhanced through integration of such technologies. However, education systems still face many challenges: one of these challenges is how to enhance student engagement to provide better educational outcomes. It has become increasingly important to use innovative pedagogical models to engage learners. Digital storytelling is one of the innovative pedagogical approaches that can engage students in deep and meaningful learning.

The mission of this research is to create a constructivist learning environment with digital storytelling. The research investigates the pedagogical aspects of digital storytelling and the impact of digital storytelling on student learning when teachers and students use digital stories. This research develops a new e-Learning Digital Storytelling (eLDiSt) framework. This framework is based on the needs and capabilities of learners at various stages of learning. A multi-site case study has been conducted in one Australian school at primary and secondary levels. In selected classrooms, students and teachers have the opportunity to engage in innovative learning experiences based on digital storytelling. In order to enhance the reliability and validity of the research, multiple methods of data collection and analysis have been used.

Data was collected with qualitative and quantitative methods. Rubric evaluation has been used to collect quantitative data, while interviews and observation are used to collect

qualitative data. Data collection was based on mixed methods research to evaluate if and how digital storytelling enhances teaching and learning outcomes.

The findings from this study suggest that digital storytelling is a powerful tool to integrate instructional messages with learning activities to create more engaging and exciting learning environments. It is a meaningful approach for creating a constructive learning environment based on the principles of teaching and learning. Thus, this approach has the potential to enhance student engagement and provide better educational outcomes for learners.

Student Declaration

"I, Najat Smeda, declare that the PhD thesis entitled "**Creating Constructivist Learning Environments with Digital Storytelling**" is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature: 

Date: 19/2/2014

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List of Publications

Smeda, N., Dakich, E., & Sharda, N. (2010). Developing A Framework for Advancing E-Learning through Digital Storytelling. Paper presented at the Proceedings of the *IADIS Multi Conference on Computer Science and Information Systems*. 26-31 July 2010. Freiburg, Germany, pp. 169-176.

Smeda, N., Dakich, E., & Sharda, N. (2012). Digital Storytelling with Web 2.0 Tools for Collaborative Learning. In *Collaborative Learning 2.0: Open Educational Resources,* A. Okada, T. Connolly, & P. Scott (Eds.). Hershey: IGI Global, pp. 145-163.

Smeda, N., Dakich, E., & Sharda, N. (2012).Transforming Pedagogies through Digital Storytelling: Framework and Methodology. Paper presented at the Proceedings of the *2nd Annual International Conference on Education & e-Learning (EeL) 2012* Bali, Indonesia, pp.206-211.

Smeda, N., Dakich, E., & Sharda, N. (2013). The Effectiveness of Digital Storytelling in the Classrooms: A Case Study. Paper presented at the Proceedings of the *Advanced Learning Technologies (ICALT), 2013 IEEE 13th International Conference on Advanced Learning Technologies*, pp. 491-492.

Smeda, N., Dakich, E., & Sharda, N. The Effectiveness of Digital Storytelling in the Classrooms: A Comprehensive Study. Paper accepted at the *Smart Learning Environments* Journal.

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Chapter 1: Thesis overview

1.1 Introduction

From ancient times to the present, storytelling has served as a popular education tool, utilised to pass knowledge from one generation to another. Over the past few years drastic changes have been experienced in the processes used for creating stories, the variety of media used to convey the message, and the target audience.

Storytelling, in general, is a powerful pedagogical paradigm that can be used to enhance learning outcomes for general, scientific and technical education (Sharda, 2007a). Stories have been told as a way of passing on traditions, heritage and history to future generations. Even today people continue to tell stories through new digital media tools. A digital story can be viewed as a merger between traditional storytelling and the use of multimedia technology (Normann, 2011).

Technological advances, such as digital cameras, editing software and authoring tools, have increased the use of technology in the classroom to help students in constructing their own knowledge and ideas to present and share them more effectively (Standley, 2003).

As confirmed by Armstrong (2003), computers, digital cameras, editing software, and other technologies are becoming more readily accessible in the classrooms, and provide learners and teachers with the tools to create digital stories more easily than ever before. Furthermore, digital storytelling helps students to develop their creativity to solve important problems in innovative ways (Ohler, 2008). It is an effective pedagogical tool that enhances learners' motivation, and provides learners with a learning environment conducive for story construction through collaboration, reflection and interpersonal communication. Students can

use multimedia software tools as well as other technology skills to create digital stories based on given educational issues.

Digital storytelling is used as an embodiment of multimedia production for education purposes. Therefore, this is becoming a part of our lives, and is on the threshold of becoming an important part of teaching and learning as well. All of this is being facilitated by ready access to hardware, such as digital cameras and scanners, in conjunction with easy to use software. Many educational institutions have already been exploring the application of digital storytelling for the past few years (Robin, 2008).

The power of storytelling as a pedagogical tool has been recognised since the beginning of humanity, and in more recent times, for e-Learning (Neal, 2001). Digital storytelling has become a modern incarnation of the traditional art of oral storytelling; it allows almost anyone to use off-the-shelf hardware and software to weave personal stories with the help of still / moving images, music, and sound, combined with the author's creativity and innovation.

Donovan, Bransford, & Pellegrino (2000) articulated why digital stories have such a positive impact on learners' motivation, and state: "Learners of all ages are more motivated when they can see usefulness of what they are learning and use that information to do something that has an impact on others" (p.61). In addition, digital storytelling can provide a real way to help students learn how to use technology effectively in their learning, particularly if provided with appropriate digital resources and usable editing tools. This would further motivate them to create quality stories that could be presented, published and shared with other students in the class (Sadik, 2008).

Therefore, this research project aimed to explore the impact of digital storytelling on student engagement and outcomes. It focuses on exploring the potential of digital storytelling as an innovative teaching and learning approach, and investigates the impact of digital

storytelling on student learning. The research involved a multi-site case study of an Australian P-12 school. It explored the use of digital storytelling within the primary and secondary curriculum. In selected classrooms students and teachers had the opportunity to engage in innovative learning experiences based on digital storytelling.

In addition, the literature review has revealed that digital storytelling is a powerful model for creating constructivist e-Learning environments. Digital storytelling has the potential to engage learners in integrated approaches to learning with digital media. Furthermore, digital storytelling enhances learners' motivation, and helps teachers in building constructivist learning environments. To facilitate the harnessing of these pedagogical benefits we need an overarching framework for creating digital stories. This framework should be cognisant of the needs and capabilities of learners at their various stages of learning (i.e. catering for learners from primary school to university level, and even professional e-Learning content creators).

This research presented a new e-Learning Digital Storytelling (eLDiSt) framework to be able to use digital storytelling as a pedagogical model for constructivist learning. This framework was developed for application at various stages of learning. The e-Learning Digital Storytelling (eLDiSt) framework articulates how storytelling can be used at different levels of education. This framework is cognisant of the Australian Core Skills Framework (ACSF) (DEEWR, 2008), and takes into the account learning expected at the five levels specified in the ACSF.

The outcomes of this research project aim to help teachers and learners tap into the power of digital storytelling and partake in more engaged teaching and learning.

1.2 Research design

This research project aims to explore the impact of digital storytelling on student engagement and outcomes. It focuses on exploring the potential of digital storytelling as an innovative

teaching and learning approach. And further, the impact of digital storytelling on student learning when teachers and students use digital stories is investigated. This research involves a multi-site case study of an Australian P-12 school, and explores the use of digital storytelling within the primary and secondary curriculum. In the selected classrooms students and teachers had the opportunity to engage in innovative learning experiences based on digital storytelling. In order to enhance the reliability and validity of the research, multiple methods of data collection and analysis have been used. Data are collected with qualitative and quantitative methods. A rubric was used to collect quantitative data, while interviews and observation have been used to collect qualitative data. Data collection and analysis of the feedback provided by teachers was based on mixed methods research to evaluate if and how digital storytelling enhances teaching and learning outcomes.

1.3 Research questions

The rationale for the project is to explore the pedagogical benefits of digital storytelling. Therefore, the overall research question is: *How can digital storytelling enhance the student engagement and provide better educational outcomes for learners?* This question can be divided into the following sub-questions:

- How can digital storytelling be used to enhance student engagement?
- How can digital storytelling be used to improve educational outcomes?
- What are teacher perceptions about student learning through digital storytelling?

1.4 Overview of the thesis

Chapter one gives an overview of the thesis, the aims of the research and its contribution to knowledge. It also sheds some light on the research methodologies used in the research.

Chapter two reviews the current literature and research in the field of digital storytelling. The literature review is carried out in order to analyse the topic and understand the viewpoints of researchers in the field.

Chapter three gives a full picture of research methods and design tools required for this research. This chapter explains details pertaining to the design and implementation of methodology to investigate relevant research questions. Also, it presents the instruments utilised in this research, details of participant groups, data collection and the analysis approach.

Chapter four consists of the findings of primary school cases (ESL and Year 3/4), chapter five presents the findings of secondary school cases (Years 7, 9 and 11), while chapter six includes the cross-case analysis for the five case studies.

Chapter seven synthesises and analyses the study findings with the literature from chapter two. Finally, the most significant findings during this research are addressed in chapter eight, followed by the conclusions and implications, as well as recommendations for future research.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the current research literature in the field of digital storytelling. The literature review will focus on technology integration and its benefits and limitations, the medium of digital storytelling, types of digital stories, existing models, educational contributions, pedagogical benefits, digital storytelling and the curriculum, and teacher reflections.

2.2 Technology integration

In recent years, our lives have become more involved with technological tools. Developing technology resulted in new generations being more technology friendly than their parents and, even more so, their grandparents. Consequently, researchers have argued that "the impact of the digital technologies and especially the Internet in the 21st century post-secondary classroom is unquestionable and dramatic" (Tamim, Lowerison, Schmid, Bernard, & Abrami, 2011, p.2).

According to Prensky (2001a) today's students are the first generation to grow up surrounded by digital technology. During their daily lives these students have been routinely exposed to computers, electronic games, digital music players, video cameras and mobile phones. They are immersed in instant messaging, emails, web browsing, blogs, wiki tools, portable music, social networking and video sites (Lea & Jones, 2011; Prensky, 2001a; Sternberg, Kaplan, & Borck, 2007). These technologies allow them to communicate instantly and access any information from virtually any place by pushing a button (Autry & Berge, 2011).

From the statistics, the resultant change in lifestyle is very apparent, and the numbers are overwhelming. There are 2.4 billion Internet users worldwide, or 34.3% of the world population: an increase of about 566% from 2000 to 2012 (Lawless & Pellegrino, 2007; Stats, 2013). Today's children have grown up socialising and living a life totally different from their parents: over 10,000 hours playing videogames, over 200,000 emails and instant messages sent and received, 20,000 hours watching TV, more than 500,000 commercials seen before the kids finish college, and less than 5,000 hours reading (Prensky, 2001b).

It is likely that the rise of some changes in educational practice, such as distance education, online learning and blended learning, has been the response to the integration of computers and the Internet to the new generation's lives (Tamim, et al., 2011). Today's school environment includes technology, and teachers use it on a daily basis; the basic school infrastructure includes computers, printers, scanners, digital cameras and the Internet, and the majority of teachers have access to word processing, calculations, multimedia and communication software (Hsu & Kuan, 2013). According to Pitler (2006), "Applied effectively technology not only increases students' learning, understanding, and achievement, but also augments their motivation to learn, encourages collaborative learning, and develops critical thinking and problem-solving strategies" (p. 38). Therefore, attention should be given to the subject of technology integration (Sadik, 2008).

Jonassen, Peck and Wilson (1999) have defined effective technology integration as curricula using reliable tasks to actively help learners build their own meaning from thinking about experiences, allowing for a more interdisciplinary project-based teaching. Harris (2005) states that effective integration of technology is possible when learners are able to choose technology tools to facilitate obtaining information in an opportune manner, analysing and synthesising the information, and presenting it efficiently. However, technology integration is not about technology itself: "Technology involves the tools with which we deliver content

and implement practices in better ways. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used" (Earle, 2002, p.7). Therefore, students should be seen as constructive agents who build knowledge instead of receiving it with a passive attitude, as their cognisant processes influence what they learn and understand (Spivey, 1997).

2.2.1 Benefits

The integration of technology in education has benefits which can be seen from different aspects. According to Abbot, Townsend, Johnstone-Wilder and Reynolds (2009) Information Communication Technology (ICT) can improve deep learning, as learners can experience concepts from diverse points of view in ways that would not have been possible otherwise. Moreover, because a learner can build his/her own meaning, founded on his/her interpretation, Wheatley (1991) stated that technology can be considered a fundamental educational tool, depending on how it is used in learning. Supporting this argument, Jonassen and Carr (2000) are of the opinion that for students to construct their knowledge, it is imperative they are actively involved in learning by means of ICT tools.

Lim and Tay (2003) classified ICT tools into different types and argued that situating tools have the benefit of placing students in an environment where they may experience the context (e.g. simulations and games). According to them, some ICT tools can be used for processing information, helping student's construct their own knowledge, or to come up with a solid outcome from a given instruction.

With technology it is possible to teach the same content more quickly or easily in routine ways, or new and perhaps better approaches to instruction may be assumed and/or the content or context of learning might be changed (Lawless & Pellegrino, 2007).

2.2.2 Limitations

Despite its benefits, the integration of ICT in education goes at a slow pace due to a range of limitations. One of these limitations is the lack of appreciation of technology use in classrooms by teachers (Wright & Wilson, 2009).

Similar findings have been reported by other researchers. Jacobsen (2001) argues that many teachers cannot implement technology in teaching and learning tasks: consequently the chasm between the presence and effective use of technology in educational institutions is widening. Bustamante and Moeller (2013) emphasised that understanding the technology is only part of the task. In order to appreciate the full potential of technology use, the underlying pedagogy needs to be understood as well.

Therefore, there is a need for active involvement of education personnel, such as the classroom teacher and university faculty, to promote, encourage, and support the deployment of technology in classrooms based on sound theoretical and pedagogical decision making (Wright & Wilson, 2009). They should design student-centred environments first and then look for ways to support these environments with technology. It should be kept in mind that students find 'course-structure' more influential than the use of computers (Tamim, et al., 2011).

2.3 Storytelling

Throughout the history of human and social development, storytelling has been used as a tool for the transmission and sharing of knowledge and values, because it is a natural and yet powerful technique to communicate and exchange knowledge and experiences. Its application in the classroom is also not new; and in relation to the use of storytelling in the classroom. Behmer (2005) stated: "Storytelling is a process where students personalise what they learn and construct their own meaning and knowledge from the stories they hear and tell" (p. 4).

Over the last two decades, however, much has changed in how stories can be planned and created; and, as a result, how multimedia can be used to facilitate the dissemination of stories. With the increased use of computers to tell stories, by using a variety of hardware and software systems, there has been a significant improvement in the way stories can be created and presented (van Gils, 2005). According to Normann (2011) "People have always told stories. It has been part of our tradition and heritage since the time we gathered around the fire to share our stories. Today people still tell stories, but now we have new media tools with which to share them. A digital story can hence be seen as a merger between the old storytelling tradition and the use of new technology" (p. 11).

To some extent, traditional storytelling and the application of computer technology in education have followed different paths to date (Banaszewski, 2005). Thus, there is a need to further increase the convergence of storytelling and the use of computers in the classroom. As mentioned by Armstrong (2003), computers, editing software, and other technologies are becoming more accessible in the classroom, providing learners with the tools to create digital stories more easily. It has been argued that technology is more useful when it is used as part of a broader educational improvement agenda (Pitler, 2006).

Fortuitously, with the increase in computer power and associated cost reduction, computers and related technologies can play a significant role in making storytelling a more widely used pedagogical tool, given that "Digital storytelling provides students with a strong foundation in what are being called '21st Century Skills'" (Miller, 2009, p. 13). While the essential technology is currently accessible in the classroom, storytelling has not been fully recognised as a valuable tool for developing students' learning skills and achieving 21st century learning outcomes.

2.4 Digital storytelling

Dana Atchley has the honour of coining the term 'digital storytelling'. A performing storyteller in the oldest of human storytelling traditions, she started using multimedia to support performances in the 1980s. Today this term is often used to refer to a myriad of digital storytelling such as web-based stories, video blogs and video games. The definition of digital storytelling is still evolving along with the concept itself, which has found outlets in a variety of different domains (Williams, Bedi & Goldberg, 2006).

Digital storytelling emerged at the Center for Digital Storytelling in California in the late 1980s as a method employed by community theatre workers to enable the recording, production, and dissemination of stories (Lambert, 2009). Normann (2011) defines digital storytelling as "a short story, only 2-3 minutes long, where the storyteller uses his own voice to tell his own story. The personal element is emphasised, and can be linked to other people, a place, an interest or to anything that will give the story a personal touch" (p.12). This has developed in a number of ways, shaped by advances in personal computing and recording technology, and by its use in a range of academic and non-academic contexts (Clarke & Adam, 2012; Normann, 2011).

Digital storytelling is defined by The Digital Storytelling Association (2011) as a "modern expression of the ancient art of storytelling" (p. 1). Although there is not a single digital storytelling definition, the majority emphasise the use of multimedia tools including graphics, audio, video, and animation to tell a story. Benmayor's (2008) digital storytelling definition is "a short multimedia story that combines voice, image, and music" (p. 202). According to Kajder, Bull & Albaugh (2005), a group of still images, combined with a narrated soundtrack, constitutes a digital story as long as they relate a story. Focusing on its presentation on screen, Alan Davis offers another definition of digital story as "a form of

short narrative, usually a personal narrative told in the first person, presented as a short movie for display on a television or computer monitor or projected onto a screen" (2004 , p.1).

Meadows (2003) offers a more technology-focused definition, where digital storytelling makes use of low-cost digital cameras, non-linear authoring tools and computers to create short multimedia stories to accomplish social endeavours of storytelling. It is a technology application which takes advantage of user-contributed content and assists teachers in utilising technology in their classrooms.

2.5 Types of digital stories

There are many different types of digital stories. However, it is possible to classify most of these into three main groups (Robin, 2006):

- Personal narratives.
- Historical documentaries.
- Inform or instruct stories.

2.5.1 Personal narrative

Personal narrative is a type of writing which describes events, details, thoughts, feelings, and experience in the writer's life, where these events are presented in an order similar to what actually happened in time (Robin, 2006). This type of story has multiple educational benefits. Students who view the story learn about the experiences of other students, who may come from different backgrounds. Consequently, this allows foreign born students to bridge the gap between themselves and the local students (Robin, 2006).

2.5.2 Digital stories that examine historical events

Digital stories that examine historical events describe the life of people or institutions (e.g. the log of a patient's medical condition, or even the history of a city). While personal stories can include historical information to place them in the right context; a purely historical story

can also be created by using achieved content such as photographs and other materials available on the Internet and other bibliographic sources (Robin, 2006).

2.5.3 Stories that inform or instruct

Stories that inform or instruct are intended to transfer information or send a message to the viewer incorporating knowledge or information of an important subject (e.g. health issues, a change in plans, rules or policies).

To some extent, all digital stories can inform and instruct; this category emphasises that we can create a separate category for stories created specifically as instructional material for specific areas such as science, engineering, health and law. Indeed, we can create stories by combining these three methods. For example, an autobiographical story can be based on historical facts, which authenticate the author's personal experiences (Robin, 2006).

2.6 Existing models of digital storytelling

The first task in creating any digital story is to work out the story and its narrative. While the terms 'story', 'plot' and 'narrative' seem to be similar concepts, there are subtle differences between them (Sharda, 2007b) as follows:

- **An event** is an incident that takes place in a story. By itself a single event does not make an emotionally engaging story.
- **A story** is formed by stringing together a sequence of events, which together create an emotionally engaging discourse.
- **The plot** is the way in which the events of the story are linked so as to create a meaningful and emotionally engaging discourse. Often a story will have a main plot and one or more sub-plots.

- **The narrative** is the actual order in which the events are presented to the audience. A given story with a given plot can be presented as different narratives, each having a somewhat different impact on the audience.

There are several approaches to creating digital stories by selecting the right events, creating effective plots, and presenting these as the most efficacious narratives. This section presents an overview of some digital storytelling models that aim to support the creation of effective digital stories.

2.6.1 Dramatica

Dramatica is a comprehensive framework suitable for creating multimedia stories; it focuses on how the various story characters dramatise the narrative. Dramatica guides the writer to create a credible and dramaturgically accurate story, but only helps to write scenes used for linear stories. In Dramatica, a story is represented by a specific model, called the "story mind". The authors can express their ideas, experiences and knowledge in the form of a linear story in which the chosen aspects of the story are populated with suitable content. The basic premise of the story is called "the grand argument" which helps in forming the story's content as a logically and emotionally consistent unit (Spaniol, Klamma, Sharda, & Jarke, 2006). According to Phillips and Huntley, there are four stages in creating and communicating a story, namely: story forming, encoding, story weaving, and reception (Phillips & Huntley, 2004). Dramatica is used mostly to create stories for entertainment. However, it has the potential to be used for eLearning.

2.6.2 Adaptive Digital Storytelling

Adaptive Digital Storytelling (ADS) allows the creation of different narratives from the same story (Franz & Nischelwitzer, 2004). In ADS s story is passed on to a flexible story-schema that can be adapted by the user before entering the story. Furthermore, the main advantage of

ADS is that it can be combined easily with other models to create new forms of digital storytelling.

2.6.3 Storylining Suspense and Story Engine

These two models are somewhat linked, and developed for the creation and consumption of non-linear digital stories. Storylining Suspense focuses on authoring non-linear stories based on a set of predefined events. These events are mapped to create different plots and narratives based on the underlying model that is modified by the user's interaction (Klamma, Spaniol, & Renzel, 2006). The current implementation of these models deals mostly with the creation of artistic stories. For this reason, it is doubtful whether the current implementation of the Story Engine can be used for creating e-Learning stories (Spaniol, et al., 2006).

2.6.4 Hypermedia Novel

Hypermedia Novel extends the original narration concept of the Graphic Novel (Heiden, Frühling, & Deuer, 2001). In addition: "Hypermedia Novel can be seen as an extension of the graphic novel by adding multimedia contents to graphics and text" (Spaniol, et al., 2006, p. 8). It is not just another type of novel that is enhanced by using digital media, as it provides higher degree of interactivity for the user, and allows the structuring of narration modules arbitrarily in a story graph. "However, despite its clear graph oriented narration structure, it does not seem to apply any theoretical concepts, and there are currently no attempts to transfer the concepts of Hypermedia Novel into other areas of application such as e-Learning" (Spaniol, et al., 2006, p 9).

2.6.5 Digital Storytelling Cookbook

Digital Storytelling Cookbook (DSC) can be viewed as a handbook for the creation of digital stories based on the heuristics gathered in a community of storytellers (Spaniol, et al., 2006). It is presented as a systematic approach for organising and producing short video-based

stories on a computer. DSC gives practical advice on how to create a good story, covering seven aspects of digital storytelling, namely (Lambert, 2007):

1. Point of view.
2. Dramatic question.
3. Emotional content.
4. Author's voice.
5. Soundtrack.
6. Economy of story events.
7. Pace and rhythm of the story.

DSC also gives some advice on scripting and storyboarding and further hints on how to use authoring software for digital storytelling.

2.6.6 Movement Oriented Design

Movement Oriented Design (MOD) provides a systematic process for developing an e-Learning story, starting with just a topic, or an idea. In MOD, an e-Learning story comprises two main parts: knowledge and narrative (Sharda, 2007a). The narrative focuses on creating an emotionally engaging story, which carries the knowledge required for e-Learning. The core element of the MOD methodology is a Movement, which is defined as a micro story with its own beginning (B) middle (M) and end (E) components (Sharda, 2005).

According to Sharda (2007a) the main five stages for creating emotional movement through a multimedia story are presented in figure2.1. "It begins with stage-1, where a story creates meaning that moves the story characters' emotions in stage-2. These emotions are then transmitted to the user through multimedia content in stage-3. If, in stage-4, these story emotions connect with the user's emotions, they create emotional movement for theuser in stage-5" (p. 4).

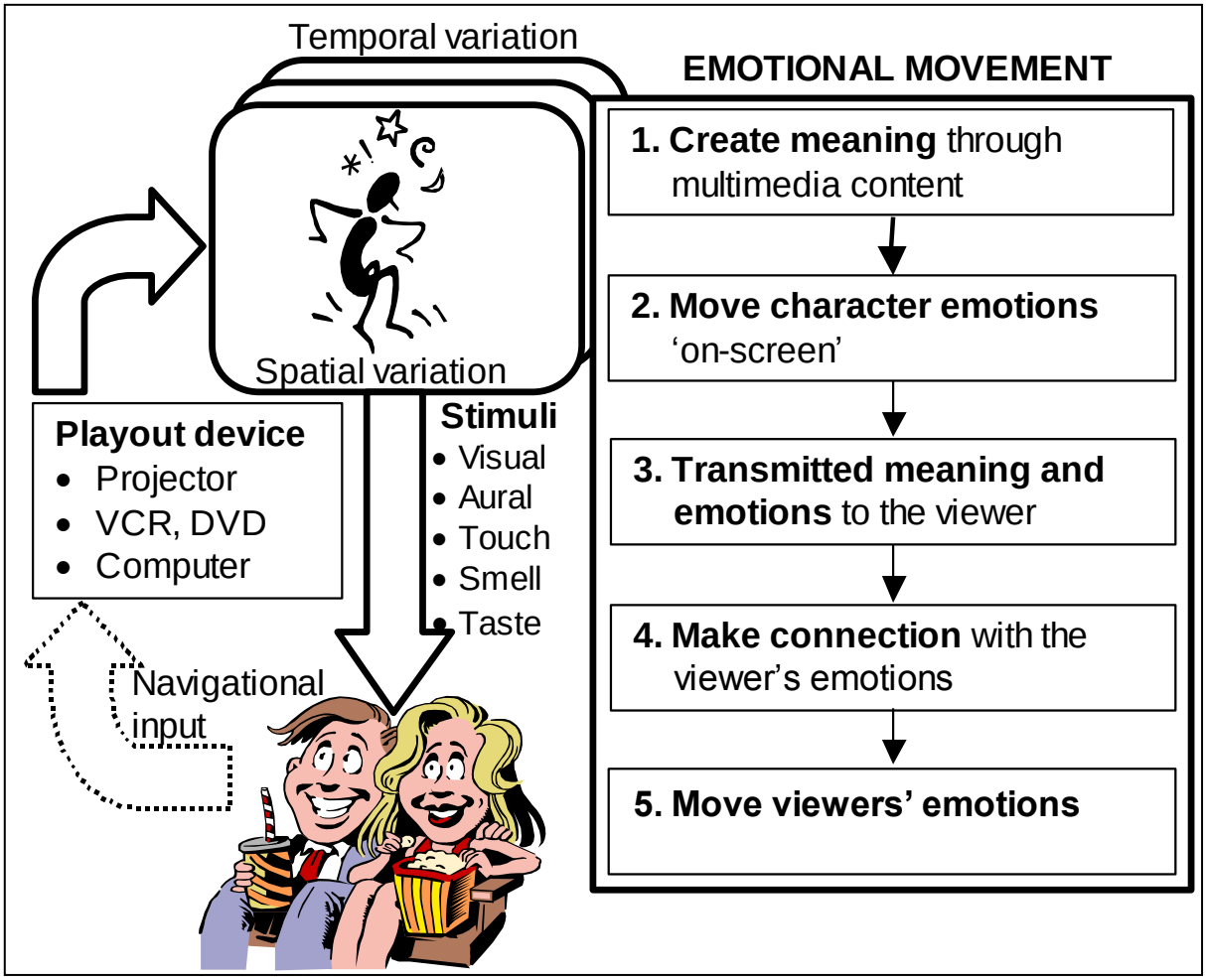

Figure 2.1 Creating Meaning and Emotional Movement (Sharda, 2005)

In addition, as presented in figure 2.2, to develop a story from an idea, the MOD methodology uses the following steps (Sharda, 2007b):

1. Start with a story concept, and brainstorm options for the B, M, and E components to generate Movements.
2. Generate a story plot by choosing well-linked Movements.
3. Create a story board by representing Movements with iconic multimedia elements.
4. Develop the required set of content using text, videos, images, graphics, and sound elements.
5. Author the presentation by instantiating the story plot with multimedia components.

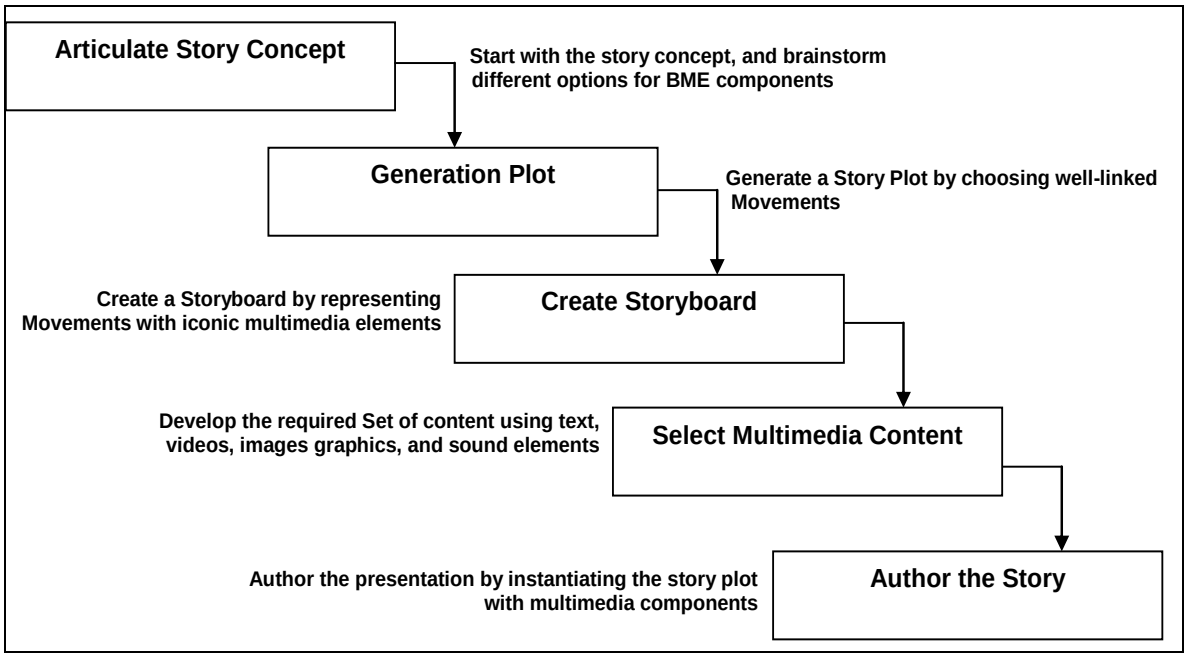

Figure 2.2 Story development process

In MOD, the selection of the B, M and E components is based on three facets: motivation, need and structure, which form the why, what and how of a multimedia story (Sharda, 2007b), as articulated in the following:

- **Motivation (Why)**: The motivation aspect directs the development of the story by raising a series of problems, or questions. One starts with a problem statement, breaks it down into sub-problems, and looks for solutions by telling a story that solves these problems.
- **Need (What)**: The need aspect explores what the user wants. In general, the user wants emotional engagement and to be emotionally moved. This emotional movement requires judicial selection of the B, M and E components within the Movements.
- **Structure (How)**: As shown in figure 2.3, in order to facilitate the creation of a moving story each story unit must have three parts: Beginning, Middle, and End (B, M, & E). The B should hook the user, the M should convey meaning or message, and the E should conclude the current story unit (e.g. a Movement or a Group of Movements), and / or link to the next story unit.

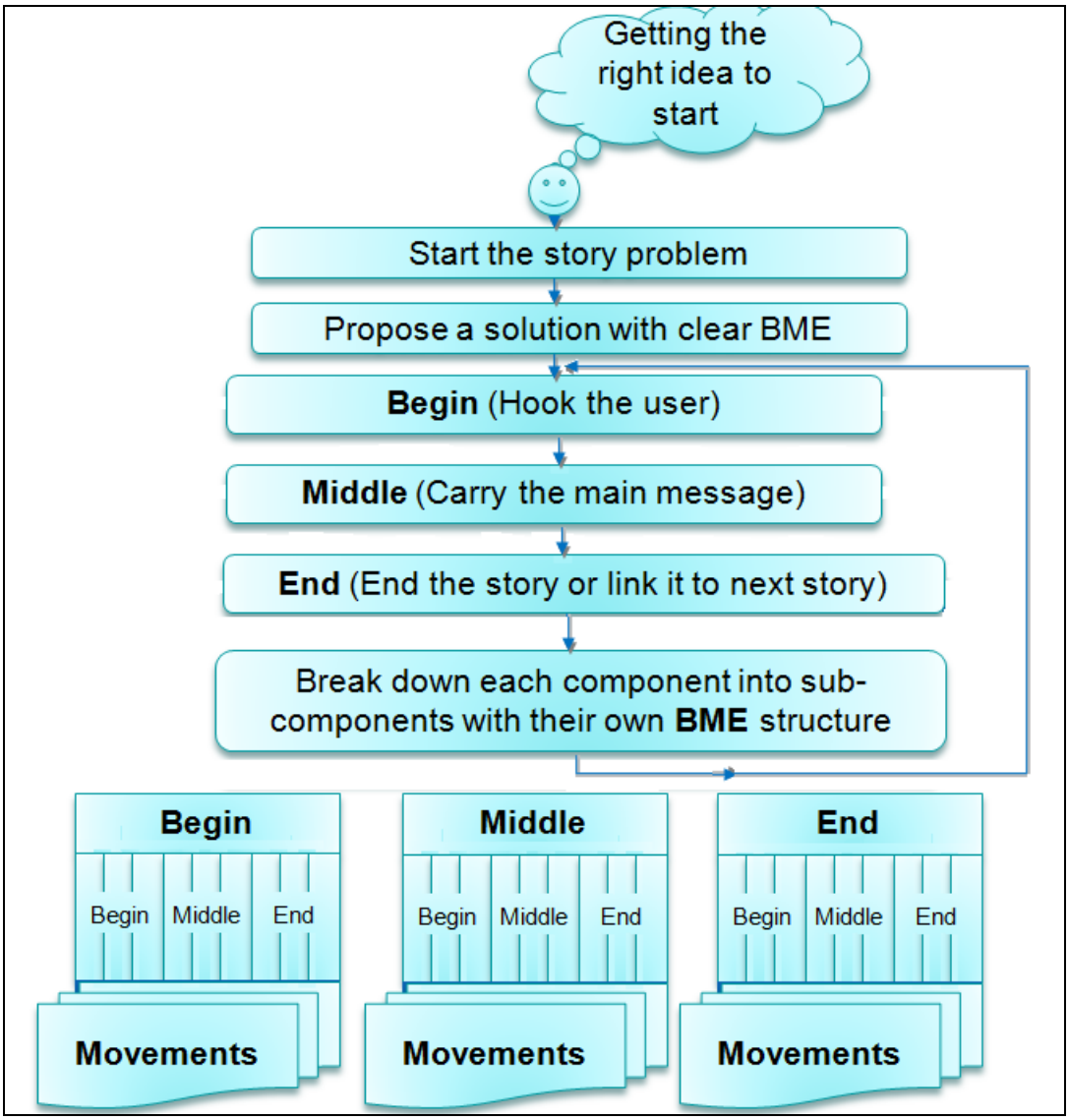

Figure 2.3 Movement Oriented Design (MOD)

The MOD is suitable for creating linear as well as non-linear digital stories; therefore it is possible to employ this model for creating e-Learning digital stories.

Thus a number of story development models have been created in the past to help educators achieve better outcomes with digital storytelling; however, none of these provide a holistic pedagogical framework for engaging students in digital storytelling at their various stages of learning. Hence, this research introduces a framework for digital storytelling.

The proposed e-Learning Digital Storytelling (eLDiSt) framework incorporates five learning levels, which address a wide range of learners from primary school to professionals.

The framework is based on four different aspects integral to digital storytelling. These aspects are classified and explained separately for each learner level (Smeda, Dakich, & Sharda, 2010). It is expected that this framework (presented in a compact form) would serve as a foundation for using digital storytelling as an effective education tool, and contribute to the widespread utilisation of digital storytelling in educational institutions in future The overview of the framework, and the different levels and aspects are presented in Chapter three.

2.7 Educational contributions to digital storytelling

Digital storytelling is the rising star of the business community for promotional purposes. Its roots in education are due to its extensive use by teachers in different areas such as history, literature, writing and science (Dupain & Maguire, 2005).

With the use of digital storytelling in a classroom environment, students might relate stories from the past by adding historical photographs, speeches, newspaper headlines, and similar material (Robin, 2008). In addition, digital storytelling is a versatile tool for teachers; they can utilise DS for delivering information on subjects ranging from math and science, to art, technology, and medical education (Robin, 2008).

The opportunity posed by digital storytelling is the ability to connect content, students and teachers in a dynamic learning experience. Taking this approach, the teacher is a facilitator, while the student wants to learn more (Ross, 2011). Currently digital storytelling is used for different approaches such as educational tools, research methods, community engagement techniques and therapeutic mediums. Related to educational applications, university lecturers have mentioned their use of digital storytelling in a myriad of subjects (e.g. literary studies, creative writing, teacher training, ESL, history on society and culture, gender study, American studies, etc.) (Clarke & Adam, 2012).

Moreover, by means of using information creatively, independently and ethically, gaming and other new media can be exploited to educate students. This can also contribute to

the development of more diverse context in which students may interact, communicate, work, and play (Morris, 2011; Wake, 2012). It is observed by Standley (2003) that during the creation of digital stories, students work together and uses different skills. Further, they pay more attention to content in group work.

In addition, integration of video, field trips, computer programs and visual aids (with the aim of supporting active learning in language arts classrooms) yielded various benefits. As a result students were excited about their work and put more effort into writing and verbal communication. It was relatively easy for students to generate projects with multimedia software and computer technologies. This success was achieved due to the collaborative nature of projects (Michalski, Hodges, & Banister, 2005). It is argued by Bull and Kajder (2004) that digital storytelling becomes the voice of struggling readers and writers. They find real means of expression and receive the benefits in the context of objectives constructed by the teacher.

And according to researchers, the use of digital storytelling in classrooms has benefits. Probably the greatest benefit in the classroom may be when students are asked to create their own digital stories, either individually or working in a small group. This effort to create an innovative piece of work provides them with a strong foundation in what many educators have called '21st Century Literacy' (Robin, 2008).

Many researchers have articulated various educational benefits of digital storytelling. For instance, Kadjer and Swenson (2004) used digital storytelling in English 11 classes with an objective of extending students' literary skills. They wanted to achieve this by permitting students to be more than just readers or writers; rather they wanted them to be directors, artists, programmers, screenwriters and designers. Run over a two-week period, this project engaged struggling students and motivated them to participate in a collaborative community.

In a similar manner Banaszewski (2005) implemented digital storytelling to encourage reluctant writers. He comprehensively and objectively reviewed the difficulties awaiting teachers who were considering using digital media for narration. It is believed that having a positive attitude towards all types of storytelling skills via digital storytelling, schools are helping students communicate into the future.

The use of digital storytelling in a seminar focused on assisting teachers is studies by Tendero (2006). Students created a digital story about their teaching experience during field placement. Students could show their work to their colleagues through a combination of reflection and classroom footage. In this way teacher assistants have the chance to see themselves as teachers. This can contribute to their future with ongoing digital storytelling, mentoring and managing the complex nature of teaching in classrooms (Tendero, 2006).

Digital stories were utilised to narrate the historical immigration experiences of an ethnically diverse group of college students. Merritt (2006) finds that the creation of digital storytelling enabled students to face their past and present in a more liberated fashion. This also enables them to contemplate the future more realistically.

Hull and Katz (2006) conducted their research in a suburban area where there was more than one culture. The duration of the research was designed for three years and six months. The data pertaining to young adults and adolescents were collected; field notes on personal interactions and dialogues, student scripts, interviews with students as well as teachers were collected and analysed. A fundamental outcome of the research showed that regardless of age, learning outcomes through digital storytelling are identical for all learners. The participants took on parts as learners and doers. The opportunities provided by this research study enabled participants to define themselves in the present and set future aspirations (Hull & Katz, 2006).

The impact of digital storytelling in a middle school was studied by Maier and Fisher (2006) in a class dealing with health education. In this way students were given the opportunity to develop their learning and thinking through sound decision-making skills rather than 'blind' memorisation. As a result, underperformers who find it challenging to take on reading and writing tasks could express their voice, productivity and imagination, and they were able to visualise their experiences (Maier & Fisher, 2006).

Robin (2006) is of the opinion that taking part in digital story creation assists students in learning to organise ideas, ask questions, express opinions and construct narratives, thereby developing enhanced communication skills. It also teaches students how to address a particular audience and present their ideas and knowledge. Furthermore, through Web sharing, digital stories permit students to develop and share their stories collaboratively.

In addition, Robin classified the benefits of digital storytelling in five main categories:

- Digital literacy: the ability to communicate with an ever-expanding community to discuss issues, gather information and seek help.
- Global literacy: the capacity to read, interpret, respond and contextualise messages from a global perspective.
- Technology literacy: the ability to use computers and other technology to improve learning, productivity and performance.
- Visual literacy: the ability to understand, produce and communicate through visual images.
- Information literacy: the ability to find, evaluate and synthesise information.

Regarding the impacts of digital storytelling on theory, Benmayor (2008) expresses that "the digital authoring process makes visible to students how theory emerges from personal experience and how theorizing is both intellectual and creative." (p. 200).

Taking this research to a developing country, Sadik (2008) performed his research to assist Egyptian teachers in using digital technologies for teaching and learning purposes. Students used MS Photo Story to produce their own piece of work. They were given training in desktop production and editing tools. Upon completion, students shared their stories with their classmates in presentation sessions. Among his findings is that teachers find it time consuming to integrate technology to teaching. They mentioned that digital storytelling requires a lot of effort and time on the teacher's part. When it comes to the students, teachers mentioned they required long periods of time to learn the software, search for suitable material and produce the story.

In research performed on high school teachers through a digital storytelling workshop conducted by Dogan and Robin (2008), teachers reported that the implementation of digital storytelling increased levels of student engagement and motivation in the classroom. The students are reported to have shown enhanced technical, research and organisational skills. Simultaneously, students increased their writing skills as well. Surprisingly, although all of the trained teachers gave positive impressions about digital storytelling, less than half of them introduced this approach to their class. The biggest hurdle in acceptance of digital storytelling in class seems to be lack of technical infrastructure (Dogan & Robin, 2008).

Lowenthal (2009) has found several issues relating to the implantation of digital storytelling in the classroom. These issues are:

- the time required to undertake the project
- the necessity to train teachers
- the need for clearly articulated goals and structures
- the importance of arrangement within the curricula areas
- problems related to access to digital software and hardware
- being aware of sensitive students

In her study Heo (2009) explored the impact of digital storytelling on self-efficacy of pre-service teachers. Furthermore, this research handled the accepting nature towards educational technology, eagerness to participate in development and training tasks, and to commit to working after hours for technology integration. Ninety-eight teachers took part in the research, attending a tutorial session and preparing their own story in Photo Story software. It is found that technology literacy and eagerness contributed to the technology experience of teachers. It is crucial to transfer technology knowledge and skills of teachers to the class while training them in technology–classroom integration.

In other research, Ryan and Prim (2010) used a case study approach. The collected data included observations, pre- and post-tests, student reflective journals, group interviews and evaluation of the physical artifact. The results were encouraging, since it was observed that working as a digital story producer in a collaborative environment improves learning of concepts and vocabulary of Physical Geography. This research defined new research areas where digital stories can be used in the primary school curricula, for the education of students with Autism, and as learning tools for a much younger audience. The overall outcome of the research indicated that the experience was rewarding and exciting for students while increasing learning outcomes.

The effectiveness of digital storytelling in facilitating a constructivist approach in learning was evaluated by Garrard (2011). The research findings suggest that digital storytelling is a good method of teaching with positive effects on the students.

A community college that offered a developmental English class for women implemented digital storytelling as a pedagogical tool. Based on experience Ross's (2011) research relates to both developmental education and women's learning, while merging both with technology of the 21st century. With the current hype about digital storytelling, there is a growing awareness about identity formation, multiple literacy and empowerment. This

research touches upon this aspect of digital storytelling by exclusively focusing on women's learning.

Morris (2011) employed a mixed research method where he used intermediate classroom and middle school library environments. The interaction of students with digital storytelling is classified under six themes which are presented in a conceptual model. These themes are Engagement, Action, Emotions, Learning, Similar Experiences, and Next Steps. He found the crucial components of digital storytelling in these setups are teaching and facilitating approaches for teachers and librarians, which include technology and information literacy integration. He added that by using digital storytelling, games and new media can support meaningful application of technology in education.

Digital storytelling's contribution to senior high school students' English learning as a foreign language was studied by Yang & Wu (2012). The study comprised pre- and post-test designs, was run for a year, and included 110 10^{th} grade students. Extensive data collection was performed both on quantitative and qualitative domains. The topics under which data were collected include English achievement and critical thinking scores, questionnaire responses for learning motivation, as well as recordings of student and teacher interviews for evaluating the effectiveness of digital storytelling in learning. It was found that participants of digital storytelling achieved better results than those who participated in lecture-type technology integrated approaches. The interview results clearly showed the appreciation of digital storytelling as an education tool, both by the teachers and the students. It increased motivation, eagerness, and improved students' analytical and technical skills

Similar research has been performed in Australia. Clarke and Adam (2012) had the objective of measuring enthusiasm levels in higher education toward digital storytelling. Three main issues were identified by researchers and these can be summarised as follows: Australian academics' experiences in using digital storytelling; how academics define and

apply digital storytelling in their classrooms; and the perceived benefits and costs, the 'pros and cons', of digital storytelling as a pedagogical and/or research tool.

In conclusion, it is safe to say that there is a myriad of research on digital storytelling's impact on learning. This research has been performed on different audiences at different learning levels with different subjects. However, the staple result has always been the improvement in student engagement and learning outcomes. Therefore, arguably researchers consider digital storytelling to be a meaningful learning experience and they encourage its use for all educational institutions, regardless of their audience or subject.

2.8 Pedagogical benefits of digital storytelling

Researchers have found that using digital storytelling helps bridge the gap between the high-tech world that operates outside of the school environment and the traditionally low-tech school setting. It also opens the door to a number of benefits to students that could not be achieved through traditional storytelling (Ohler, 2008) and these are now discussed.

2.8.1 Personalised learning experience

Digital storytelling helps students to take ownership of their own learning. According to Hargreaves (2005), students' sense independence and a level of self-confidence will be enhanced by personalised learning. Van Gils (2005) emphasises personalised education as one of the main advantages of digital storytelling. He argues that learners can present their experiences, reflections, and evaluate their achievements while creating their digital stories.

According to Ohler (2008) the use of digital storytelling does not exclusively relate to classrooms, but it builds the foundation for professional life where "the sort of critical thinking required to read new text is essential for success in the workplace" (Ohler, 2008, p. 47). Clarke and Miles (2003) suggest new systems should be established for students to apply their knowledge and skills based on their own experiences. Story creation can thus be viewed as personalised learning, because even when students are creating the same educational story,

they are likely to use different narratives and characters; every student will use his/her imagination, ideas and opinions to create the story. Consequently, they will enjoy the process of creating their stories and this will result in increased engagement (van Gils, 2005).

Sadik (2008) indicates that story creation helps students think in-depth about their own topic, personalise their experience, clarify what they already know about it, and reflect on their own thoughts and knowledge. Moreover, through story creation students develop their creative skills, as well as writing, reading, oral and research skills. This process gives them the opportunity to present their experiences and reflections, as well as evaluate their achievements. According to Ohler (2006), digital storytelling helps students in becoming active participants rather than passive consumers of information.

Through the use of digital storytelling, learning becomes student-centred as students conduct research, analyse and synthesise information, and creatively communicate their findings in a digital story. In contrast to individualistic structure of the traditional classrooms, this approach also provides an interactive learning environment. As a result of consultations between peers, digital story does not reflect a student's understanding of the subject, but rather it is the outcome of a collective effort. In this way, digital storytelling encourages personality and creativity (Dupain & Maguire, 2005).

Furthermore, Kickmeier-Rust, Göbel, & Albert (2008) believe that digital storytelling "strongly supports a personalised learning experience by adapting the story to individual preferences and by providing the possibility of explorative learning processes" (p.4). Therefore, digital storytelling can be used to develop personalised learning experiences for students, thereby responding to diverse individual needs.

2.8.2 Fostering collaboration

Digital storytelling enhances cooperation and collaboration in the classroom. As already mentioned, students are more engaged when they are working together to create a digital

story. According to Slavin (1996), collaborative learning leads students to encourage themselves, support each other and work together to achieve an academic goal. Students can obtain a range of skills through story creation, while they work collaboratively and engage with the digital content. As mentioned by Johnson and Johnson (1986), compared with individual learning, collaborative learning helps students in achieving higher levels of comprehension, thought and preservation of knowledge. Therefore, with digital tools that are now widely available, students can work together to create stories by using their ideas, writing their own stories, recording their own voices, as well as choosing their favourite images and music.

According to Hung, Hwang, & Huang (2012), digital storytelling instils confidence between students working in the same group. Through personal interaction, individuals improve their performance due to peer-supervision and reflection. Their skills are also enhanced by using databases and the internet sources; the researchers also concluded that digital storytelling based on technology is more effective than traditional teaching approaches.

Moreover, digital storytelling can provide students with a flexible learning environment where they can work collaboratively and judicially apply their communication and technology skills, as digital content helps to form networks and encourage students to share resources; thus digital content can improve the level of collaboration and increase resource sharing (Behmer, 2005; Tech4Learning, 2007; VanderArk & Schneider, 2012). In addition, throughout the active learning process that digital storytelling provides, students can improve their ability to think and developing relations between the texts, the teller and themselves, which supports their skills development in understanding, listening and interacting with others (Mello, 2001). Consequently, digital storytelling can lead to a more negotiated

meaning for deeper understanding and increases the engagement and collaboration of students in reflective learning.

2.8.3 Building digital literacy

Digital storytelling is a new pedagogical method that helps to integrate educational technology with literacy skills including Information and Communication Technology (ICT) and digital media. According to Ala-Mutka, Punie and Redecker (2008), "Digital literacy consists of the ability to access digital media and ICT, to understand and critically evaluate different aspects of digital media and media content and to communicate effectively in a variety of contexts" (p.4).

As compared with traditional curricula, digital storytelling enables students to practice "self-expression" and to engage in interactive ways of learning about their world; therefore, digital storytelling can play a significant role in enhancing their digital literacy (Banaszewski, 2005). According to Robin (2006), students who create digital stories gain a full complement of literacy skills including: research, writing, organisation, technology, presentation, interviewing, interpersonal, problem-solving, and assessment skills. Technical skills, communication skills and grammatical knowledge can also be enhanced by implementing digital storytelling in the classroom (Signes, 2010). In addition, according to Miyaji (2010), even at university level, digital storytelling can help students to increase their subject understanding by heightening their writing skills, and technology skills in using computers and problem solving. The three factors which can increase significantly by using digital storytelling are: evaluating and creating cooperatively; clarifying problems and expressing opinions; and technical skills in using computers.

Further, as students work together to create their stories they not only use their own experiences, but they also learn from each other about computer applications that can assist them in developing their stories. As Behmer (2005) emphasises, students working as a team

are able to help each other learn different technology skills and they can evaluate their peers' stories. It is also expected that students who participate in the full digital storytelling experience benefit from learning to criticise their own work, as well as the work of others. This is indispensable for reinforcing social learning and emotional intelligence (Robin, 2008).

Furthermore, digital storytelling provides a perfect opportunity to engage students who are not responsive to traditional academic learning methods; digital storytelling tools can help them to engage actively in the classroom. And as Banaszewski (2005) argues, digital storytelling can help to shift from the existing pedagogy of "teaching to the test" towards "learning how to learn", and this will equip learners with the digital literacy required for 21st century learning. Therefore, digital storytelling can improve the literacy and technologies expression in all areas plus the ability to use a wide range of new technologies.

2.8.4 Deep learning

Digital storytelling is a very useful tool that supports and encourages deep learning and further reflection. According to Tagg (2003), deep learning is a concept taking root in our minds, in terms of entrenched meanings we use to define and understand the world.

Barrett (2006) argues that digital storytelling helps to integrate four kinds of student-centred learning strategies, namely:

1. Reflection for deep learning.
2. Project based learning.
3. Student engagement.
4. Effective integration of technology into instruction.

In addition, a story is a particular pedagogical tool that provides considerable scope for deep learning (Williams, Bedi, & Goldberg, 2006). Johnstone and Reynolds (2009) state that deep learning is intimately connected with improvement of skills and abilities, particularly for ICT applications; thus, digital storytelling can enhance deep learning of ICT skills by

providing learners with experiences that were not otherwise available. Furthermore, with digital story creation, students use and hone their skills for multiple ICT applications. By telling their story and browsing through other students' stories, they can get a deeper understanding of the topic and a more fulfilling learning experience.

2.8.5 Active learning

Digital storytelling provides avenues for students to engage in active learning processes by building on their prior experiences and by helping them to design powerful social interactions. According to Prince (2004), the basic elements of active learning are student activity and participation in the learning process, which cannot take place in the traditional classroom where students can only receive information and knowledge from the teachers. Digital storytelling offers an interactive learning system that improves the participation of students, leading to active learning (van Gils, 2005).

Digital storytelling is an innovative approach to teaching and learning that provides opportunities for integrating student-centred and interactive teaching and learning in technology-rich environments, as it naturally amalgamates human creativity with technologies. In addition, digital storytelling can help students to get involved actively in their learning process. Studies have shown that students can learn better when they are actively engaged in the learning process; therefore, digital storytelling can be seen as one form of active learning that can enhance a student's preservation rate and understanding of the subject (Dupain & Maguire, 2005). Consequently, digital storytelling is a strategy to integrate technology into the learning process to provide students with an active learning experience.

2.8.6 Enhancing learning engagement

Learner engagement, otherwise known as student engagement, is considered to be one of the aspects of the Learning Criteria for 21st Century Learners (The International Center for Leadership in Education, 2009). This engagement can be defined in various ways: i) the willingness to participate in routine school activities with clever cognitive, behavioural, and affective indicators in specific learning tasks (Chapman, 2003), or ii) the posture of the student, his thoughts, levels of responsibility, participation, and test readiness (Parn, 2006), and iii) with more focus on the work done, as students' effort, investment, and strategies for learning: the work students do and the ways students go about their work (Yazzie-Mintz, 2007).

Although student engagement is not the only objective of education, it is an essential part of overall student achievement and school success. Students are more likely to enjoy learning tasks if they retain and apply what they have learned (The International Center for Leadership in Education, 2009).

Student engagement is a reliable indicator of teaching and development. It is a building process where the more students work on a subject, the more they tend to learn about it. Likewise, the more students practice and get feedback on their work such as writing, analysing, or problem solving, the more skilled they become (Kuh, 2003). The International Centre for Leadership in Education (2009) rightfully suggests that in order to increase student engagement, it shall be made possible to measure it since this creates awareness among people. The use of digital storytelling in the classroom environment proved to be a very reliable tool in measuring and increasing student engagement.

The use of digital storytelling in education circles has become a powerful tool due to the fact that it engages both teachers and students. That being said, little attention has been paid as to how effectiveness of technology can be increased in a classroom environment (Robin,

2008). It is not a secret that educators always search for creative ways to engage students with course content. With the advent and development of technology, digital storytelling is being used in the classrooms to motivate students to perceive an academic concept and to present their own ideas (Dupain & Maguire, 2005).

In addition, digital storytelling can engage and motivate students to understand difficult subject matter. Combined with enhanced retention rates and learning effectiveness, digital storytelling can deliver complex concepts in an easier way that will be more effective and last longer (Dupain & Maguire, 2005). According to Xu, Park and Baek (2011), digital storytelling can enhance learning strategies such as student engagement, reflection for deep learning, project-based learning system, and technology integration, for example, using multimedia technology skills in the classroom; with digital storytelling students will be more engaged and enthusiastic in the classroom. According to Joseph (2006), using different software to create digital stories with advanced technologies, not only helps students increase their engagement level, but also helps students develop their technical and communication skills.

Consequently, digital storytelling provides avenues for students to engage in active and authentic learning by building on their prior experiences and by helping them to design powerful social interactions.

In conclusion, as we move from traditional learning methods toward a new learning environment suitable for the 21st century, digital storytelling emerges as a powerful tool for creating e-Learning environments based on constructivist principles of teaching and learning. This has the potential to immerse learners in integrated approaches to learning with digital media. Thus, it can enhance the student engagement and provide better educational outcomes for all learners.

2.9 Digital storytelling: A constructivist approach to learning

For the past two decades, various learning paradigms have been used to inform teaching and learning outcomes; each one of these learning theories, such as behaviourism, cognitivism and constructivism, has its own perspective on learning methods. Before explaining the main concepts underpinning each of these theories, first let us consider what a learning theory is. According to Hill (2002), a learning theory is the attempt to explain how people (and animals) learn, and a paradigm to understand what is fundamentally involved in the learning process.

The Behaviourism school founded by Thorndike (1913), Pavlov (1927) and Skinner (1974), was based on the assumption that learning changes behaviour, and resultant responses outside the environment. In addition, it focuses on how this pattern of behaviour is repeated until a new one emerges. A behaviour patterns includes the use of direction signs, and learning practice. A change in behaviour is based on corresponding changes in observable aspects of learning and the learning process. The key elements of behavioural patterns are motivation, answers, and the connection between them. One of the most important features is the incentive present for learning within a learning environment (Jung, 2008).

Compared with behaviourism, which explores students' behaviour, cognitive theories inquire into the processes driving the behaviour. It places greater emphasis on the environment to facilitate the learning process (Jung, 2008). Cognitivism focuses on the construction, organization and arrangement of educational content to facilitate optimal management of information, and how to remember, store, and retrieve information. In addition, learning is seen as a dynamic process, which is created by the learners themselves (Anderson, 2008).

Constructivism is one of the most influential educational approaches developed in recent times. It overlaps the cognitive learning school in many ways; however, it is

characterised by its emphasis on learning through the use of authentic contexts, and a focus on the importance of the social dimension of learning. Wilson (1996) defines it as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (p.5).

In addition, according to Anderson (2008) the constructivist has more than a simple perspective on learning, recognising that people explain the learnt information and the world around them, based on their personal vision. Jonassen (1999) argues that learning environments should offer constructive, active, intentional, collaborative, complex, conversational, contextualised and reflective learning. To sum up, the most important learning characteristics of constructivism are that learners can build on their own interpretation of the world, depending on experience and interaction, and that will generate a new understanding through the collection of knowledge from various sources (Duffy, Lowyck & Jonassen, 2012).

On the other hand, the education theories developed in the 20th century consider teaching and learning as more than mere interaction or transmission of knowledge (Daniels, 2001; Dewey, 2007; Vygotsky, 1978; Wells, 1999). These theories consider teaching as a specific paradigm of teacher–student interaction, where the desired role of the adult is a collaborator and/or co-constructor.

Bouman (2012) defines learning as the acquisition of knowledge or skills through experience, practice, or study, or by being taught. He classifies learning under different headings: the two main ones are student-led and teacher-led learning. Student-led learning is a process of learning information where students ask questions of one another, while they assist each other as peers in discussing the method used to acquire the answers to those questions; students are also allowed to work with one another in a student-centred

environment. Teacher-led learning is currently the most popular form of teaching students. This method involves the teacher holding all the information and sharing it with the students over time. The most recent works in the literature favour student-led over teacher-led learning since it leads to longer retention. This hinges on the fact that when students take a more active role in their learning process, this results in a more meaningful connection to the information.

The learner's active position is strongly emphasised as it is indispensable for the development of lifelong learning skills (Verenikina, 2008). The zone of proximal development (ZPD), developed by these researchers (Wells, 1999), is defined as the distance between what a student can do with or without help (Vygotsky, 1978). The main focus in the ZPD is to ensure that students are actively engaged in learning that will make them self-directed, lifelong learners in the long run. In this sense, teaching becomes a co-construction of knowledge between learner and teacher. It also facilitates further transformation of that knowledge into individual, student knowledge (Verenikina, 2008).

Digital storytelling can thus facilitate a constructivist approach for teaching and learning. It can be a helpful educational tool, as it provides a vehicle for combining digital media with innovative teaching and learning practices. Apart from building on learners' technology skills, digital storytelling encourages additional educational outcomes (Dakich, 2008). It enhances learners' motivation, and helps teachers in building constructivist learning environments that encourage creative problem solving based on collaboration and peer-to-peer communication. In addition, digital storytelling can be used to facilitate integrated approaches to curriculum development, and engage learners in higher order thinking and deep learning (Dakich, 2008).

Behmer (2005) emphasises that digital storytelling provides students with a flexible learning environment where they can work collaboratively and consider the various issues

critically, while applying their communication and technology skills. Throughout the active learning processes that digital storytelling provides, students can improve their ability to think and develop relations between the texts, storytellers, and themselves; this enhances their understanding of the issues, and their ability to listen and interact with others (Mello, 2001). In addition, particular multimedia tools, such as Illustrator, PowerPoint, MultiMedia Builder, Moviemaker and iMovie, have proved to be good productive tools to learn from through production, collaboration and project management (Sadik, 2008). Consequently, the mission of our research is to create a methodology for building constructivist learning environments based on digital storytelling.

2.10 Digital storytelling and curriculum

Digital storytelling benefits from the long history that the art of storytelling enjoys, as it is but a "modern expression of the ancient art of storytelling. Digital stories derive their power by weaving images, music, narrative and voice together, thereby giving deep dimension and vivid colour to characters, situations, experiences, and insights" (The Digital Storytelling Association, 2011, p.1). Kajder, Bull and Albaugh (2005) argue that digital storytelling constitutes a powerful method of expression which reinforces the opinion of the author.

According to the Department of Education and Early Childhood Development (2013): "Integrating digital learning can help teachers and leaders expand learning possibilities to create effective contemporary learning environments where students and teachers use technology purposefully and flexibly to improve student learning outcomes" (p.1).

The United Nations Educational, Scientific and Cultural Organization (UNESCO) program considered storytelling as one of the modules for developing professional skills for teaching and learning approaches that could enable students to achieve the wide range of skills, knowledge and value objectives for Education for Sustainable Development

(UNESCO, 2010). Further, UNESCO believes that storytelling is "a key teaching strategy for achieving the objectives of education for sustainable futures" (p.1).

2.11 Teachers' reflections on digital storytelling

The fact of the matter is that supporters of instructional technologies have argued that school administrations and policy makers shift their focus from technology to methods of using technology for teaching and learning, by teachers and students respectively. That being said, many of the teachers who are accustomed to conventional teaching methods are not well founded in using technology to teach (Robin, 2008).

Researchers highlight the necessity of integration of technology into the curriculum. However, the benefits can only be received if teachers have the ability to use technology in the classroom effectively (Sadik, 2008).

Jacobsen (2001) is of the opinion that there is a clear mismatch between the level of hardware in the schools and technological knowhow of teachers and this hinders the effective use of technology in teaching. What is more striking is that many teachers believe that technology integration is troublesome and not worth the effort (Sadik, 2008).

In light of this issue, a requirement is that the professional development of teachers needs to include the development of their technical skills and align their curricula with the technology by learning from their colleagues, who have already done it. In line with an integrated curriculum approach teachers can make meaningful connections between the subject they teach and different contexts for learning. In addition, digital storytelling can be used by teachers to present their teaching experience to peers and build their own collaborations (Sadik, 2008).

Furthermore, being a versatile tool for teachers, digital storytelling can be utilised to transmit information about different subjects such as math, science, technology, art and medical education (Robin, 2008). Talking to teachers, Sadik (2008) revealed that most of

them find it time consuming to integrate technology with teaching. These teachers see digital storytelling as a waste of time as its benefits are not worth the fuss. Teachers also mentioned that the use of digital storytelling in the classroom is time- consuming, since students need to learn the software, search for material and create the story.

Dogan and Robin (2008) recorded teachers' reports on increased student engagement and motivation in the classroom as a result of digital storytelling. The students have improved a variety of skills such as technical, research and organisational skills. Writing skills were among developed skills too. Amazingly, although all of the trained teachers were in favour of digital storytelling, less than half of them introduced it to their class. The research linked this to the lack of technical infrastructure in teaching environments.

It was found that higher technology literacy and eagerness levels in teachers resulted in better experiences with digital storytelling. Therefore, instead of focusing on the transfer of course content, technology integrated curriculum should focus on the transfer of technological skills from the teacher to the class (Heo, 2009).

Gils (2005) noted the curiosity of teachers about the possibilities offered by digital storytelling. None of them expressed fears of being replaced by technology in future, but they envisaged that that future will have a different role for teachers in the classroom. This might be represented as a student advisor in the class. They thought that implementation of digital storytelling can offer more practice and training to students, while providing more compelling and engaging experiences for them. They expressed that systems shall be developed so they focus on education, and are easy to use and operate. According to Czarnecki (2009), teachers argued that by using digital storytelling in the class, students can learn various subjects such as technical knowledge and communication skills. In this way, they can acquire more experience and utilise storytelling in different fields. Moreover, a

successful digital storytelling experience is found to be interlinked with familiarity of teachers with the process, technology, challenges and benefits to the students (Miller, 2009).

2.12 Summary of the literature review

Even though the required technology is now available in millions of classrooms, the practice of storytelling has still not been used to its full potential. While the use of technology has been considered essential to all areas of the curriculum, storytelling has not been fully recognised as a valuable tool for developing students' learning skills and achieving 21st century learning outcomes. Current curriculum aspects used for the integration of digital technologies into student learning do not seem to recognise the critical role of story literacy in developing digital storytelling skills; consequently, many approaches used for digital media production in the classroom fall short in the production of effective digital stories.

Therefore, to facilitate the harnessing of these pedagogical benefits we need an overarching framework for creating digital stories. This framework should be cognisant of the needs and capabilities of learners at their various stages of learning, (i.e. it should cater for learners from primary school to university, and even professional e-Learning content creators). A number of story development models have been created in the past to help educators achieve better outcomes with digital storytelling; however, none of these provide a holistic pedagogical framework for engaging students in digital storytelling at various stages of their learning.

Therefore, this research introduces a framework for digital storytelling. The proposed e-Learning Digital Storytelling (eLDiSt) framework incorporates five learning levels, which address a wide range of learners from primary school to professionals. The framework , which will be presented in Chapter three, is based on four different aspects integral to digital storytelling. These aspects are classified and explained separately for each learner level. It is expected that this framework (presented in a compact form) would serve as a foundation for

using digital storytelling as an effective education tool, and contribute to the widespread utilisation of digital storytelling in educational institutions in future.

Chapter 3: Overview of Method and Study Design

3.1 Introduction

This chapter explains the design and implementation of the methodology used to investigate the research questions. Firstly, research questions are expounded and an overview of the research methodology is then presented. Important concepts, such as the case study approach, its advantages, and selection of a case study for the research presented in this thesis are examined. Qualitative and quantitative data are presented, since the research design involves both of these data types. Following these fundamental concepts, the instruments utiliseutilised in this research, the details of participant groups, and data collection and analysis approach are described, as well as the overview of the framework, and the different levels and aspects are also presented. In this way, a fuller picture of research methods and design tools required for this research are presented in this chapter.

3.2 Research questions

The objective of this project is to explore the pedagogical benefits of digital storytelling. Therefore, the overall research question is: *How can digital storytelling enhance the student engagement and provide better educational outcomes for learners?* This question can be divided into the following sub-questions:

- How can digital storytelling be used to enhance student engagement?
- How can digital storytelling be used to improve educational outcomes?
- What are teacher perceptions about student learning through digital storytelling?

3.3 Research overview

This research project aims to explore the impact of digital storytelling on student engagement and outcomes. It focuses on exploring the potential of digital storytelling as an innovative teaching and learning approach. It investigates the impact of digital storytelling on student learning when teachers and students use digital stories. This research involves a multi-site case study of an Australian P-12 school. It explores the use of digital storytelling within the primary and secondary curriculum. In the selected classrooms students and teachers were given the opportunity to engage in innovative learning experiences based on digital storytelling. In order to enhance the reliability and validity of the research results, data collection and analysis used both qualitative and quantitative methods. A specifically designed rubric was used to collect and analyse quantitative data, while interviews and observation were used for qualitative analysis. Data collection and analysis of the feedback provided by teachers was based on mixed methods research (Creswell & Clark, 2007) to evaluate if and how digital storytelling enhances teaching and learning outcomes.

3.4 Research design

Case study design (Yin, 2009) – using multiple case studies – has been chosen for this research. Case study research is a qualitative approach in which the researcher explores a case or multiple cases over time, involving multiple sources of information, for example, observations, interviews, documents and reports (Creswell, Hanson, Plano, & Morales, 2007; Yin, 2009).

3.4.1 Definition of the case study

A case study can be defined as an empirical inquiry that:

- investigates a contemporary phenomenon within its real-life situation, especially when:
    - the boundaries between the phenomenon and context are not clearly evident;

- multiple sources of evidence are used.

- is suitable for studying complex social phenomena
- has many variables of interest; multiple sources of evidence; theoretical propositions to guide the collection and analysis of data (Yin, 2009).

According to (Yin, 2009), the case study method can be used when "*Who*" or "*How*" questions are being investigated a contemporary set of events, and over which the investigator has little or no control.

The case study method allows the investigator to examine the phenomenon within a specific context in its real-life context, when the boundaries between phenomenon and its context are not clearly evident. It also enables the investigator to explore the current phenomenon in-depth, through many variables of interest, using multiple sources of evidence, and theoretical plan to collect and analyse the data, and report the results over a specific period of time (Yin, 2009).

Case study research includes both single and multiple case studies; multiple case design improves and supports the previous results, and it can help increase the level of confidence in the strength of the methods. However, the cases should be selected in the same way as the topic of an experiment is selected (Yin, 2009). Creswell (2008) argues that case study method is a form of qualitative research; however, according to (Yin, 2009) some case studies can go outside a type of qualitative research, by using a mix of both qualitative and quantitative evidence (Yin, 2009).

According to Yin (2009) there are three types of case studies: exploratory, descriptive and explanatory. In order to prove any phenomenon in a data-set, which may be of special interest for the researcher, exploratory case studies have been used or preferred. A pilot study, which is crucial to determine the protocol that shall be employed, is deemed to be an example of an exploratory case study; sometimes case studies are limited to exploratory use

in business related subjects. For instance, question formulation or hypothesis can be built on a test pilot case study. Natural phenomena occurring within the data under consideration are described by descriptive case studies. A descriptive case study is intended to reveal the details of the product's launch. In contrast, with the purpose of explaining the phenomena in the data, explanatory case studies analyse the data, not only at a surface level, but also at a deeper level. As an example, researchers working on processes in companies might find explanatory research useful (Noor, 2008; Zainal, 2007).

3.4.2 Advantages and limitations of the case study

Usage of case studies provide many advantages, one of which is the provision of more exhaustive information than other methods due to the fact that case studies present data collected from multiple methods (e.g. surveys, interviews, document review, and observation) (Neale, Thapa, & Boyce, 2006). Furthermore, the data is examined in its relevant context (Yin, 2009); in other words, it is related to the situation where the activity takes place. Case studies do not only help explore or describe the data in real-life environments, but also explain the complexities of real-life situations. It may not be possible to grasp these aspects through experimental or survey research (Zainal, 2007). However, it is also crucial to detail the shortcomings of this approach:

- Yin (2009) argues that "many times [the] case study has allowed equivocal evidence or biased views to influence the direction of the findings and conclusions" (p.21).
- Since case studies use a limited number of subjects, where some are conducted with a single subject, they provide restricted basis for scientific generalisation. Moreover, case studies may be long, and require complex procedures to conduct and yield a massive amount of documentation (Yin, 2009).
- Evaluation and research fields have always considered case studies less rigorous than surveys or other methods. This is due to the fact that some people still consider qualitative

research unscientific; in many cases, in the past researchers have not been systematic in data collection for the case study, or their findings were affected by bias (Neale, et al., 2006).

- An often expressed concern about case studies is the difficulty of generalisation of one case over another. Remarkably, selection of some examples and assumption without evidence that these are typical or representative of the population, resulted in overgeneralisation of case studies. As a scientist generalises from experimental results to theories it is advised by Yin, a prominent researcher, that case study analysts generalise their findings to theories (Neale, et al., 2006).

3.4.3 Selection of a case study for this research

According to Yin (2009), it is indispensable that the strengths and weaknesses of case study research be analysed and acknowledged. Five major research methods are listed in Table.3.1, where the relation of each method with the following three conditions have been given in detail (Yin, 2009, P8): (1) the form of research question, (2) the requirement for control of behavioural events, and (3) the degree of focus on contemporary events. Each method aims to explain, explore or describe a specific topic (Garrard, 2011).

Table 3.1. Relevant situation for different research methods

Method	(1) Form of research question	(2) Requires control of behavioural events	(3) Focused on contemporary events
Experiment	How, Why?	Yes	Yes
Survey	Who, What, Where, How Many, How Much?	No	Yes
Archival analysis	Who, What, Where, How Many, How Much?	No	Yes/No
History	How, Why?	No	No
Case study	How, Why?	No	Yes

Additionally, according to Neale, et al. (2006), case studies are especially appropriate for cases where there is a unique or interesting story to be told. Mostly, case studies outline the context of other data (such as outcome data), and offer a more holistic understanding of the happenings in the program and their reasons (Neale, et al., 2006). Similarly, according to Yin (2009), a case study is suitable where events are observed directly and the events include interviews.

The research question is "*How can digital storytelling enhance the student engagement and provide better educational outcomes for learners?",* and the case study approach has been chosen accordingly. Therefore, multiple case studies have been conducted at an Australian school; this study focuses on the implementation and evaluation of digital storytelling at two different levels of schooling: primary school and secondary school. In the selected classrooms students and teachers were given the opportunity to engage in innovative learning experiences based on digital storytelling.

3.5 Implementation of digital storytelling in classrooms

Since the main aim of this research is to investigate the impact of digital storytelling on student learning when teachers and students use digital stories, and evaluate if and how digital storytelling can enhance student engagement and improve educational outcomes; the next section will focus on how digital storytelling is implemented in the classroom, describing the digital story workshop, and explaining the teacher roles and students' tasks (Smeda, Dakich, & Sharda, 2012b).

As mentioned by Sadik (2008), the use of technology is only effective if the teachers have the expertise to customise the use of technology for story creation. The benefits can only be received if teachers have the ability to use it in the classroom effectively. Therefore, the

researcher started by giving an orientation seminar, followed by workshops to teachers during the first two weeks to support and engage them in the project.

The following steps were used to help teachers easily integrate digital storytelling in their classroom. It is not the only way to implement digital storytelling; however, it can provide clear strategies on how to integrate digital storytelling when teachers and their students do not have any previous training in digital story (Kajder, Bull, & Albaugh, 2005; Lasica, 2006; Miller, 2009; Ohler, 2008; Robin, 2006; Sadik, 2008; Sharda, 2007a; University of Houston, 2011).

3.5.1 Teachers' workshop

There were two workshops and their main objectives follow:

1. Introduce Digital Storytelling (Workshop 1):
    - Objective: Describe the concept of digital storytelling
    - Facilitator: Researcher
    - Description: The workshop started with a conversation about teachers' experiences with digital sound, video, and storytelling. An overview of possible strategies of using digital storytelling as a medium for engaging students and improving learning outcomes followed. The potential power of digital storytelling as a teaching and learning tool was then explored within the constructivist paradigm.
2. Introduce Moviemaker software (Workshop 2):
    - Objective: Describe how to create a digital story with the Moviemaker software
    - Facilitator: Researcher
    - Description: in this workshop Moviemaker software was introduced to the teacher with an explanation of how to create a digital story using this software, and various features and options available in Moviemaker were demonstrated.

3.5.2 Students and teacher roles

Students at different levels have different skills and knowledge, so they need different levels of help. For example, primary school students who have basic skills and knowledge need more direction and guidance to create a digital story. Obviously, students in different grades might need different levels of assistance and scaffolding. Therefore, students were working under the supervision of their teachers, and depending on each individual student, teachers provided help in constructing and creating the story. It is expected that the level of teacher support and the extent of scaffolding may vary across levels; teachers were prepared to provide this support through a series workshops (Smeda, Dakich, & Sharda, 2012b).

The following lessons explain how teacher and student worked together to create the digital stories step-by-step:

Lesson 1: Brainstorm

The objective of this lesson is to brainstorm the story. Typical expected duration is 1 to 3 days. In this lesson, teachers divide students into groups and allocate topics for them to discuss between themselves, share their ideas with each other and brainstorm the story in different ways. The students jot down ideas and write the initial narrative for the story for a particular topic the teacher had given them.

Lesson 2: Storyboard

The purpose of this lesson is to create the storyboard. The estimated duration is 2 to 4 days. In this lesson, teachers help their students in writing the storyboard to organise the story sequences. They also help students clarify the main ideas of the story. Students, on the other hand, create the storyboard and select the right element for it. They may also start by writing a draft of their storyboard. This assists in planning the visual materials in order and thinking about how to match images or videos with the voiceover and music.

Lesson 3: Search the material

This lesson is directed towards collecting the material required to create the digital story over a period of 2 to 4 days. Teachers demonstrate to their students how to look for images from different sources such as books, magazines, and the internet. They also explain copyright and digital rights issues related to the materials used. Furthermore, teachers show the students how to use the digital camera, if required. It is the students' responsibility to choose elements which match their digital storytelling such as photos, videos, and music.

Lesson 4: Creating digital storytelling

The objective is to use Moviemaker software with the purpose of creating digital storytelling. Due to the amount of work associated, the duration of this lesson is 5 to 10 days, the longest among digital story creation steps. For teachers, this lesson is designed to help students create the digital story and explain how to import pictures and videos into the Moviemaker software. Moreover, teachers help the students who want to record their voices and use them within the story. The students created the digital story based on the storyboard by importing the elements to Moviemaker software and record the student's voice to add to the narrative and test if it works efficiently with the digital story. They also add special effects and adjust the length of each visual element. This is achieved by choosing and adding some special effects, such as music and transitions, to make the story more attractive, adjusting the length of each visual element to make sure it matches the narrative over the entire digital story.

Lesson 5: Editing and feedback

Placed after the story creation, this lesson is aimed at editing and finalising the digital story. It is projected to be completed in 1 to 3 days. In this lesson teachers provide some feedback to incorporate further improvements before the final draft of the digital story. Students, on the other hand, revise and edit the drafts based on teachers' comments and feedback. Then, they

discuss the final drafts with the teacher and other students. The final form of the story will be prepared based on these comments and feedback.

Lesson 6: Presentation and evaluation

The final step of digital story creation is about presenting and evaluating the finalised digital stories in 1 or 2 days. Teachers attend the students' presentation of their digital story to the audience, and evaluate them based on story elements, story creation and presentation. The sole responsibility of the students in this lesson is to present the digital story to teachers, classmates, and parents.

3.6 Research method

This research has been designed to utilise both quantitative and qualitative methods. As previously mentioned, this research aims to explore the pedagogical benefits of digital storytelling; therefore, this research will focus on the level of the student engagement and the educational outcomes associated using digital storytelling. In order to achieve a complete understanding of these phenomena, both quantitative and qualitative data have been collected.

3.6.1 Classroom observations

As both qualitative and quantitative observations have been carried out a new observation form has been created (See Appendix A). This observation form was adapted from WestEd (WestEd, 2002) to fit the purpose of this study. This tool contains three different forms to be filled in:

- Pre-observation form (qualitative)
- Timed observation form (quantitative)
- Field notes form (qualitative)

The pre-observation and field notes forms have been used to collect qualitative data. The pre-observation form was used to collect information about the class being observed, objectives of the story, and materials used. Whereas the field notes form has been used immediately after class, to write up research notes.

The timed observation form has been used to collect quantitative data about the use of new technologies. The timed interval observation sheet is divided into several components, analysed for the percentage of time each variable observed in the classroom. To collect data, the observer checks the presence of various attributes of technology integration observed during three-minute intervals. The check marks for the noted intervals are then tallied for an overall distribution of observed events (Sadik, 2008). This observation has been conducted to examine the quality of student engagement in authentic learning tasks using digital storytelling, and specifically focuses on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and modes of learning.

3.6.2 Evaluation rubric

In addition to classroom observations, a scoring rubric has been used by teachers to assess the quality of the digital stories. This stage had two different aims: to assess the level of student engagement and document the provision of better education outcomes through digital storytelling. The level of engagement is a quantity that can be measured with the help of a scoring rubric. According to Sadik (2008) it is appropriate to use an assessment instrument, such as a scoring rubric, to evaluate ICT-based learning projects. Therefore, the role of digital storytelling in realising student engagement and outcomes in authentic learning has been assessed by means of an evaluation rubric (See Appendix B).

An evaluation rubric created by the University of Houston (2011) has been chosen as a guideline to create the rubric fit for this research. This rubric has been used to assess students' success and level of engagement in authentic learning using digital storytelling.

The evaluation rubric included nine criteria; in conjunction with the eLDiSt framework, these criteria have been classified in the eLDiSt framework under the four different digital storytelling aspects. These criteria are: Purpose, Plot, Pacing of Narrative, Dramatic Question, Story Content, Grammar and Language Usage, Technological Competence, Emotional Content and Economy of Content. Four levels of descriptors were given for each category, with scores of 4, 3, 2, or 1 possible, depending on the level of success in that area (See Appendix B).

3.6.3 Teacher interviews

Once the level of engagement is measured, we need to ascertain the educational outcomes associated with digital storytelling. To perform this step qualitative data has been collected through teacher interviews (See Appendix C). After conducting interviews the interview data have been analysed to identify the benefits related to the use of digital storytelling as a pedagogical approach, and the teacher's opinion about integrating new technologies in their curricula and classroom.

Therefore, three different methods have been utilised for data collection: observation, teacher evaluation rubric, and interview. Timed observation and field notes have been used as the observation method, while a scoring rubric instrument will be used for teacher assessment. Finally, an interview protocol has been used for interviewing the participating teachers. The overall conclusions will be extracted by integrating the findings of each method (Creswell, 2008).

3.7 The e-Learning Digital Storytelling (eLDiSt) framework

The eLDiSt framework is designed primarily as a tool to help story creators in producing engaging digital stories, considering their needs and capabilities at various stages (Smeda, Dakich, & Sharda, 2012a).

This framework is organised, as shown in (Appendix K), with the following components: various education levels at which a digital story could be used as a learning tool are shown as individual columns; and various aspects to be considered in creating a digital story are listed as individual rows.

3.7.1 Framework overview

The eLDiSt framework considers the needs and capabilities of learners at various stages of learning, including learners from primary school to university level, and even professional e-Learning content creators. This framework is based on thirteen storytelling aspects and five levels: each aspect advances in complexity as the learner's levels advance from one to five.

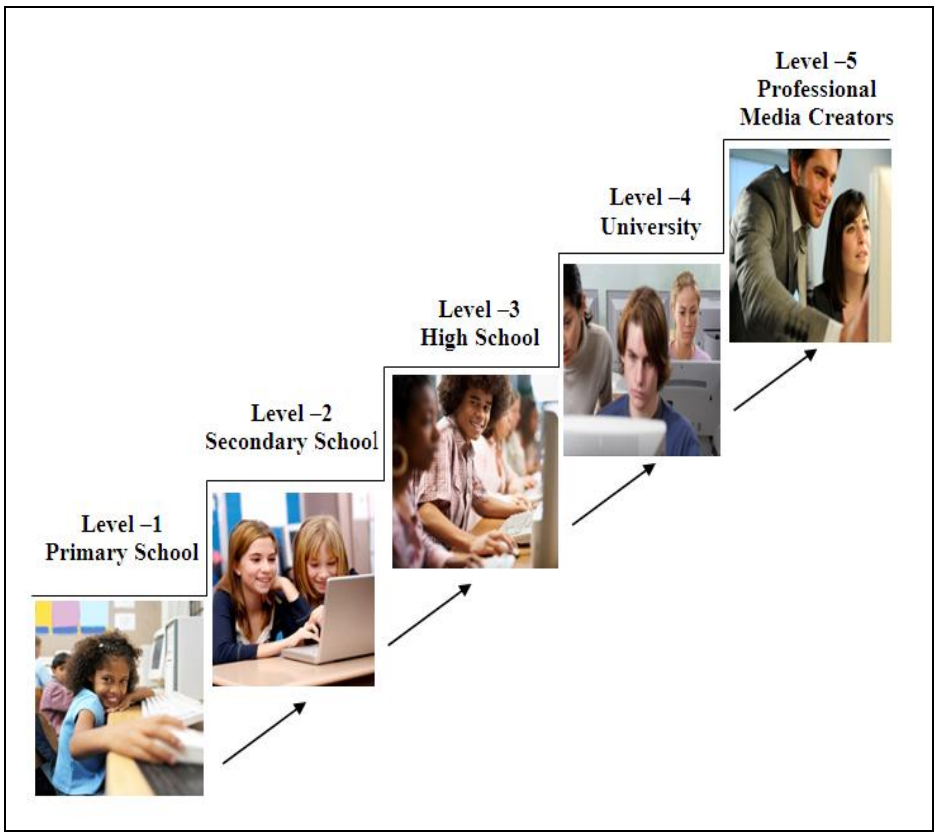

Figure 3.1 The five levels of the eLDiSt framework

3.7.2 Framework levels

The levels are numbered from 1 to 5, as presented in Figure 3.1, and make reference to the learner's knowledge levels. The framework is cognisant of the Australian Core Skills Framework (ACSF) (DEEWR, 2008), and takes into account expected learning pertaining to the five levels specified in the ACSF. At Level 1, learners have basic skills and knowledge, and they need much direction and guidance to create a digital story. Therefore, primary school students could be included. Levels 2 and 3 include learners who are able to understand the study subject on their own, but still need some guidance and supervision to create a digital story. These levels could include students from secondary schools and high schools, even if they belong to different educational systems.

Highly skilled learners are included at Level 4. These learners are specialists in the study subject, able to work independently, and offer in-depth analysis in their area of study. Consequently, university students are included. Finally, at Level 5 learners operate at a very high level of knowledge and they are expected to be experts at creating digital stories. Therefore, this level includes professional media creators.

This framework is based on thirteen storytelling aspects. Depending on the learner's skills and the education objectives of the digital story, the complexity of each aspect increases as the learner's level advances from 1 to 5 (Smeda, Dakich, & Sharda, 2012a).

3.7.3 Digital Storytelling Aspects

The eLDiSt framework comprises a number of Digital Storytelling Aspects (DSAs) divided into four categories: Story Aspects (SA), Learning Aspects (LA), Digital Creation Aspects (DCA), and Combined Aspects (CA). A detailed explanation of the various DSAs is given below.

3.7.3.1 Story Aspects

Story Aspects (SA) are related to the structure and methodology used to create the story. Table 3.2 presents SA and the definition of each aspect.

Table 3.2 Story Aspects (SA) and definitions

Story Aspects (SA)	Definitions
Plot	The set of events that make up the story.
Pacing and narrative	The rate at which the events proceed.
Dramatic question	The question which makes the main point of the story, and moves it forward.
Story characters	Characters are the actors, participant, or players that populate the events and scenes of the story.
Emotional content	The range of emotions depicted by story characters.

- **Plot**

The plot is formed by the news and events within the story (Laidlaw, 2010). The plot should also include the following five parts: introduction, rising action, climax, falling action and denouement (Theune, Rensen, Akker, Heylen, & Nijholt, 2004). In the introduction, the information related to the characters and settings are shown. The story conflict is shown in the rising action part, where the events also start to become more complex. The climax shows the most interesting part of the story. At this point, the reader cannot know what the end of the story will be, or whether the conflict will be resolved. In the falling action part, the conflicts start to be resolved, and the reader identifies with what is going to happen in the next stage of the story. The denouement is the final result and all story events are untangled.

Taking into consideration plot structure; to create an educational story the first step should be to define the events that will form this story. These events must be selected judicially from a large set of possible events that can make up a story.

- **Narrative**

The terms of story, plot and narrative may appear similar; however they are complementary. Ip (2011) argues the series of events form the story, the plot links these events while the narrative is how the story is presented to readers. Therefore, narrative establishes the order of the events, durability and frequency, as well as communication of these events. Consequently, narrative can be more flexible than plot or story (Ip, 2011).

Narrative is the foundation of digital stories (Ohler, 2008) and it engages the reader through the story (Bury, 2009). According to Bury (2009) when the narrative is well done, the reader can even become a part of the story events.

- **Dramatic question**

According to Lambert (2007), a story with a dramatic question, which is resolved in the last part of the story, can hold audience attention. To develop a dramatic question the process usually includes the definition of the conflict, the motivation for the story, and the method to resolve the conflict (Lambert, 2007).

Asking questions offers a great opportunity to find ideas for stories and see if they are interesting (or not); as a result of this process there will be a list of questions that can be used to start a story (Burruss, 2008). The dramatic question is often answered at the end of the story. There are many sub-questions that keep getting answered throughout the story. However, to create a moving story, the answer to each sub-question should raise another sub-question.

- **Story characters**

Characters can be simple or complex. Simple plots usually include simple characters while complex plots in general incorporate complex characters. The character's emotions can have influence on plot creation, as their ability to adopt aims is more influenced by their emotions than by story guidelines (Theune, Rensen, Akker, Heylen, & Nijholt, 2004).

According to Spierling, Grasbon, Braun & Lurgel (2002), characters with a low level of autonomy follow predefined dialogue scripts while characters with a high autonomy level can makes their own choices (Spierling, Grasbon, Braun, & Iurgel, 2002).

- **Emotional content**

The audience is engaged with the story through emotional content (Robin, 2008). Therefore, emotional content is essential to create a moving story, and should therefore be integrated in the interactive plot (Cruz-Neira, 2003).

3.7.3.2 Learning Aspects

Learning Aspects is related to expectations of what will be achieved through the story, in terms of learning outcomes, and the complexity of the language used to present the story. Table 3.3 presents Learning Aspects (LA) and definitions.

Table. 3.3 Learning Aspects (LA) and definitions

Learning Aspects (LA)	**Definitions**
Purpose	Goals (aims and objectives) for creating the story.
Language usage	Complexity of the language used in the story.

- **Purpose**

The purpose is what will be achieved through the story, in terms of message and/or learning outcomes. According to Lambert (2007); generally stories follow a model where the main character deals with a problem, a need or a desire, that the author tries to communicate. Therefore, it is crucial to identify the aim of the story to ensure that every part of the story is contributing to achieve it (Lambert, 2007).

- **Language usage**

The story can be presented in a single language (e.g. English), or it can be multilingual (e.g. English and Arabic). The vocabulary and the grammar can be simple or complex, or anything between.

3.7.3.3 Digital Creation Aspects

Digital Creation Aspects (DCA) are linked to the elements and technology used to create and present the story. Table 3.4 presents the DCA and definitions.

Table 3.4 Digital Creation Aspects (DCA) and definitions

Digital Creation Aspects (DCA)	**Definitions**
Story content	The digital elements used to create the story.
Technological competence	Complexity of technology.
Production	The process and tools used for creating the digital story.
Presentation	Present the story to audiences.

- **Story content**

Story can be based on text, spoken words, music, video, animation or a combination.

- **Technological competence**

Technological competence is associated to the complexity of technology needed to create the story. The risk with the use of technology to create digital stories is that many students are more focused on the technology than the story. For this reason, sometimes the final product can be a good quality technical piece instead of a story with a clear message. Ohler (2006) suggests beginning with the story structure before considering the technological aspects. And according to Ohler (2008), "story without digital works, but digital without story does not" (p. xviii).

The creation of digital stories leads to the need for digital media content, and this need can be met through the use of various tools such as video and digital cameras and scanners.

Additionally, it is possible to combine audio, video, text, still images, and even web publishing, through specialised software designed for this purpose (Behmer, 2005).

- **Production**

The hardware and software used for story production can be as simple as a home video and computer, or as complex as that used for professional movie production.

- **Presentation**

Digital stories can be presented on a computer, on a TV using VCD / DVD, or in a theatre. Web systems such as YouTube and devices such as iPods are also becoming popular.

3.7.3.4 Combined Aspects

Combined Aspects (CA) are linked to the economy and quality of digital storytelling elements. Thus a good story should be told as simply as possible without overloading it with excess content (Robin, 2008). And the quality of the story should always be evaluated (Ohler, 2008). Table 3.5 presents the CA and definitions.

Table 3.5 Combined Aspects (CA) and definitions

Combined Aspects (CA)	**Definitions**
Economy of content	Optimisation of contents and quality.
Evaluation	Evaluate the effectiveness of the story.

- **Economy of content**

As mentioned above, a good story should be told as simply as possible and can be effectively illustrated by using images, audio and brief text.

- **Evaluation**

The evaluation aspect is related to the process of giving feedback about the effectiveness of the story. For example, determining how effective the story elements are including plot, narrative and characters.

Therefore, this framework is based on thirteen storytelling aspects and five levels, and each aspect advances in complexity as the learner's level advances from level one to five. It considers the needs and abilities of learners at different stages of learning, including learners from primary school to university, and even professional e-Learning content creators. With the help of this eLDiSt framework, digital storytelling can be used as an efficient and effective learning tool at various levels of education. Different aspects identified in this framework enable teachers as well as students to fully grasp the elements required for an engaging and educative digital story.

3.8 Participant groups

This study involved five teachers from prioritised curriculum areas (Science, Art, English, Library and Social Studies) to integrate digital storytelling into the primary and secondary school curriculum during third and fourth terms in 2012.

Table 3.6 provides the scenario for each setting including the subject area in which the digital storytelling was implemented, the number of students and days spent observing the project development and viewing digital storytelling.

Table 3.6 Case study groups

Cases	Grades	Subjects	Student Numbers	Groups	Observation days
1	ESL	English	8	Individual	17
2	3/4	Library	92	Groups of 4 to 5 students	12
3	7	Art	29	Groups of 4 to 5 students	12
4	9	Sciences	17	Groups of 4 to 5 students	7
5	11	Improve personal skills	4	Pairs of students	12

3.9 Ethics consideration

For the purpose of this research, ethics approval was granted by the Victoria University Human Research Ethics Committee (HREC) before conducting this research.

The researcher sent an email to potential teacher participants with information about the project (See Appendix D). Potential participants were asked to express their interest in participating in the project by replying to the email. Potential participants had the right to ask questions about the project before they signed the consent forms (See Appendix E). The researcher was available to answer any questions or concerns about the project. According to VU recommendations, an initial contact has been made with the school to ensure there is an interest in participating in the proposed study. Initial approval was obtained from the school principal (See Appendix F). Parents were informed and made aware of the research project processes (See Appendix G), and parents were asked to sign the form and send it back to the school.

3.10 Data analysis

Data has been analysed using a conceptual model of technology integration developed in the project. The quantitative data was analysed using SPSS. The researcher used inferential statistics to identify the relationship between independent and dependent variables. The qualitative data has been transcribed and coded. Findings were interpreted using a conceptual theoretical framework based on a comprehensive review of current literature and empirical research.

3.11 Summary

This chapter presented the research design utilise in this study. The research methodology was provided including a description of the selected research methods, instruments used for data collection, participant groups, implementation phases, and strategies for data analysis. In

an attempt to produce an effective methodology chapter this research has attempted to follow the guidelines created by Creswell (2008) and McMillan (2004). The research findings will be presented in Chapters 4, 5 and 6.

Chapter 4: Engaging Primary School Students through Digital Storytelling

4.1 Introduction

For the purpose of this research, a case study has been conducted to investigate the impact of using digital storytelling on student engagement and learning outcomes at East Preston Islamic College (EPIC). Five cases have been studied at two different levels of schooling: primary school, and secondary school. The findings of these cases are presented in chapter four, five, and six. In chapter four the finding of the primary school cases (ESL and Years 3/4) are presented, chapter five presents the finding of secondary school cases (year 7, year 9, and year 11), while chapter six includes the cross-case analysis for the five cases. Accordingly, this chapter reports the findings of the primary school cases (ESL and Years 3/4). Three different methods have been utilised for data collection: observation, evaluation rubric, and teachers' interview. The overall conclusions are extracted by integrating the findings of all three methods.

The results are organised to address the research questions; therefore, they will be divided into three parts based on the research questions:

- How can digital storytelling be used to enhance student engagement?
- How can digital storytelling be used to improve educational outcomes?
- What are teacher perceptions about student learning through digital storytelling?

4.2 The participants

This study consists of five primary and secondary school cases studies from different curriculum areas (Science, Art, English, Library and VCAL). These case studies were conducted during the third and fourth terms in 2012, for the integration of digital storytelling into the curriculum in primary and secondary stages of education. The following sections present the participants in the two primary school cases, namely ESL and Library classes.

4.2.1 Digital storytelling in ESL class

The first case examines the role of digital storytelling in enhancing student engagement and outcomes in the ESL class. Participants were ESL (English as a Second Language) students who had recently come to Australia: English is not their first language. This was a mixed class of 8 students from grades 3, 4, and 6. Each student was asked to create a digital story using the Moviemaker software, based on a story he/she had to write, as an ESL assignment on any topic they liked.

4.2.2 Digital storytelling in library class

The second case in this chapter examines the role of digital storytelling in enhancing student engagement and outcomes in the Library class. The participants were Years 3/4 students, and the subject was Library. A total of 91 students comprising 4 different classes included 3\4A, 3\4\B, 3\4C and 3\4D; there was only one teacher for the Library class. The students worked in groups of 4 to 5; therefore, this case has 21 groups. For the purpose of this case study, the teacher used digital storytelling to help her students present a good story. Each group was asked to create a digital story based on a story they loved to write, and the teacher gave them topics to choose from (See Appendix J for examples from digital stories).

4.3 Using digital storytelling to enhance student engagement

To examine the quality of student engagement in authentic learning tasks using digital storytelling, classroom observations were carried out. The findings of classroom observation for primary school cases (ESL and Years 3/4) are presented in the following sections.

Classroom observations were conducted to examine the level of student engagement within authentic learning tasks using digital storytelling. Classroom observation built a picture of the actual implementation practices used by teachers and students, which contributes to the validity of the data collected, and provides additional perspectives on the research conclusions.

4.3.1 Observation in ESL class

For this case study 17 observations were carried out as the students completed 17 full class periods (about 50 minutes per class plus 10 minutes travel time from their previous classroom), working on this project. As previously mentioned, an observation tool has been used to examine the level of student engagement within authentic learning tasks using digital storytelling. The observations focused on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and the modes of learning.

4.3.1.1 Class collaboration

Several aspects of class collaboration have been observed; as can be seen from the observation form (See Appendix A), these aspects include five options:

1. Individual students working alone.
2. Pairs of students.
3. Small groups (3+ students).
4. Whole class.

5. Student presentations.

Timed observations of the class collaboration (See section 3.5.1) indicated that students were working individually most of the time. It is important to mention here that the teacher decided to ask the students to work individually, since students had different levels of language proficiency and therefore needed different levels of support. Thus, as we can see in Figure 4.1, in the first 5 instances (full class periods) the whole class was working together for at least 20 minutes. The teacher spent this time explaining digital storytelling, what students had to do, how to write a good story; she also read some exemplar stories to help them write their own story. Furthermore, the teacher explained what elements students needed to create their digital story. After 20 minutes each student worked individually on his/her story, and received help from the teacher as and when required.

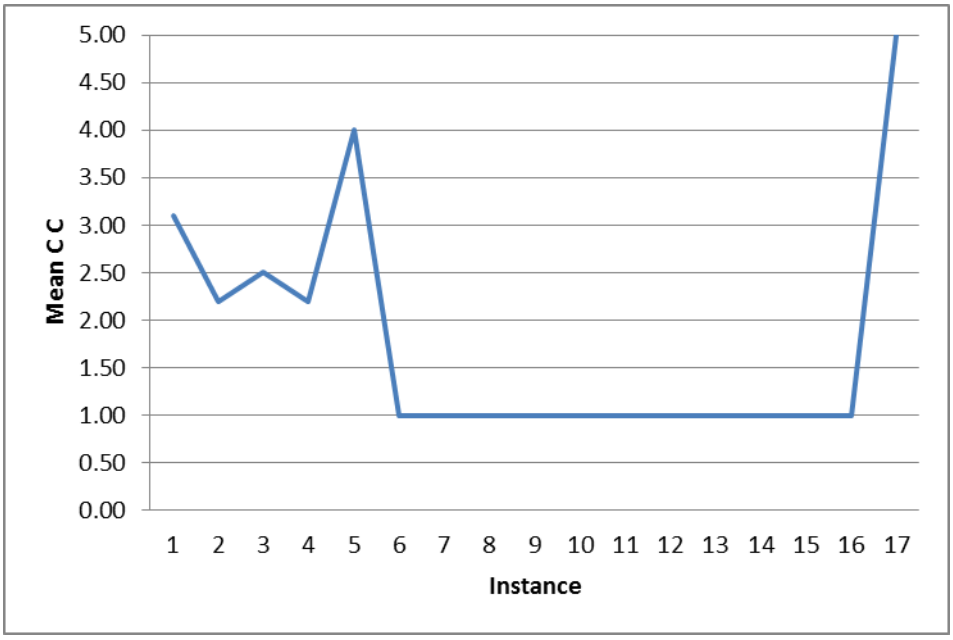

Figure 4.1 Class collaboration for ESL

Class collaboration shown in Figure 4.1 illustrates the level of collaboration throughout this case study. Figure 4.1 plotting the mean of the Class Collaboration (CC) considering all the five aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). The first five instances reveal a higher level of class collaboration since the teacher had to explain digital storytelling

at the outset, how to write a story, how to choose the correct vocabulary for a particular story and how to edit the story with correct grammatical structure. Given that English was the second language of all students in the class, the teacher's scaffolding was crucial for the improvement of their language knowledge. The teacher was helping every student and providing them with the support they needed for writing or creating an engaging story. Once the story was ready, the students worked individually on creating the digital story using Moviemaker software, and received individual assistance from the teacher as and when required (Figure 4.1). From instance 6 to 16 each student worked individually on his/her story with some help from the teacher. The last instance, i.e. instance 17, was allocated to student presentations and teacher evaluation. Students also showcased their digital stories to classmates and evaluated their work.

Overall, the class collaboration reached its peak when the entire class was working together. Since the students had different levels of English competency and therefore required different assistance, the teacher deemed it suitable for students to work individually most of the time with help from her, so students can do better with more one-on-one time from the teacher.

4.3.1.2 Knowledge gain

Several aspects of knowledge gain have been observed; as it can be seen from the observation form (Appendix A), these aspects include four options:

1. Receipt of knowledge.
2. Applied procedural knowledge.
3. Knowledge construction.
4. Other (specify).

Timed observations indicated the main type of knowledge gain occurred mainly through knowledge construction. Figure 4.2 plotting the mean of the Knowledge Gain (KG)

considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.2 shows, for the first 5 instances there was a mixed knowledge gain, where the first three options co-existed and applied procedural knowledge was dominant. This is due to the fact that, during this period, the teacher taught the fundamentals and components of digital storytelling to the class; the students then worked individually and received help from the teacher based on their needs.

After receiving the basic information, from instances 6 to 16 each student constructed knowledge on software usage and digital story creation. In instance 17, the presentation of the digital stories contributed to applied procedural knowledge gain.

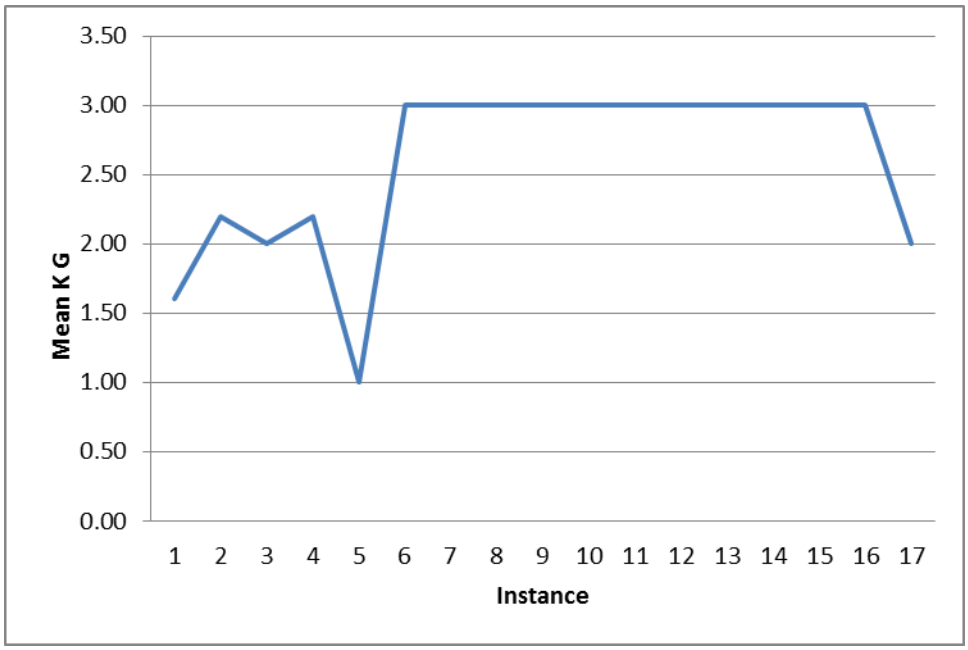

Figure 4.2 Knowledge gain for ESL

Classroom observations indicated the main type of knowledge gain was knowledge construction related to software usage and digital story creation, where students were involved in activities such as generating knowledge, performing collaboration in activities, solving problems, building comprehension, invention, performing pre-writing activities, question clarification, meaning co-construction, organisation and revision.

4.3.1.3 Student roles

Three different aspects of student roles have been observed:

1. Passive/ little response.
2. Active response.
3. Co-construct meaning.

Timed observations of these roles indicated students were mainly engaged in co-construct meaning, where they initiate dialogue with the teacher and construct their own meaning from the lesson activity. Figure 4.3 plotting the mean of the Student Roles (SR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 4.3 shows that for the first 5 instances there was a mixed student role in which the second and third options co-existed. During this period, the teacher taught the fundamentals and components of digital storytelling to the class; the students responded actively by providing input to open-ended questions and participating in discussions led by the teacher. Consequently, the students had the opportunity to construct their own understanding of the activity such as writing their own storyline and creating the digital story with the software. After receiving the basic information, during instances 6 to 16 each student worked individually and further constructed knowledge by receiving feedback from the teacher.

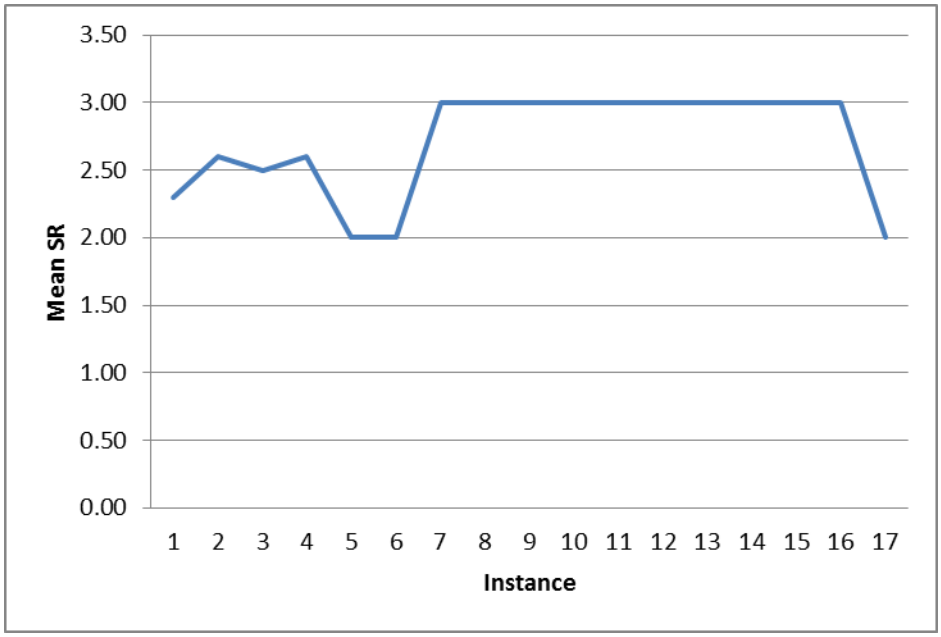

Figure 4.3 Student roles for ESL

During the presentation of the digital stories in the last instance (17), students actively participated in terms of presentation, discussion and evaluation. Therefore, the main type of student roles was co-construct meaning where students constructed their own meaning after initiating a dialogue with the teacher.

4.3.1.4 Teacher roles

Three different aspects of teacher roles have been observed:

1. Leads class.
2. Observes student/s.
3. Facilitates/Scaffolds learning.

Figure 4.4 plotting the mean of the Teacher Roles (TR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.4 shows, timed observations of teacher roles indicated that for the first 5 instances the teacher led the class by directing learning and providing information and/or explanations to students. In addition, the teacher managed behaviour, provided materials, or solved computer problems in order to get

students started and keep them on task. Throughout the class the teacher performed the role of facilitator of learning with the exception of instance 5, where the teacher introduced digital storytelling software to the class. Therefore, the teacher directed learning and provided information about the use of software. For the remaining instances, students did most of the work and the teacher provided clarification, engagement and motivation on a one-on-one basis.

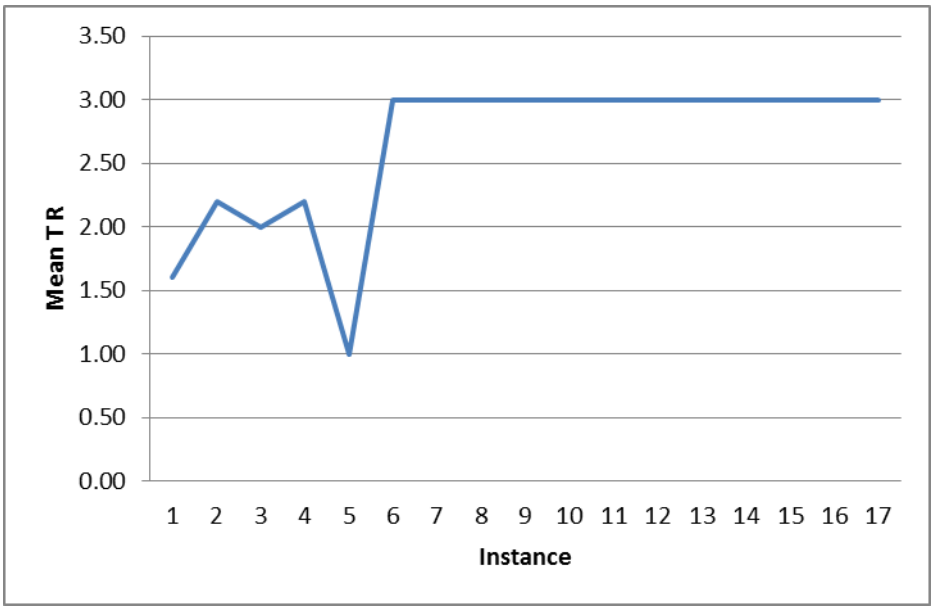

Figure 4.4 Teacher roles for ESL

Therefore, the teacher mainly fulfilled the role of facilitator and consultant, offering insightful comments or scaffolding learning. The teacher clarified and enhanced engagement and motivation on a one-on-one basis or in a small group, while the major portion of the work was done by the students.

It was observed by the researcher that a significant number of students referred to the teacher for story ideas and more instructions for story creation.

4.3.1.5 Student engagement

Three different aspects of student engagement were observed; these include:

1. Low engagement.
2. Moderate engagement.

3. High engagement.

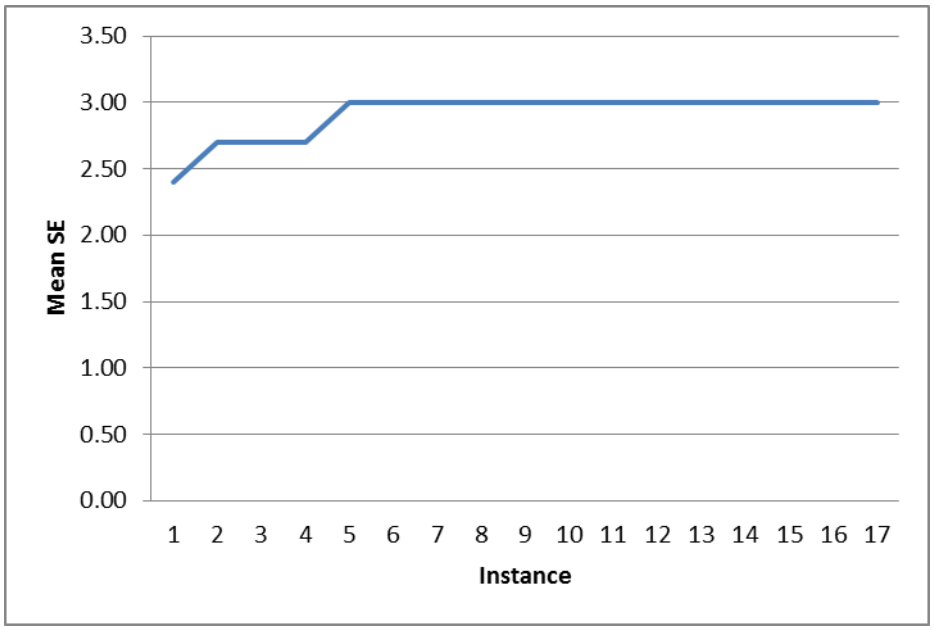

Figure 4.5 Student engagement/instance for ESL

Figure 4.5 plotting the mean of the Student Engagement (SE) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 4.5 shows timed observations of student engagement and depicts that students were always engaged with the lesson, where engagement levels varied between moderate and high. Moderate engagement means that at least half of the students were focused on learning tasks, but some were easily distracted or confused, and a minority may not be on task.

On the other hand, high engagement required nearly all of the students to be focused on the learning tasks and most of the activity in the classroom to be relevant to the tasks. Starting from instance 6, students worked on their own digital story creation and this yielded the highest engagement. This hinges on the fact that students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their own story. Therefore, student engagement was high until the very end.

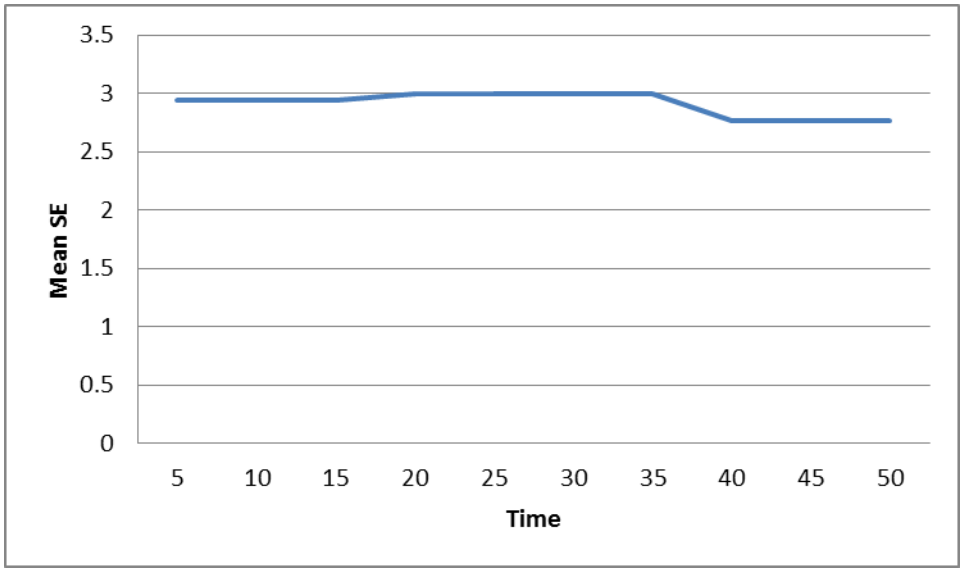

Figure 4.6 Student engagement/time for ESL

The average distribution of engagement levels in a single instance is shown in Figure 4.6 above. For the first 20 minutes in which the teacher explained the tasks to the class, student engagement was between moderate and high. When each student proceeded to work individually on his/her own story or digital story, student engagement was still high. The figure shows a slight decrease in engagement level towards the end of the instance. This was mostly apparent in the early days of the research, where students were required to create a storyboard. The challenge of writing, vocabulary selection and poor command of English played a major role in students losing interest in the task.

However, once storyboards were ready and students started using computers for digital story creation, the language impediment was removed and students were engaged until the very end.

Student engagement observations indicate that despite slight variations in engagement levels, students were always engaged with the lesson. Almost the entire class is engaged with the learning tasks and the major portion of classroom work is related to the tasks.

4.3.1.6 Technology integration

Four aspects of technology integration have been observed; these are:

1. Not used.
2. Add-on.
3. Partially integrated.
4. Fully integrated.

Figure 4.7 plotting the mean of the Technology Integration (TI) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.7 shows, the first two instances did not incorporate any technology integration as the teacher used traditional teaching methods to explain the tasks to the students. Instances 3 and 4 showed a gradual increase in technology integration to add-on and partially integrated options, respectively. The former means limited use of computer or related technology by students and teacher while the latter requires moderate use of computer or related technology by students and teacher. Starting from instance 5, the technology integration reached its peak at option 4 as fully integrated, where computer or related technology was extensively used by students and teacher. This is due to the fact that students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their own story.

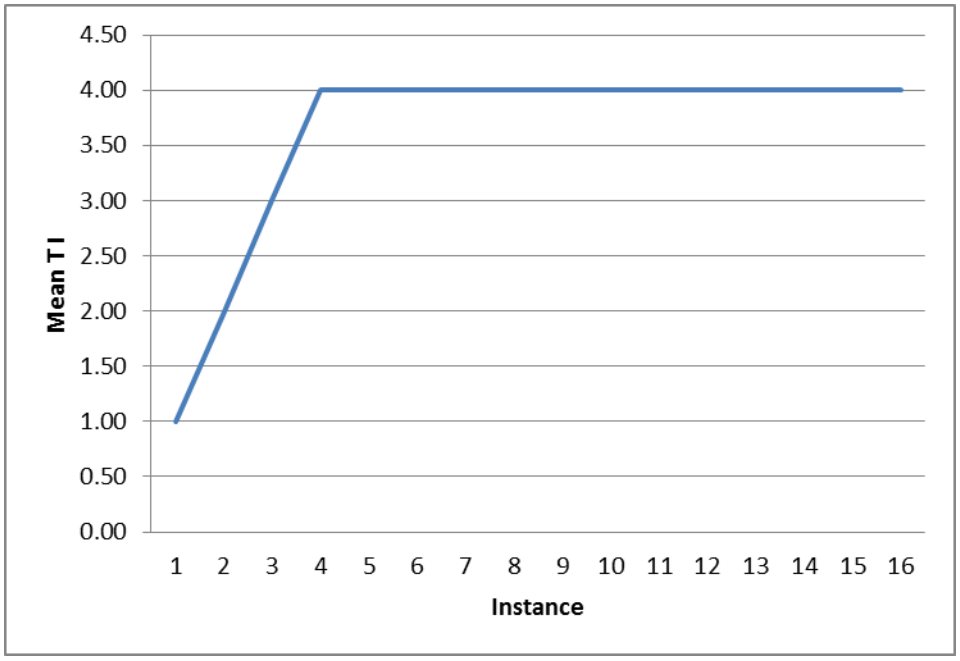

Figure 4.7 Technology integration for ESL

Student engagement and technology integration observations show there is a strong relation between them. In other words, the higher the level of technology integration, the better the student engagement. This is an expected result since the students are interested in using computers and the internet for any purpose. Therefore the introduction of technology to classes increased student engagement in the subject matter.

For statistical analysis, the relationship between student engagement and technology integration was investigated using Spearman's rho correlation coefficient given by equation 4.1.

$$\rho = \frac{\sum i(x_i - \bar{x})\,(y_i - \bar{y})}{\sqrt{\sum i(x_i - \bar{x})^2 \sum i(y_i - \bar{y})^2}} \qquad (4.1)$$

Where i = paired score.

Spearman's Rho is used to determine the level of correlation that exists between variables. This statistical tool is used to evaluate the level of correlation between variables representing ordinal measures. It is a non-parametric test used to measure the strength of

association between two ranked variables, where the value r = 1 means a perfect positive correlation and the value r = -1 means a perfect negative correlation.

Therefore, Spearman's Rho will be used to find out whether there is a relationship between student engagement (X) and technology integration (Y).

Preliminary analysis was performed to ensure there is no violation of the assumptions of normality, linearity and homoscedasticity. In other words, the collected data assumed to have homogenous distribution, show continuous behaviour and have same finite variance. There was a strong, positive correlation variables r = +.99, n =17, p< .001.

Therefore, it can be concluded that the use of digital storytelling in classrooms can increase technology integration. It is also observed that student engagement is directly proportional to technology integration.

This stems from the fact that the students are interested in technology. Furthermore, students found Moviemaker software very engaging and easy to use. Therefore, this contributed overall to student engagement in class and helped students develop their technical skills.

4.3.1.7 Modes of learning

Two aspects of learning modes have been observed; these are:

1. Teacher-led.
2. Student/s-led.

Figure 4.8 plotting the mean of the Modes of Learning (ML) considering the two aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.8 shows, timed observations of modes of learning indicated that the first three instances can be classified as purely teacher led, where the teacher explained the tasks to the students. This implies that the teacher dominated the interactions. There was little interaction by students

with the teacher or by students with other students. Instance 4 showed a balanced mix of teacher- and student-led modes of learning, since the students were writing their storyboard and receiving necessary feedback.

For the next three instances, a return to the teacher-led mode of learning is observed because this period was used by the teacher to introduce the Moviemaker software and explain its features. Since the necessary training and explanations were completed, the mode of learning for the remaining instances was dominantly student led, where the students dominated the interactions. The student-led mode of learning continued until the final presentation of digital stories by students.

Therefore, the interactions were dominated by the teacher in the beginning; later students controlled the interactions, and talked to the teacher about their lesson activities.

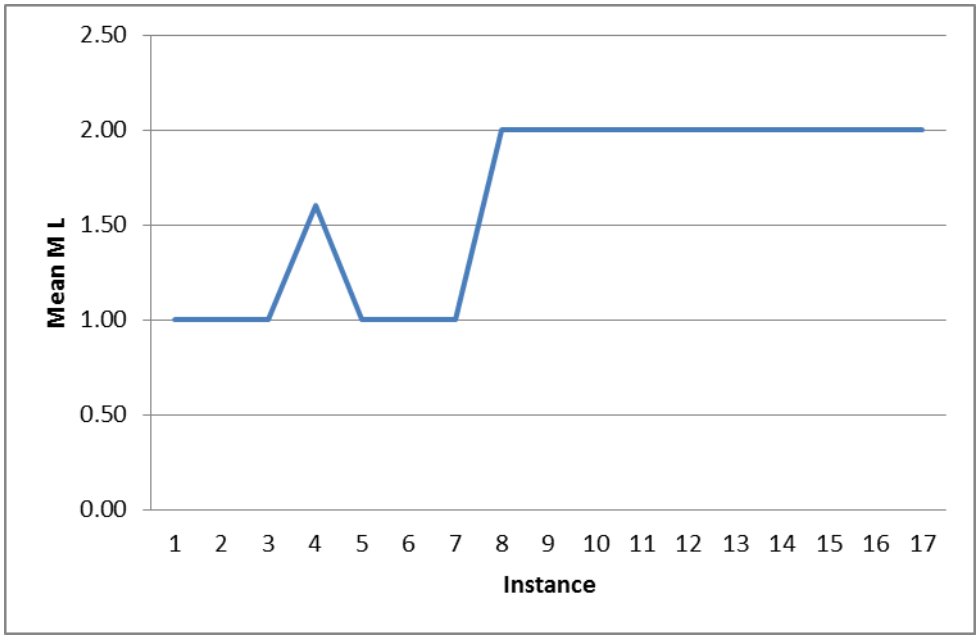

Figure 4.8 Modes of learning for ESL

4.3.1.8 Summary

In sum, classroom observations indicated that student outcomes were satisfactory and this is demonstrated by the stories presented on presentation day. Since students had different levels of language proficiency and required different assistance, the teacher deemed it suitable for

students to work individually most of the time with more one-on-one help from her. The observations indicated the main type of learning was knowledge construction related to software usage and digital story creation. Students were mainly engaged in co-constructing meaning, which occurred after initiating a dialogue with others. In these activities, the teacher fulfilled the role of facilitator and consultant including answering questions about software. Nonetheless, a significant number of students referred to the teacher for story ideas and more instruction for story creation.

Despite slight variations in engagement levels, the students were always engaged with the lesson. It is also observed that student engagement is directly proportional to technology integration. This stems from the fact that students are interested in technology use and this can be observed from the calculated r value which is very high (i.e. 0.99). Consequently, the introduction of technology increased student interest. Furthermore, students found Moviemaker software very engaging and easy to use and this helped students develop their technical skills.

A specific example of how digital storytelling can contribute to student engagement was observed with a 6^{th} grade student studying in a class composed of mainly 3^{rd} and 4^{th} grade students. This particular student could not accept the fact that he participated in an ESL class with pupils much younger than himself. He used to sit alone and not pay attention. However, when digital storytelling was introduced by the teacher and the tasks were explained, he was very excited to create his story on 'Basketball' and show it to the class. He became very active and engaged in the class. Furthermore, he started helping his classmates with computer tasks that they needed assistance with. For the first time, he approached the teacher and started interacting with her. The positive effect of digital storytelling was also observed by the teacher. This shows how digital storytelling can contribute to resolving various barriers such as age and isolation.

4.3.2 Observation in library class

As mentioned in section 4.3, classroom observation has been conducted to examine the quality of student engagement in authentic learning tasks using digital storytelling. For this case study (Years 3/4) 12 observations have been completed according to 12 full class periods (instances).

The teacher started the lesson by talking with students about the different ways in which to tell a story such as oral, written, or digital. The teacher explained digital storytelling and how a digital story can be created. Students were very excited about the idea of digital story; one of them expressed his excitement as "we are going to create a movie, it is great!"

The teacher gave each student four topics to choose from and explained each topic, asking them to choose a topic and a group. After selection of the topics and groups, students sat in groups, and started discussing their topic. Students came up with very big ideas and a lot of discussion, which clearly showed they were really engaged with their story.

Before the actual formation of stories, the teacher explained how the story must have three parts (i.e. bargain, medial and end). She also added that with every story there should be a lesson. She asked them to start with a question and at the end of the story this question must be answered.

Initially, students sat in groups and started to discuss their topic. Whenever they found difficulties in writing the teacher provided them with stories and books that related to their topics. At this stage, students were engaged in a lot of discussion and managed to come up with interesting ideas supported by their imaginations.

The teacher was leading the class and working with each group for at least 15 minutes. She was listening to their story and trying to direct them, and she also asked them to think about their characters. The next step involved groups working on their storyboards. Initially

some groups had difficulties. However, when they started the storyboard, they were interested in drawing, even more so than writing (See storyboard exemplar in Appendix I).

As previously mentioned, the observation tool examines the quality of student engagement in authentic learning tasks using digital storytelling, and specifically focuses on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and modes of learning.

4.3.2.1 Class collaboration

Several aspects of class collaboration have been observed; these are:

1. Individual students working alone.
2. Pairs of students.
3. Small groups (3+ students).
4. Whole class.
5. Student presentations.

Timed observations of the class collaboration indicated students were working in groups most of the time. Figure 4.9 plotting the mean of the Class Collaboration (CC) considering all the five aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As we can see in Figure 4.9, in the first 2 instances the whole class was working together for at least the first 20 to 30 minutes. This is due to the fact that the teacher took time explaining digital storytelling, what students needed to do, how to write a good story, and asked them to read other stories to help them write their own story.

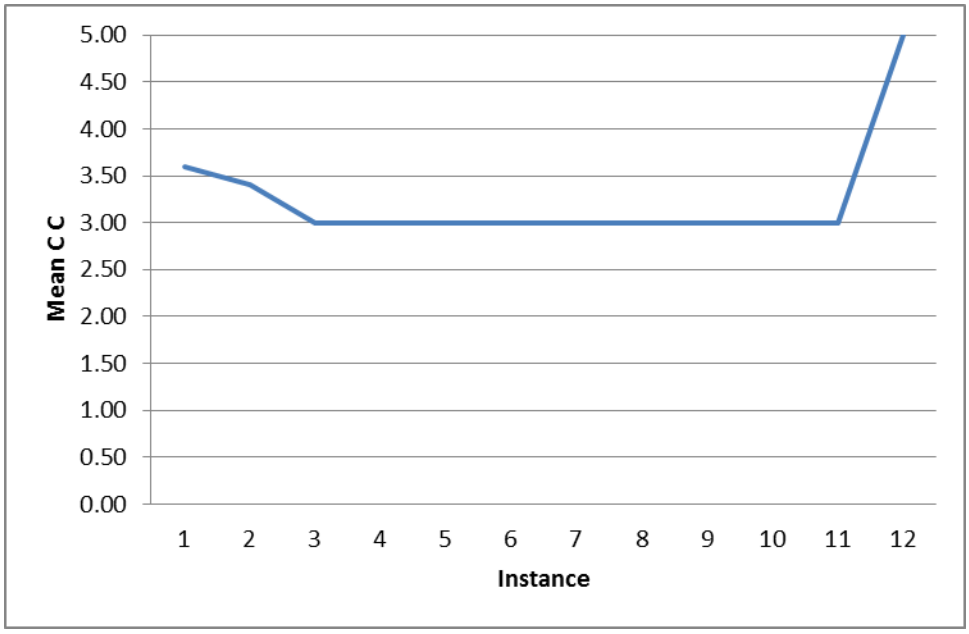

Figure 4.9 Class collaboration for Years 3/4

After 20 to 30 minutes each group worked on their own story and received help from the teacher, depending on their needs. From instance 3 to 11 each student was working in groups with some help from the teacher. The groups worked together on writing the storyboard. Once this task was completed, the group started using the software and creating their digital story based on the storyboard. Instance 12 was allocated to class presentation and teacher evaluation.

Class collaboration, shown in figure 4.9, illustrates the level of collaboration throughout the case study. The first two instances reveal a higher level of class collaboration, since from the outset the teacher had to explain digital storytelling, how to write a story choosing the correct vocabulary, and how to edit the story using correct grammatical structure. Once the story was ready, the students worked in groups to create the digital story using Moviemaker software and received individual assistance from the teacher. This was the case for the remaining instances, except for 12. In this instance, students showcased their digital stories to their classmates and evaluated the work of others. Therefore, the class collaboration was at its peak, where the entire class was engaged in working together.

4.3.2.2 Knowledge gain

Several aspects of knowledge gain have been observed; these are:

1. Receipt of knowledge.
2. Applied procedural knowledge.
3. Knowledge construction.
4. Other (specify).

Timed observations indicated that the main type of knowledge gain occurred mainly through knowledge construction. Figure 4.10 plotting the mean of the Knowledge Gain (KG) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol).

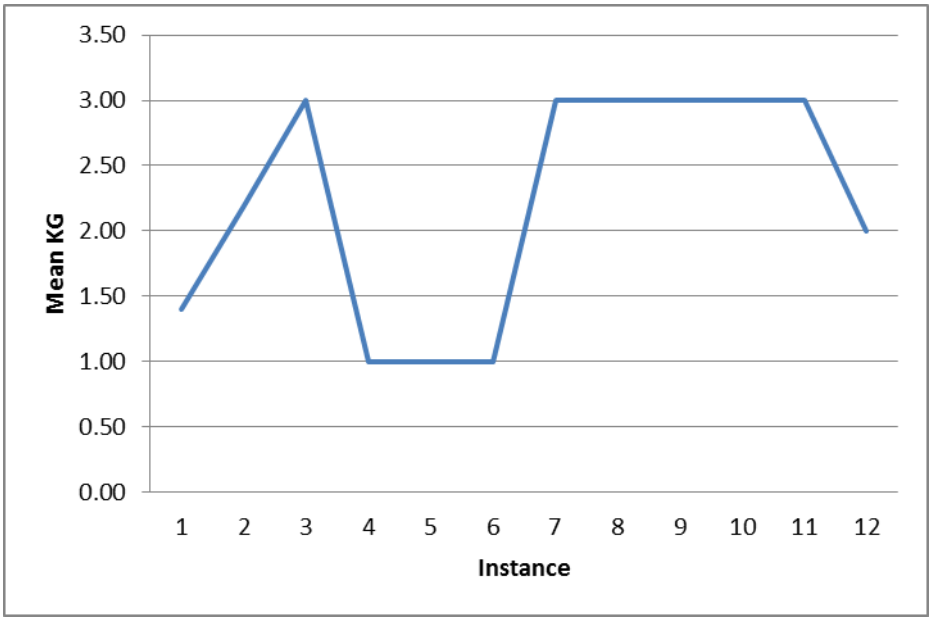

Figure 4.10 Knowledge gain for Years 3/4

As figure 4.10 shows, for instances 1 and 2 there was a mixed knowledge gain, where the first three options co-existed and applied procedural knowledge was dominant. This is due to the fact that, during this period, the teacher taught the fundamentals and components of digital storytelling to the class; students then worked in groups and received help from the teacher based on their needs. The students used the third instance to write their story and organise their storyboard. The teacher realised that students were struggling with their writing

s or associating it with the capabilities of the software. For this reason, the teacher decided to use instances 3, 4 and 5 to introduce the software to students so they could imagine how their story would look, and rework the storyboard with the acquired software knowledge.

After receiving the basic information, from instances 7 to 11 each group constructed knowledge on software usage and digital story creation. In the last instance, which is explained above, the presentation of the digital stories contributed to applied procedural knowledge gain.

4.3.2.3 Student roles

Three different aspects of student roles have been observed; these are:

1. Passive/ little response.
2. Active response.
3. Co-construct meaning.

Timed observations of student roles indicated that students were mainly engaged in co-construct meaning, where they initiate dialogue with the teacher and construct their own meaning from the lesson activity. Figure 4.11 plotting the mean of the Student Roles (SR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.11 shows, for instances 1 and 2 there was a mixed student role in which the second and third options co-existed. During this period, the teacher taught the fundamentals and components of digital storytelling to the class; students responded actively by providing input to open-ended questions and participating in the discussions led by the teacher. Consequently the students had the opportunity to construct their own understanding of the activity.

As previously mentioned students used instance 3 to write their storyboard. The teacher used instance 4 mainly to introduce the Moviemaker software to students. This is why students had been listening with little response.

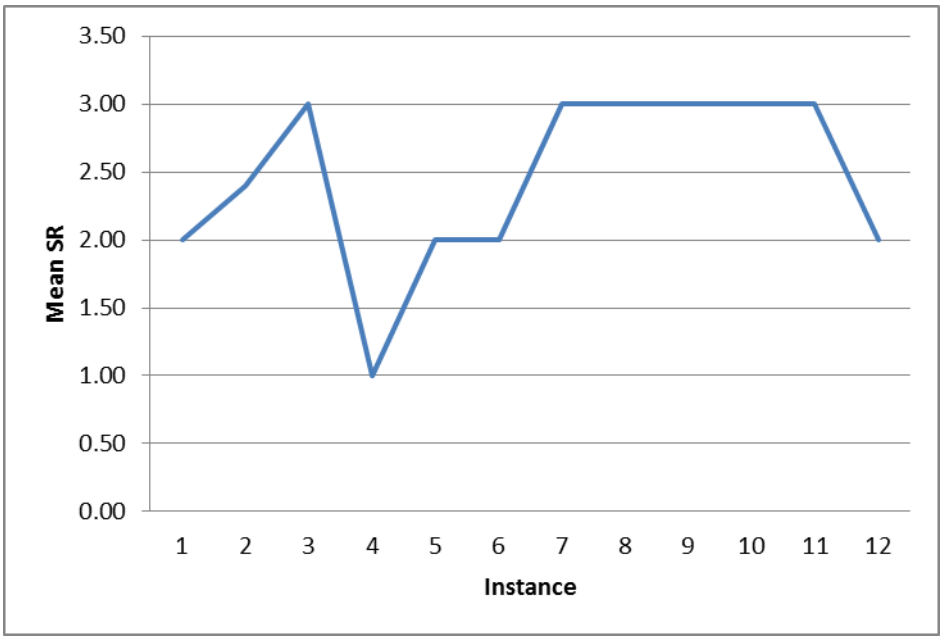

Figure 4.11 Student roles for Years 3/4

After receiving the basic software information, each group worked on the software and they were really engaged with an active response. Between instances 7 to 11 each group worked on their story and further constructed knowledge by receiving feedback from the teacher. During the presentation of the digital stories in instance 12, students were actively participating in class in terms of presentation, discussion and evaluation.

4.3.2.4 Teacher roles

Three different aspects of teacher roles have been observed; these aspects are:

1. Leads class.
2. Observes student/s.
3. Facilitates/Scaffolds learning.

Figure 4.12 plotting the mean of the Teacher Roles (TR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.12 shows, timed observations of teacher roles indicated that for instances 1 and 2 the teacher led the

class by directing learning and providing information or explanations. In addition the teacher manages behaviour, provides materials, or solves computer problems in order to get students on task.

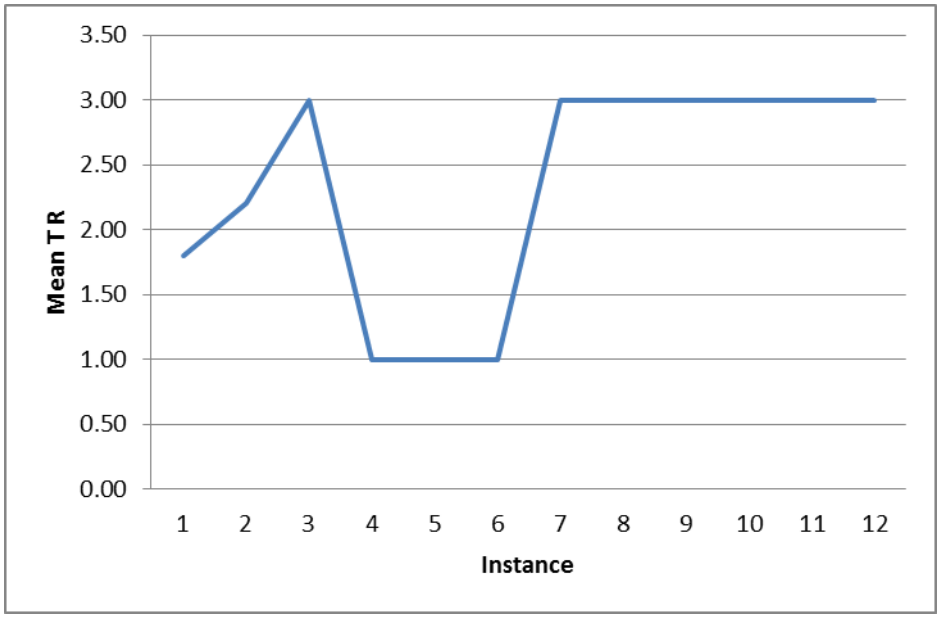

Figure 4.12 Teacher roles for Years 3/4

In instance 3 the teacher performed the role of facilitator of learning, where each group worked on their story and storyboard, and received individual comments from the teacher. The teacher used instances 4, 5, and 6 to introduce and explain digital storytelling software to the class. Therefore, the teacher directed learning and provided information about the use of software. The reason for spending 3 instances to introduce and explain software was due to the large number of students and a limited number of computers. For the remaining instances (7 to 12), students did most of the work and the teacher provided clarification, engagement and motivation on a one-on-one basis.

4.3.2.5 Student engagement

Three different aspects of student engagement have been observed; these include:

1. Low engagement.
2. Moderate engagement.

3. High engagement.

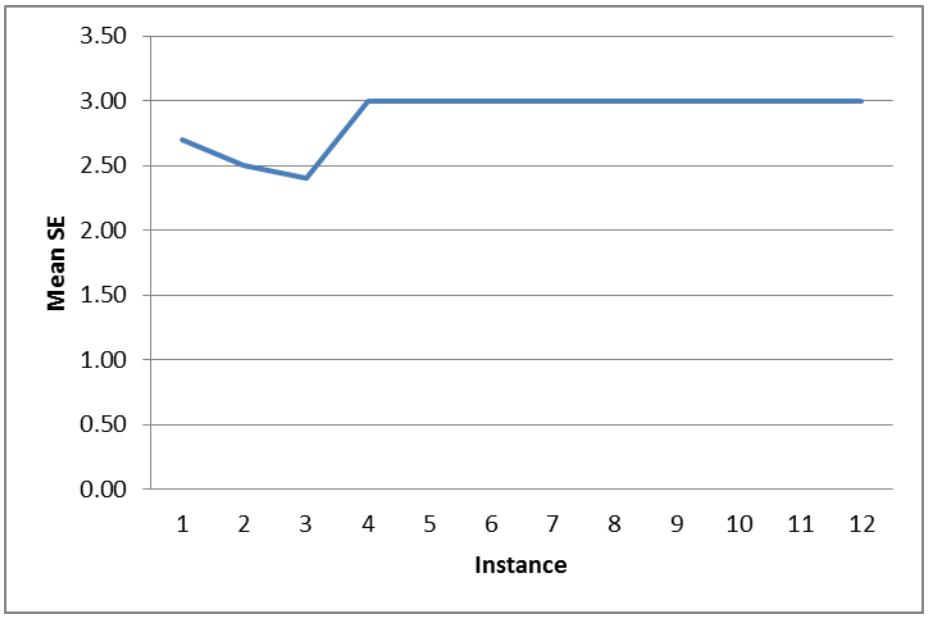

Figure 4.13 Student engagement/instance for Years 3/4

Figure 4.13 plotting the mean of the Student Engagement (SE) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 4.13 shows that timed observations indicated students were truly engaged with the lesson, where the engagement was almost high in most instances. In instances 1, 2 and 3 student engagement was between moderate and high. Starting from the instance 4, students worked with Moviemaker software and this yielded a high level of engagement. This hinges on the fact that students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their own story. Therefore, student engagement was high until the very end.

The average distribution of student engagement levels in a single instance is given in Figure 4.14. As shown, throughout the entire class, student engagement was between moderate and high. The highest level of engagement was achieved when each group started working together, following the teacher's briefing. Strikingly, the student level of engagement was kept between moderate and high until the very end of the class. This is due

to the exceptional performance of the teacher when leading the class and endeavouring to engage students.

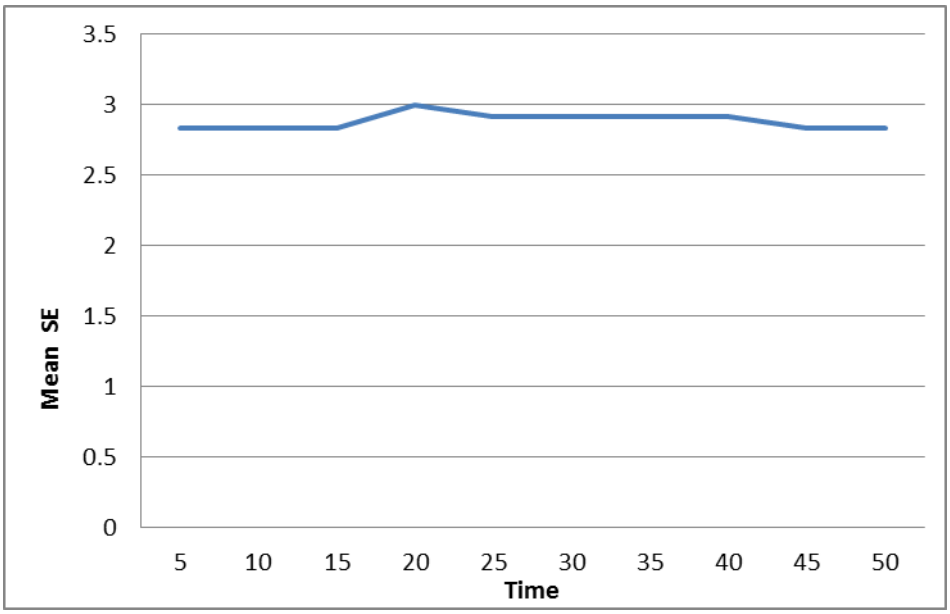

Figure 4.14 Student engagement/time for Years 3/4

4.3.2.6 Technology integration

Four aspects of technology integration have been observed; these are:

1. Not used.
2. Add-on.
3. Partially integrated.
4. Fully integrated.

Figure 4.15 plotting the mean of the Technology Integration (TI) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 4.15 shows, instances 1, 2 and 3 did not incorporate any technology integration, as the teacher used traditional teaching methods to explain tasks. Starting from instance 4 students made full use of technology. The teacher asked the students to write their storyboard as a Word document. This increased the technology integration and brought its introduction to the class to an earlier stage. Later students copied the stories from their Word documents and pasted into

Moviemaker software. This not only made the process easier but also increased the use of technology in the class.

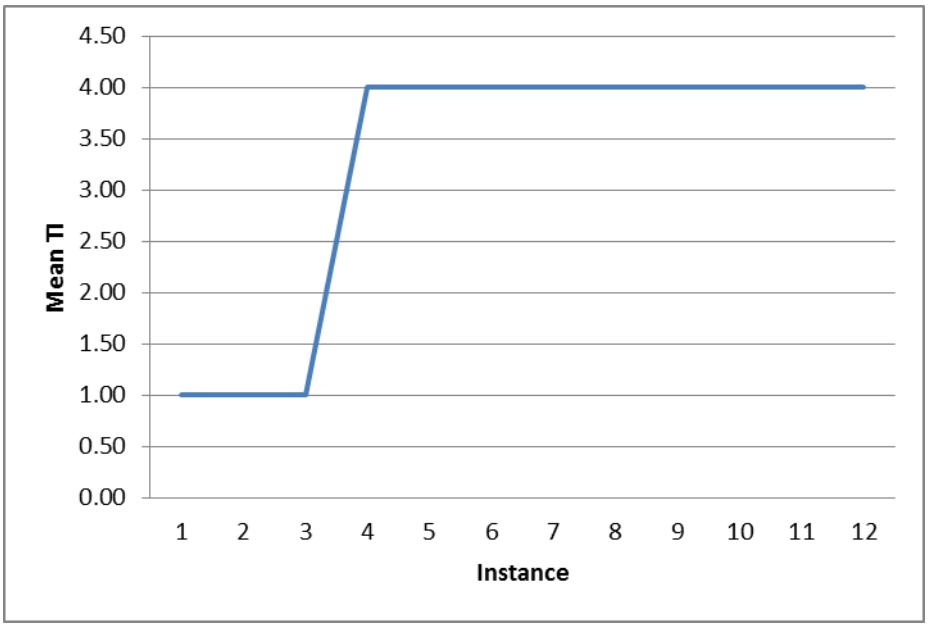

Figure 4.15 Technology integration for Years 3/4

Similar to the previous case study, student engagement and technology integration observations show there is a strong relation between them. In other words, the higher the level of technology integration, the better the student engagement. This is an expected result, since students are interested in using computers and the internet for any purpose. Therefore the introduction of technology to the classes increased interest in the subject matter. Same statistical analysis approach was assumed and there was a strong, positive correlation variables $r = +.95$, $n = 12$, $p < .001$.

4.3.2.7 Modes of learning

Two aspects of learning modes have been observed; these are:

1. Teacher-led.
2. Student/s-led.

Figure 4.16 plotting the mean of the Modes of Learning (ML) considering the two aspects discussed above on y-axis and their respective instances on x-axis from the

observations (Refer Appendix A: Classroom observation protocol). Figure 4.16 shows that timed observations of the modes of learning indicated that instances 1 and 2 can be classified as a mix of teacher-led and student-led teaching. In instance 3, students started working in their own groups, which yielded a purely student-led teaching. However, as mentioned above, when the teacher realised students were having problems in linking their stories to the software, she decided to introduce the software to the students. This helped them understand the capabilities and limits of software.

Therefore, from instance 4 to 6, the teacher dominated the interactions with little interaction by students with the teacher or by students with other students. Starting from instance 7 until the end (instance 12), students started working alone and the mode of learning was purely student-led, where the students dominated the interactions. The student-led mode of learning continued until the final presentation of digital stories.

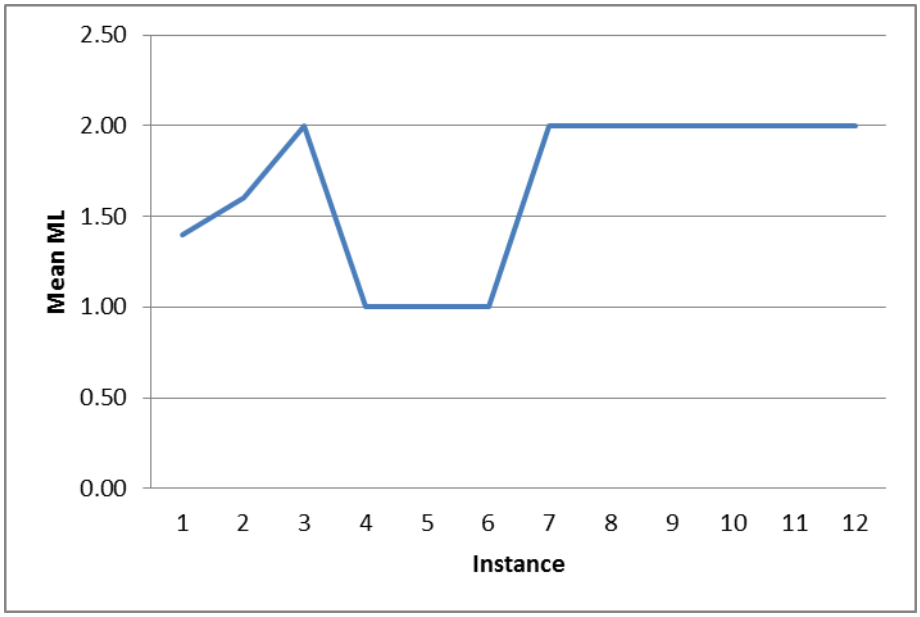

Figure 4.16 Modes of learning for Years 3/4

4.3.2.8 Summary

In sum, classroom observation indicates that student outcomes were satisfactory, demonstrated by the stories presented on presentation day. Since student numbers were large and computer facilities limited, it was practical for students to work in groups. The

observations indicated that the main type of learning was knowledge construction related to software usage and digital story creation. Students were mainly engaged in co-construct meaning, where they constructed their own meaning after initiating a dialogue with others. In these activities, the teacher fulfilled the role of facilitator and consultant. Nonetheless, the teacher continuously supervised students and maintained engagement during story creation by answering their questions and giving them advice to improve their stories.

Student engagement observations indicate that engagement levels were always high including the last minutes of every lesson. It is also observed that student engagement is directly proportional to technology integration. This stems from the fact that students are interested in technology use. Furthermore, students found Moviemaker software very engaging and easy to use. Therefore, this contributed to student engagement in class and also helped students develop their technical skills.

A specific example of how this process can affect student engagement levels was observed in the case study. When students had difficulties in linking their ideas to real-life digital stories, for example, the teacher opted to introduce Moviemaker software. This step was crucial, since it helped students understand what is possible and feasible. They then planned their story according to the capabilities of the software. A solid outcome of this critical intervention by the teacher was a sustained, high student engagement for the entire class.

4.4 The impact of digital storytelling on student outcomes

In addition to classroom observations, a scoring rubric was used to assess the quality of digital stories. This stage had two different aims; firstly to assess the level of student engagement, and secondly to document the provision of better education outcomes through digital storytelling. Level of engagement is a quantity that can also be measured with a

scoring rubric. In the following sections the evaluation of outcomes for primary school cases (ESL and Years 3/4) are presented.

The role of digital storytelling in realising student engagement in authentic learning has been assessed by means of an evaluation rubric (See Appendix B). A panel of three reviewers selected from school teachers evaluated the students' final digital stories by completing the rubric on the last day of the research. Each reviewer evaluated eight digital stories in total, developed by students.

The evaluation rubric included nine criteria; in conjunction with the eLDiSt framework, these criteria have been classified in the eLDiSt framework under four different categories as follows:

- **Story aspects**
    a. Plot.
    b. Pacing of narrative.
    c. Dramatic question.
    d. Emotional content.
- **Learning aspects**
    a. Purpose.
    b. Grammar and language usage.
- **Digital creation aspects**
    a. Story content.
    b. Technological competence.
- **Combined aspects**
    a. Economy of content.

Therefore, these criteria were used to evaluate the students' final digital story.

4.4.1 Evaluation of outcomes in ESL class

The data collected regarding outcomes are evaluated under four different categories: the overall analysis of student scores, the scores assigned by each teacher, the difference between teachers' evaluations and the overall scores on each criterion.

4.4.1.1 Overall analysis of student scores

The overall scores given by teachers are presented in Figure 4.17. These scores are the sum of the scores (on nine criteria) assigned by these three teachers. As the score for each criterion ranged between 1 and 4, the theoretical range of the overall scores is 27 to 108. The results are shown in Figure 4.17 and Table 4.1.

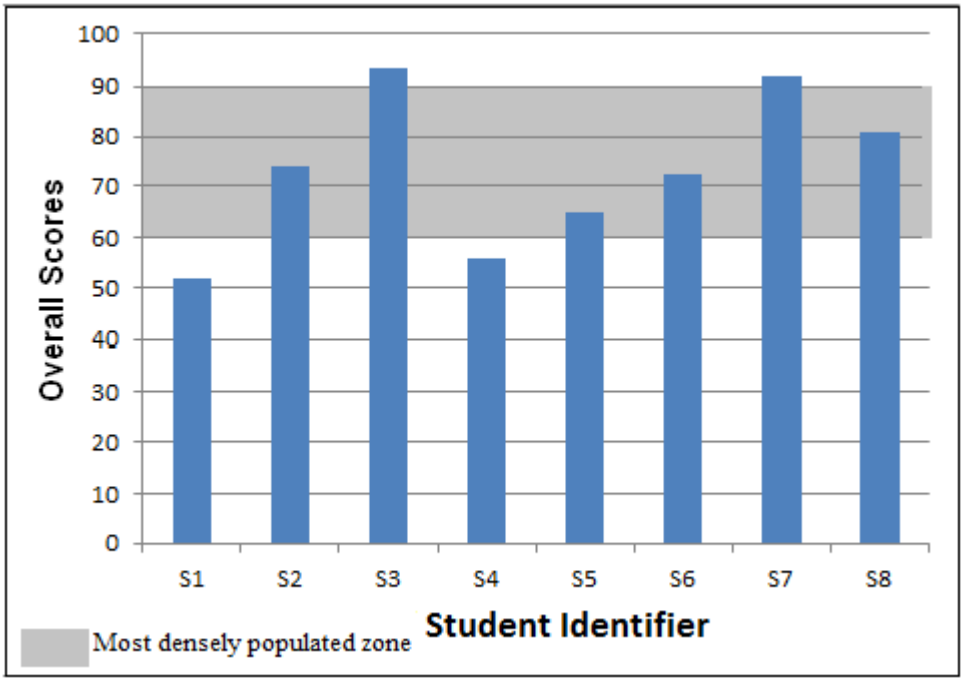

Figure 4.17 Overall scores for digital story quality for ESL

As shown in Figure 4.17, students scored between 52 and 93. The 60 to 90 zone is the most densely populated since 6 out of 8 students were placed therein. Therefore, it can be concluded that the concept of digital story was clear to the majority of students and helped them to create engaging digital stories, regardless of their proficiency in the English

language. Furthermore, the scores given in Figure 4.17 reveal the overall performance of students in digital story creation was satisfactory, and final outcomes fulfilled most of the good digital storytelling criteria. The average length of digital stories was 2 minutes, while the length of the stories varied from 1 to 3 minutes (Smeda, Dakich, & Sharda, 2013).

Figure 4.17 clearly demonstrates the differences between students regarding their overall score level. Table 4.1 shows that student 3 is ranked highest among all students (Total Score = 93; Mean Score = 3.44), closely followed by student 7 (Total Score = 91; Mean Score = 3.37). In strong contrast, the lowest scores are given to student 1 (Total Score = 52; Mean Score = 1.93) and student 4 (Total Score = 56; Mean Score = 2.07). The average overall score for the eight students is 73 and the average mean score is 3.

Table 4.1 Descriptive statistics of overall student scores for ESL

Students	Rank	Sum	Mean	Variance	Std. Deviation
Student 1	8	52	1.93	0.23	0.47
Student 2	4	74	2.74	0.35	0.59
Student 3	1	93	3.44	0.41	0.64
Student 4	7	56	2.07	0.07	0.27
Student 5	6	65	2.41	0.25	0.50
Student 6	5	72	2.67	0.31	0.55
Student 7	2	91	3.37	0.32	0.56
Student 8	3	81	3.00	0.31	0.55

To examine whether there are differences among students with respect to their overall scores, a Kruskal-Wallis ANOVA has been conducted. The results of the ANOVA confirm significant differences among students with respect to their scores ($p < 0.000$). A p-value lower than 0.05 indicates statistically significant differences.

4.4.1.2 Student scores assigned by teachers

While in the previous section we reported overall student scores; in this section we focus on scores assigned by individual teachers. These results should not be confused with the results that will be reported in the next section, where we will focus on the differences between teachers. Here, the focus is still on differences between students. As students are evaluated on nine criteria (with a score range between 1 and 4), the theoretical minimum score for a student is 9 (= 9 x 1) and the theoretical maximum score is 36 (= 9 x 4).

The results shown in Figure 4.18 indicate that the individual student scores assigned by each teacher are consistent with the overall scores. Students S3 and S7 are rated the highest, while students S1 and S4 are rated the lowest by teachers.

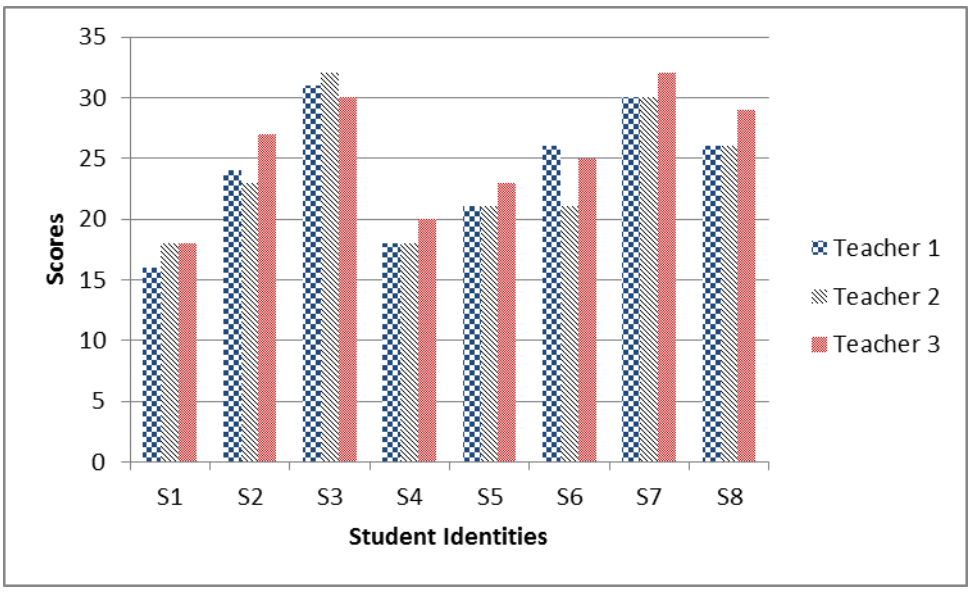

Figure 4.18 Student scores assigned by teachers for ESL

Results of a Kruskal-Wallis ANOVA indicated significant differences between students with respect to their scores as evaluated by the three teachers ($p < 0.000$). A p-value lower than 0.05 implies significant differences.

4.4.1.3 Differences between teachers' evaluations

In this section, the aim is to examine whether teacher evaluations of student scores are dependent on the teacher. Preferably, there should be a high correlation between teacher

evaluations (i.e. evaluations should not vary significantly across teachers). Figure 4.18 shows the consistency between teachers' scores. The next section will further focus on the consistency of teacher evaluations.

To examine whether there are differences among teachers with respect to their evaluations of student scores, an analysis using Kruskal-Wallis ANOVA on the overall scores given by the evaluating teachers was conducted. The results indicated no significant differences between teacher evaluations ($p = 0.206$): a p-value higher than 0.05 indicates no statistically significant differences.

In addition, Cronbach's Alpha rating reliability is 0.903, which confirms our method is consistent and reliable.

As previously established there are no significant differences between teachers with respect to their evaluations of students; the next section will focus on the extent of the relationship between teacher evaluations. More specifically, we will look at Pearson correlation between teacher evaluations.

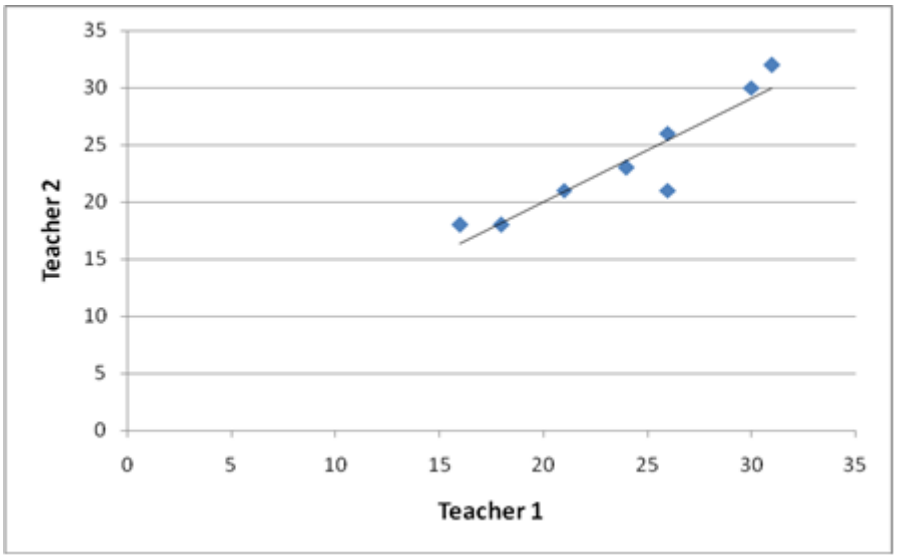

Figure 4.19 Correlation between evaluations of Teacher 1 and Teacher 2 for ESL

Figure 4.19 indicates there is a high correlation between scores given by Teacher 1 and those given by Teacher 2 (Pearson correlation = 0.923; $p < 0.000$).

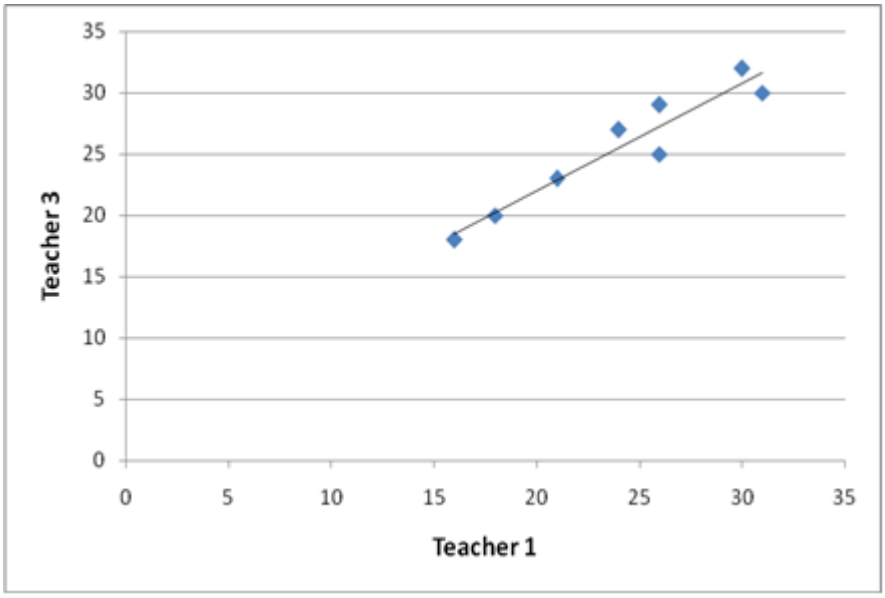

Figure 4.20 Correlation between evaluations of Teacher 1 and Teacher 3 for ESL

In the same way, Figure 4.20 shows that the evaluations of Teacher 1 and Teacher 3 are very similar (Pearson correlation = 0.955; $p < 0.000$), and Figure 4.21 shows that the correlation between scores given by Teacher 2 and Teacher 3 is also very high (Pearson correlation = 0.915; $p < 0.000$).

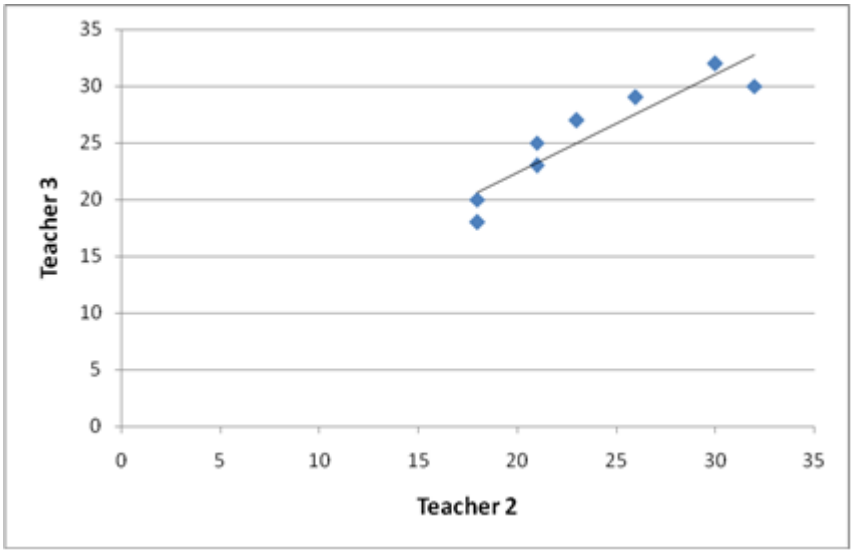

Figure 4.21 Correlation between evaluations of Teacher 2 and Teacher 3 for ESL

4.4.1.4 Overall scores on each criterion

In this section, the aim is to investigate how students perform on each criterion. Preferably, there should be a high equivalence between criteria and a moderate level of variance for each

criterion. All three teachers were asked to give an evaluation score between 1 and 4 for the final digital stories. As such, the theoretical mean score for a criterion, aggregated over all students and teachers, varies between 1 and 4, and there are 28 observations for each criterion (= 3 x 8). The results are shown in Figure 4.22 and Table 4.2.

Figure 4.22 indicates there is a high equivalence between the nine criteria, with some differences, as the mean score for each criteria is around 2.5. In Table 4.2 it is shown that the criterion with the highest mean score is Criterion 3 (mean score = 2.88). Criterion 3 also has the highest level of variance (=0.81). The criteria with the lowest mean scores is Criterion 4 (mean score = 2.42). The criteria with the lowest variance is Criterion 6 (=0.26).

In addition, as can be observed from Figure 4.22, the story aspect that students performed best is the "Pacing of Narrative" criterion. They have scored an average of 2.87 out of 4.

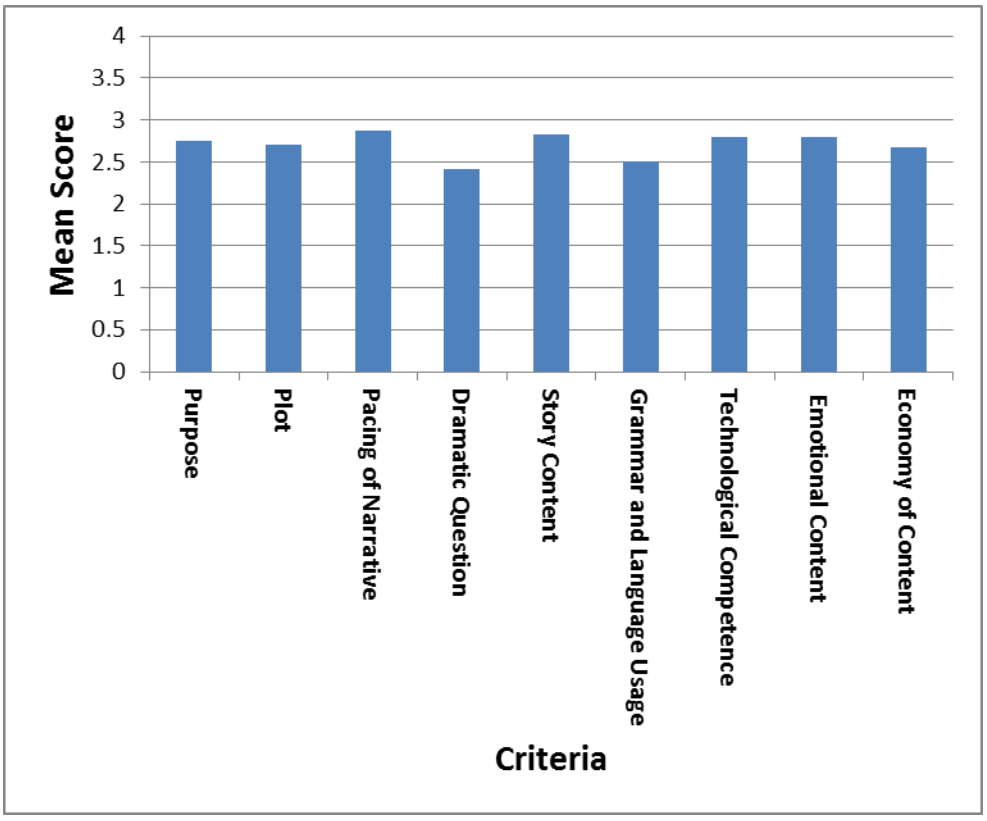

Figure 4.22 Mean scores for criteria for ESL

Moreover, results of the learning aspects reveal that students had average scores of 2.75 and 2.5 out of 4 in "Purpose" criterion and "Grammar and Language Usage" criterion,

respectively. On the other hand, for the digital creation aspects, the results show that students scored an average of 2.8 out of 4 in both aspects ("Story Content" and "Technological Competence"). Finally, for the last criterion, "Economy of Content", students scored an average of 2.67 out of 4.

To examine whether there are differences among the nine criteria that measure student overall scores, an analysis of variance (ANOVA) has been conducted. The results from a Kruskal-Wallis ANOVA indicated no significant differences between various criteria ($p = 0.492$). A p-value higher than 0.05 indicates there were no statistically significant differences.

Table 4.2 Descriptive statistics of criteria scores for ESL

Criteria	Min	Max	Mean	Variance	Standard Deviation
Criterion 1	2	4	2.75	0.28	0.53
Criterion 2	2	4	2.71	0.65	0.81
Criterion 3	2	4	2.88	0.81	0.90
Criterion 4	1	4	2.42	0.60	0.78
Criterion 5	1	4	2.83	0.67	0.82
Criterion 6	2	3	2.50	0.26	0.51
Criterion 7	2	4	2.79	0.52	0.72
Criterion 8	1	4	2.79	0.69	0.83
Criterion 9	2	4	2.67	0.41	0.64

4.4.1.5 Reliability analysis

Reliability analysis is an essential requirement for test validity. Test validity is the degree to which a test measures what it is designed to measure. Hence, the aim is to examine to what degree the nine criteria measure the overall scores for digital story quality effectively. For this purpose, the Cronbach's Alpha has been calculated which equals 0.903, and suggests that our method is highly internally consistent and reliable. This method also revealed a Spearman-Brown coefficient of 0.901. Consequently, the reliability of this scale is very high.

4.4.1.6 *Summary*

In sum, the results showed a considerable level of difference between students, whether measured overall or separately for each evaluating teacher. Student 3 and Student 7 have the highest scores of academic engagement, while Student 1 and Student 4 have the lowest. We could not find any significant differences for teacher evaluations. In other words, there is a great consistency between teacher evaluations of different students.

The majority of the students had planned their storyboard quite efficiently (See Appendix H for examples of the students' storyboard). The key to students' success is the fact that they spent more time in writing and editing their story with help from the teacher, before starting the actual creation stage. This helped students get good marks for the pacing of narrative item. This assistance also helped students use suitable vocabulary and correct grammar in their stories, despite their weakness in English.

However, students did not perform as effectively in the "Dramatic Question" criterion, since some of them were not able to clearly state the main point that contributes to the overall meaning of the story. This caused the stories to lack a striking dramatic question, to be conveyed through the digital story.

In terms of the technical design of the stories, the majority of students used pictures from the internet, music and their own text. However, students were able to choose suitable images and music for their digital story, and employed the technical features of Moviemaker software creatively. In addition, the results showed that video effects, transitions, titles and credits were well chosen and presented, and students enjoyed working on editing the movie most.

4.4.2 Evaluation of outcomes in library class

As mentioned in the first case, a rubric has been used by teachers to assess the quality of the digital stories; therefore, in this case a panel of three reviewers evaluated the students' final

digital stories by completing the rubric. Each reviewer evaluated 21 digital stories in total. The data collected regarding outcomes were evaluated under four different categories: the overall analysis of student scores, the scores assigned by each teacher, the differences between teachers' evaluations and the overall scores on each criterion.

4.4.2.1 Overall analysis of student scores

The data presented in Figure 4.23 show the quality of performance. As the score for each criterion ranged between 1 and 4; the overall score ranged between 27 and 108. Students scored between 50 and 88. 60-74 zones were the most densely populated since 16 out of 21 the groups were placed therein.

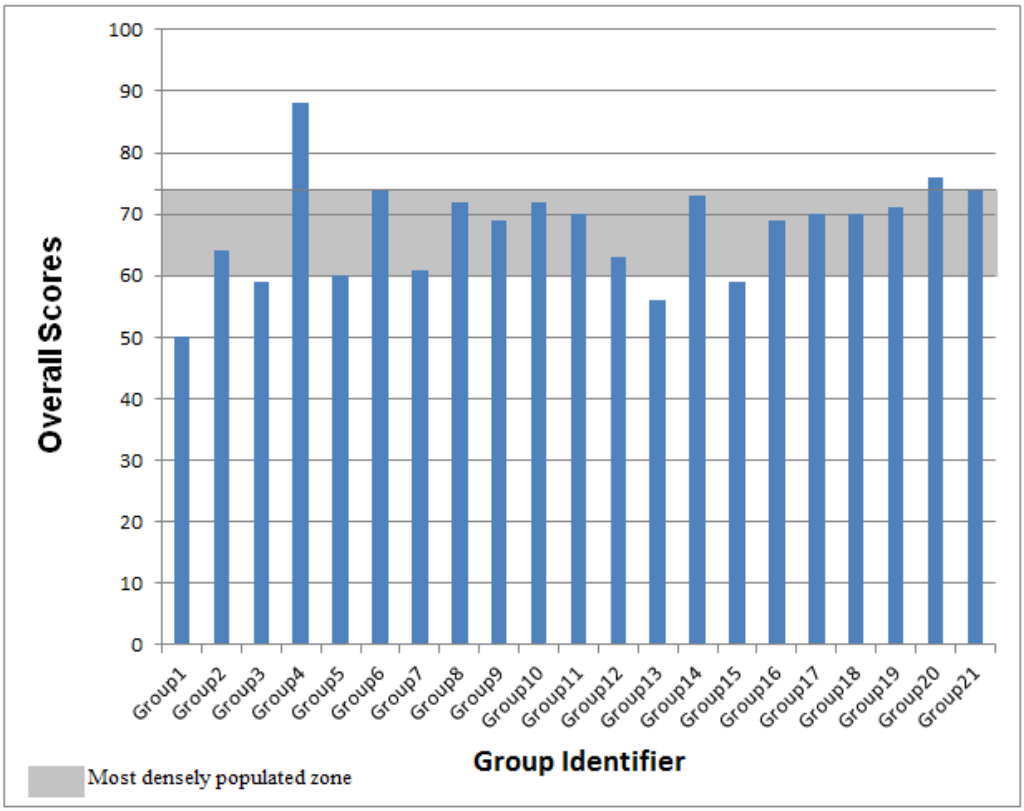

Figure 4.23 Overall scores for digital story quality for Years 3/4

In addition, Table 4.3 shows that Group 4 is ranked highest (Total Score = 88; Mean Score = 3.26), followed by Group 20 (Total Score = 76; Mean Score = 2.81). In strong contrast, the lowest scores are given to Group 1 (Total Score = 50; Mean Score = 1.85) and

Group 13 (Total Score = 56; Mean Score = 2.07). The average for overall scores of the 21 groups was 73 and the average mean score was 2.50 with a standard deviation of 0.728.

To examine whether there are differences among groups with respect to their overall scores, a Kruskal-Wallis ANOVA was conducted. The results confirmed there are significant differences among student groups with respect to their scores ($p < 0.000$). A p-value lower than 0.05 indicates statistically significant differences.

Table 4.3 Descriptive statistics of overall student scores for Years 3/4

Groups	Rank	Sum	Mean	Variance	Std. Deviation
Group 1	21	50	1.85	.516	.718
Group 2	14	64	2.37	.627	.792
Group 3	19	59	2.19	.387	.622
Group 4	1	88	3.26	.584	.764
Group 5	17	60	2.22	.333	.577
Group 6	4	74	2.74	.507	.712
Group 7	16	61	2.26	.353	.594
Group 8	7	72	2.67	.462	.679
Group 9	13	69	2.56	.410	.641
Group 10	6	72	2.67	.462	.679
Group 11	9	70	2.59	.328	.572
Group 12	15	63	2.33	.538	.734
Group 13	20	56	2.07	.687	.829
Group 14	5	73	2.70	.601	.775
Group 15	18	59	2.19	.464	.681
Group 16	12	69	2.56	.256	.506
Group 17	10	70	2.59	.481	.694
Group 18	11	70	2.59	.405	.636
Group 19	8	71	2.63	.319	.565
Group 20	2	76	2.81	.541	.736
Group 21	3	74	2.74	.276	.526

Therefore, it can be construed from the result of the rubric evaluation that the concept of digital story was clear to the majority of the students and helped them create engaging digital stories regardless of their level. Furthermore the scores given in Figure 4.23 reveal that the overall quality of the performance of students in digital story creation has been

satisfactory, and the final products met most of the digital story aspects. The average length of digital stories was 3 minutes, while the length and quality of stories varied.

4.4.2.2 Student scores assigned by teachers

While in the previous section overall scores were reported, in this section the focus will be on student group scores separately for each evaluating teacher. These results should not be confused with those to be reported in the next section, where the focus is on the differences between teachers. Here, the focus is still on differences between student groups.

As the groups are evaluated on nine criteria (with a score range between 1 and 4), the theoretical minimum score for a student is 9 (= 9 x 1) and the theoretical maximum score is 36 (= 9 x 4). The results are shown in Figure 4.24 which indicate separate group scores are consistent with overall scores.

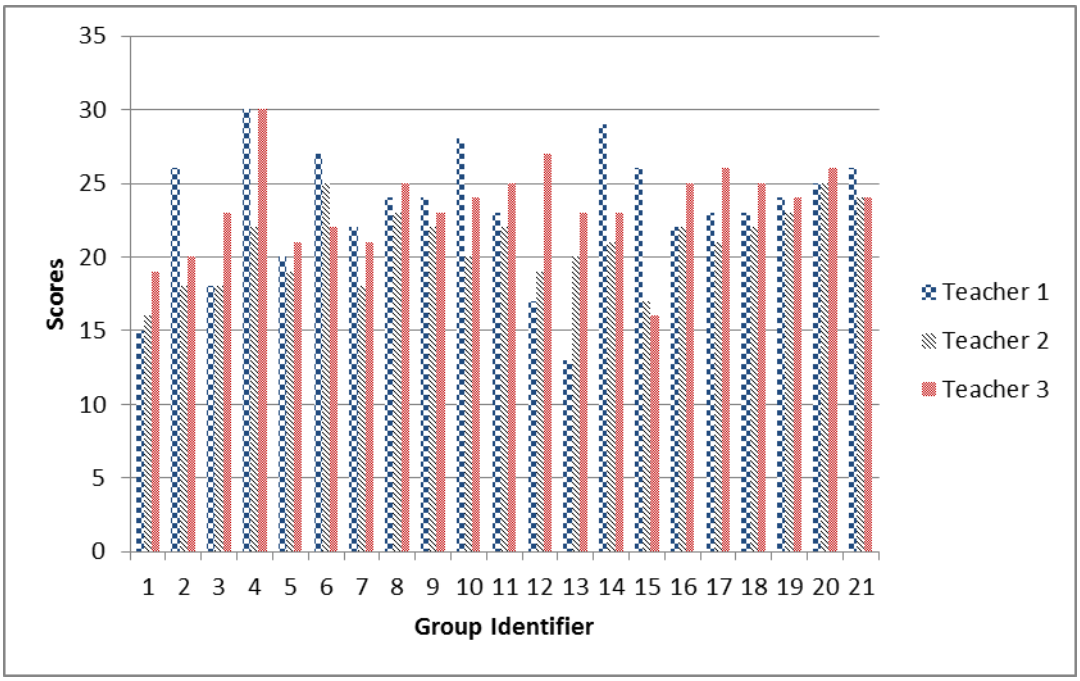

Figure 4.24 Student scores assigned by teachers for Years 3/4

The results of Kruskal-Wallis ANOVA confirmed significant differences between student groups with respect to their scores as evaluated by teachers ($p < 0.000$): a p-value lower than 0.05 suggests significant differences.

4.4.2.3 Differences between teachers' evaluations

In this section, the aim is to examine whether evaluations of groups are dependent on the teacher. Ideally, there should be a high correlation between teacher evaluations, and these evaluations should not vary significantly across teachers. The results are shown in Figures 4.25, 4.26 and 4.27 respectively.

To examine whether there are differences among teachers with respect to their group evaluations, a Kruskal-Wallis ANOVA was conducted on overall scores and compared the evaluating teachers. The results indicated significant differences between teacher evaluations ($p < 0.000$). A p-value lower than 0.05 indicates statistically significant differences.

We will now focus on the extent of the relationship between teacher evaluations. More specifically, we will look at Pearson correlation between teacher evaluations.

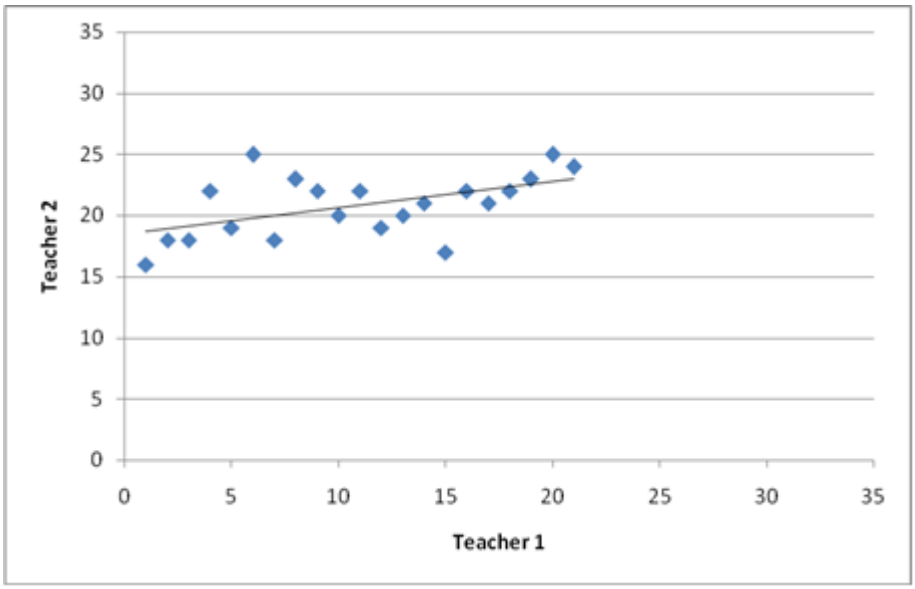

Figure 4.25 Correlation between evaluations of Teacher 1 and Teacher 2 for Years 3/4

Figure 4.25 indicates a modest correlation between scores given by Teacher 1 and Teacher 2 (Pearson correlation = 0.430; p = 0.052).

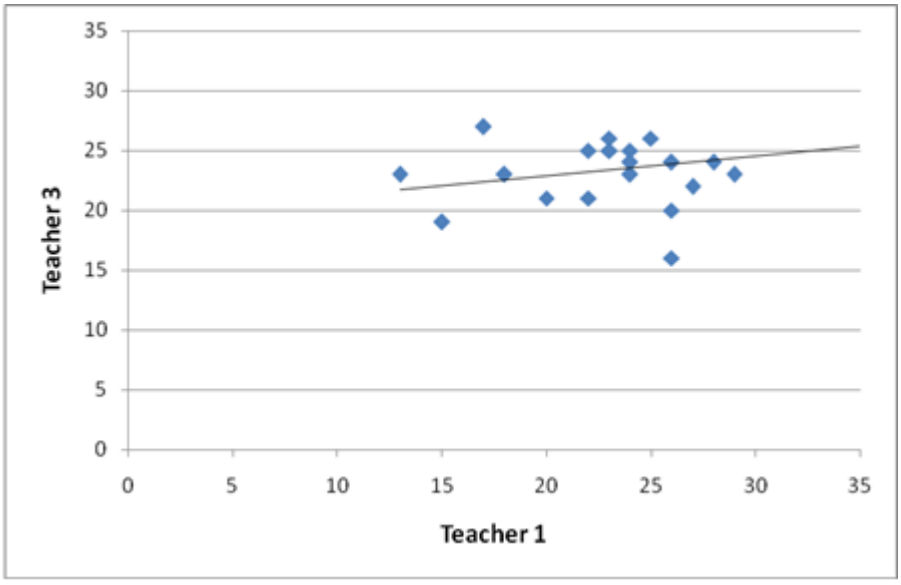

Figure 4.26 Correlation between evaluations of Teacher 1 and Teacher 3 for Years 3/4

In the same way, Figure 4.26 shows that evaluations of Teacher 1 and Teacher 3 do not significantly correlate (Pearson correlation = 0.277;p = 0.223). However Figure 4.27 shows that the correlation between scores given by Teacher 2 and Teacher 3 is significant (Pearson correlation = 0. 581; p = 0.006).

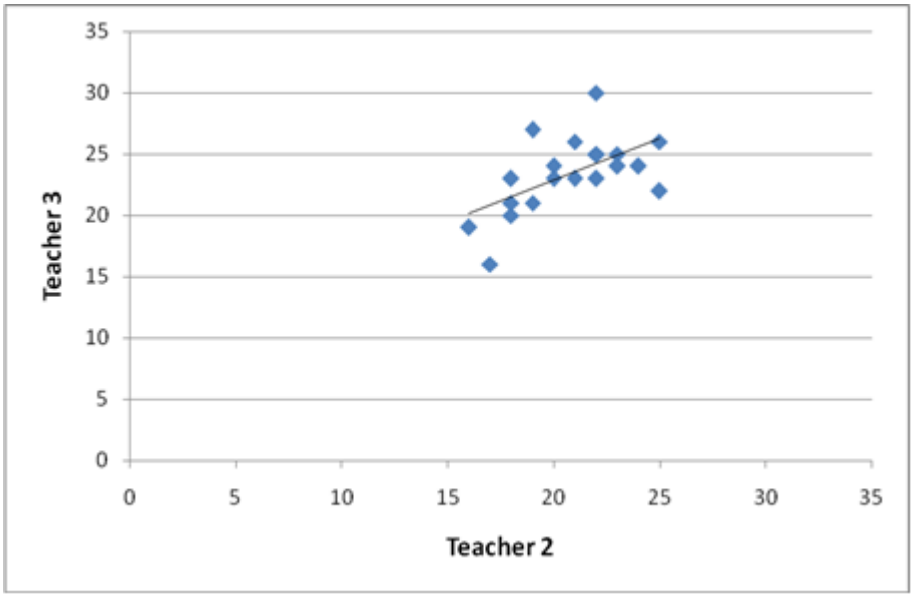

Figure 4.27 Correlation between evaluations of Teacher 2 and Teacher 3 for Years 3/4

4.4.2.4 Overall scores on each criterion

In this section, the aim is to investigate how students perform on each criterion that measurse student engagement. Ideally, there should be a high equivalence between criteria and a

moderate level of variance for each criterion. Three teachers were asked to give an evaluation score between 1 and 4 for 21 student groups. As such, the theoretical mean score for a criterion, aggregated over all students and teachers, varies between 1 and 4, with 63 observations for each criterion (= 3 x 21). Hence, the total N is 567 (=63 x 9). The results are shown in Figure 4.28.

Figure 4.28 indicates a high equivalence between the nine criteria. That is, there are few differences between criteria as the mean score for the nine criteria is around 2.5.

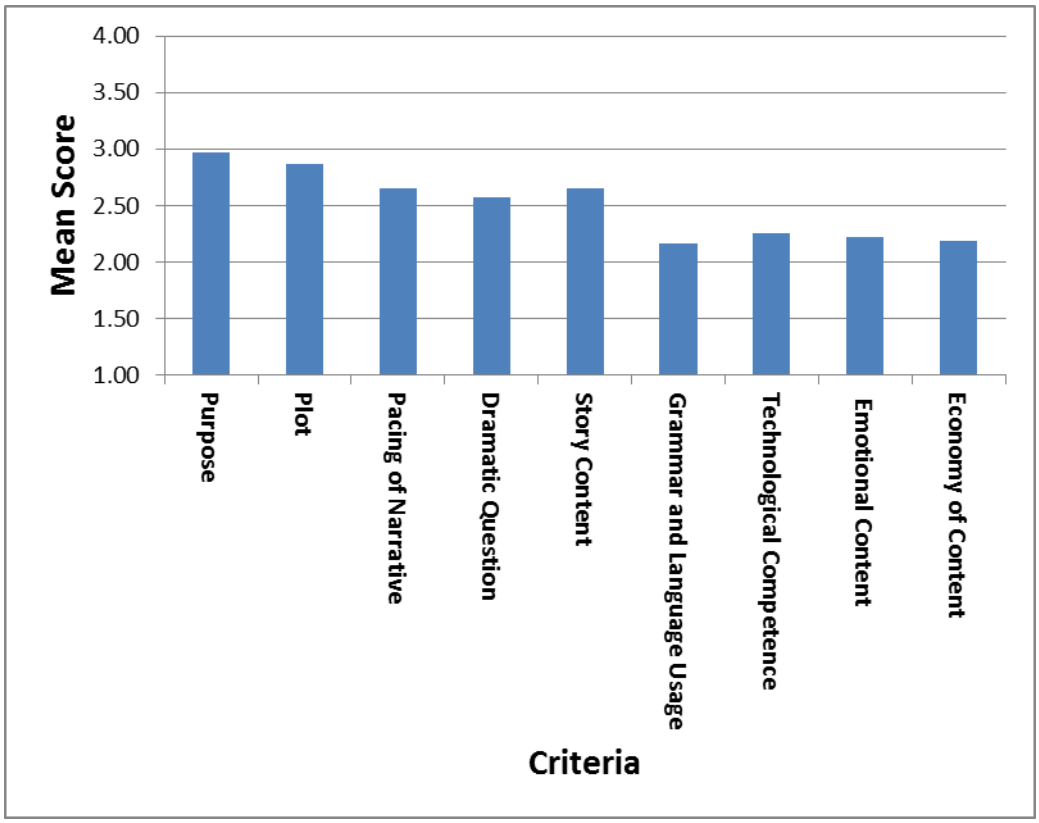

Figure 4.28 Mean scores for criteria for Years 3/4

In Table 4.4 Criterion 1 has the highest mean score (mean score = 2.97). Criterion 3 also has the highest level of variance (=0.81). The criteria with the lowest mean score is Criterion 4 (mean score = 2.42). The criteria with the lowest variance is Criterion 6 (=0.26).

Table 4.4 Descriptive statistics of criteria scores for Years 3/4

Criteria	Min	Max	Mean	Variance	Standard Deviation
Criterion 1	1	4	2.97	.32	.57
Criterion 2	1	4	2.87	.47	.68
Criterion 3	1	4	2.65	.42	.65
Criterion 4	1	4	2.57	.54	.73
Criterion 5	1	4	2.65	.42	.65
Criterion 6	1	4	2.16	.52	.72
Criterion 7	1	4	2.25	.58	.76
Criterion 8	1	4	2.22	.43	.66
Criterion 9	1	4	2.19	.35	.59

To examine whether there are differences among the nine criteria that measure the group scores, a Kruskal-Wallis ANOVA has been conducted. The results indicated significant differences between various criteria ($p < 0.00$). A p-value lower than 0.05 indicates statistically significant differences.

4.4.2.5 Reliability analysis

Reliability analysis is an essential requirement for test validity, which is the degree to which a test measures what it is designed to measure. Hence, the aim is to examine to which degree the nine criteria measure the overall scores for digital story quality effectively. For this purpose, Cronbach's Alpha has been calculated which equals 0.817, and this suggests that our method is consistent and reliable. This method also revealed a Spearman-Brown coefficient of 0.688. Consequently, the reliability of this scale is high.

4.4.2.6 Summary

In sum, the results show a considerable level of difference between students. Groups 4 and 20 have the highest scores, while Groups 1 and 13 have the lowest. However, while Teacher 1 and Teacher 3 perceived significant differences across student groups, Teacher 2 did not. The

consistency of rating between various teachers was medium to low, and teachers did not always assign similar results to the same student groups. The correlation of scores was especially low between Teacher 1 and Teacher 3, for example.

The students were very efficient in planning their storyboards (See Appendix I for examples of the students' storyboard). Spending more time in writing, editing the story and receiving assistance from the teacher helped students create better stories during the actual creation phase. As a result they received high marks for "Purpose" and "Plot" criteria. The assistance of the teacher also helped students organise their ideas and come up with engaging stories. The teacher's discretion to introduce software to the students at an early stage assisted students in understanding software capabilities. Consequently students planned their stories accordingly and enjoyed working with the Moviemaker software.

Although the majority of students used only pictures from the Internet, music and their own text; they were able to choose suitable images and music for their digital story. They received good marks in the "Story Content" criterion. However, students did not perform as effectively in the "Grammar and Language Usage" criterion due to their age group and level of English competency.

4.5 Primary school teachers' reflections on digital storytelling

It is imperative to answer the following question to utilise digital storytelling in learning successfully: "What does producing a digital story of one's teaching do and mean to teacher assistants and those involved in the practice of teaching?" (Tendero, 2006, p.3). As such, determining teachers' perspectives during the implementation of digital storytelling in class and their subsequent concerns holds a key position in this research.

One-on-one interviews were conducted with primary and secondary school teachers to give some insights, which may not have been necessarily reflected during observation or the evaluation rubric, and triangulate findings of multiple data sets in order to arrive at a deeper

understanding. With the motivation of providing consistent data, a group of interview questions was asked of each teacher. The format utilised was a structured and open-ended interview and interviews were recorded and transcribed. Due to the small number of participating teachers, each open-ended question was hand-coded by the researcher. The decision was made to code and analyse the transcriptions manually to gain the most from interpretation; hand coding has the potential to offer greater capabilities to the interpretation process (Bong, 2002; Davis & Meyer, 2009). Hand coding is also considered sufficient and appropriate when the research questions are specific, and analysis is being deduced; it allowed the researcher to stay close to the text and, most significantly, allowed the text rather than the method or software to drive the process (Klenke, 2008).

In this section, only the interviews of the participants working in primary school (i.e. two participants) are presented. These interview results were subjected to qualitative data analysis (Creswell, 2008) and the following major themes have emerged, which will be discussed and theorised in this chapter.

- **The effectiveness of digital storytelling in student engagement**

Regarding the effectiveness of digital storytelling in student engagement, teachers generally found digital storytelling to be a beneficial tool. For instance, an ESL teacher said that digital storytelling is "an amazing way of engaging the kids in writing, which is a task that they find difficult. It is basically that is what engage them" (ESL teacher).

When asked about student attitude towards digital storytelling, she added:

> Absolutely engaged with it, with what the whole process will do in the end. To see their little movie, it is a little mini movie; they are thoroughly engaged with it now. They will struggle, they will persevere with their writing now and they would know what the end is going to be. (ESL teacher)

The library teacher thinks that digital storytelling engaged students across the academic scale. She also stated that this approach to education works for students who have recently arrived in an English-speaking country.

> All kids, high achieving and low achieving, were engaged. This is the best, and of course they will produce according to their level, if they are a high- or low-achieving kid. But [this is] fantastic for new arrivals in the English-speaking country. (Library teacher)

She thinks it is a big advantage that schoolchildren are very comfortable with using computers and digital devices. According to her, digital storytelling builds on this foundation and makes use of an asset, which is ready to be used.

> Today's kids are very computer-friendly. Computer is their best buddy. So, digital story is a very effective way of teaching them the process of writing and creating, which is very appealing for today's kids. (Library teacher)

She also commented on the impact of digital storytelling, saying that it improves social skills and confidence in students. She thinks this experience is a lifetime memory for students.

> This digital storytelling was new to our school. It was never done before, that's why I opted to give it a go with a lot of enthusiasm. But I see it has got a lot of application in future in this school. And the other comment is we are holding a presentation the day tomorrow, next week Tuesday and the other very good aspect of digital storytelling will be that every group will be presenting their story. And they feel very proud that they have achieved, there is a sense of achievement. And they can treasure it. They can keep it as a memory for all their life that when they were in Grade 3 or 4 what they did to start with. (Library teacher)

- **Effectiveness of digital storytelling in relation to student outcomes**

In terms of teachers' concerns regarding student outcomes, teachers have slightly different observations, depending on their subjects. For instance, one of the ESL teachers appreciated the fact that digital storytelling helped students in a task that they previously found very difficult. She firmly believes that digital storytelling has increased and will increase student outcomes. These outcomes include improving the spelling skills of the students, sentence

formation, building-up sentences and forming the whole body text. The use of digital storytelling contributed to improving these skills solidly.

> I think I know a grammatical area, they will learn more about what they need to do in terms of improving their text for drafting. And I think it will help them solve the problem that they come up with, how best to create the purpose of the story, and how they are going to solve the problem that is there, and the use of technology. They got [sic] an experience in learning how to use these functions in ICT. It can improve their spelling skills: their sentence formation, structuring sentences, and text writing, the introduction, the body, the conclusion, and the steps of the text right through to the end. (ESL teacher)

The library teacher thinks that the use of stories in education is very beneficial for countries receiving immigrants such as Australia. According to her, digital storytelling incorporates all aspects of curriculum and all teachers should use it at some stage. She commented on the school where she works which has many students who are coming from non-English-speaking countries. The ability to express themselves through visual media, rather than words, facilitates communication for new students and builds confidence.

> I think it can improve students' outcome to a great deal. It is a very powerful teaching tool and I think all teachers at some stage of their topic or level of topic should incorporate computer into their learning or teaching… Like our school, there are lots of students coming from non-English-speaking countries. And digital story writing can be very meaningful to start with. They can start with pictures which is a very forceful or powerful way of identifying, and then learning the vocabulary. That can allow [them] to write and think and to construct their own meaning through these stories. It involves writing, speaking, listening… All sorts of links with the curriculum. (Library teacher)

- **Benefits and/or challenges of implementing digital storytelling in the classroom**

One ESL teacher observed that the implementation of digital storytelling in the classroom created a sense of unity. Students felt a sense of common belonging. Therefore, it was very beneficial for the classroom spirit.

> I noticed that when the students all came together in the presentation and sat in a circle, they were really happy to collaborate with each other and share their ideas and give support or how they rated the story; that was a very cohesive way that the group came together. There was a common thing that they worked on and then they were really a tight, happy group, in the way that they responded to it (ESL teacher).

She thinks that digital storytelling challenges can be solved once the students repeat this procedure. Giving an example, she said that students will address the challenges with their experiences. She thinks that students will be more aware of story creation tasks and they would know how to overcome the problems they have encountered before. This increases her trust in the use of digital storytelling in education since the issues can be removed in time.

> For them to, next time they would, I think work more, be more, they would be happier about, they would accept the fact that they had to work harder on the writing process before getting into the process of selection of the images and music and so on and the transition of the text. I think they would accept that because they would know what they would be able to do down the track in the process. (ESL teacher)

According to her, the use of digital storytelling can also support various skills of students such as writing and technology use. Furthermore, digital storytelling enhances design skills since students choose images and music for their stories. Use of digital story in the class contributed to social and psychological skills:

> ...Observing what the students had done and the choices that they have made in terms of their images or the music in relation to, maybe their struggled [sic] attempt in writing, gave me a chance to learn more about that student that I wouldn't have known. That they had ascertained subtlety and sensitivity, like a student would be brass and bold in the classroom; there is a certain subtlety and sensitivity to the music they have chosen from the choices they were given that I would never have guessed they would happy to be doing, so I learned something about most students through doing this. (ESL teacher)

According to the Library teacher the only challenge was to keep up with the high spirits of the students. The availability of computers and time was managed wisely to respond to the enthusiasm of the students. In other words, the technological infrastructure of the school has to be prepared for the fully-fledged implementation of digital storytelling in classes.

> I think the challenge was to keep up with the enthusiasm of the students shown in this area and [a] couple of times we came across [a] shortage of time or there were too many things happening in the school and [a] shortage, and or, availability of computers and sometimes they weren't working properly. But, otherwise, as I said before, it can be applied across the multiple subject areas and multiple contents of the subject and curriculum. (Library teacher)

- **Subject areas that benefit from the use of digital storytelling**

After exploring opportunities for new learning with digital storytelling for different subjects, teachers were asked about which subjects might be more suitable for digital storytelling integration. One ESL teacher was of the opinion that digital storytelling can be used not only in Human Sciences, such as English and History, but also in almost all sciences including Maths. She also reinforced her ideas by giving some examples from several subject areas.

> Here we are in ESL in the writing journey process and in my past experience I found kids find narrative very difficult. So I think that this process helps them come up with the problem and then find a way of solving it. … I always found kids, in my prior teaching placements, they had struggles with that. So in English prose it could be used, I guess it could even be used in history if you were talking about a story, a person, because history is really stories from the past. Like the king or the queen. Maybe it could happen. If they are looking at how a caterpillar changes into a butterfly. They could write that from the perspective of the caterpillar. I have seen endless possibilities for it. Or maybe I'd say in Mathematics. (ESL teacher)

The library teacher had a similar opinion. She thinks digital storytelling can be used in all areas. However, focusing on the fact that digital storytelling eases the learning process she

thinks the special key focus area for implementation of digital storytelling should be ESL and special needs students.

> As we mentioned, it can be applied to broad curriculum areas. But in my opinion, being a librarian, I think it is very effective for ESL students and special needs students. And it has got very good relevance with English where they can interpret their ideas and they can indicate their skills such as information literacy, visual literacy, communication combined with technology. (Library teacher)

- **Skills that can be improved with digital storytelling**

Next, based on their experiences, the teachers were asked about skills that can be improved with digital storytelling. One ESL teacher mentioned that it helped students improve their writing skills. Integration of technology assisted students to overcome this problem.

> When they were writing I found they had trouble in some instances matching the steps of the story with their pictures and when they came to, actually, put it together with the digital processes, with the technology, that all fell into place. So that really helped them in the steps and stages of the introduction and then the steps through the story to the conclusion. (ESL teacher)

One library teacher mentioned that digital storytelling is a golden tool to increase library and research skills of students. They have the opportunity to choose the skill they want to work on and improve. This may include individual skills such as spelling and writing, as well as interpersonal skills such as working in a team or collaborating with students and teachers. Furthermore, the use of technology in the class helps students improve their technical skills and information literacy.

> I think the major skills were selecting the topic, that means they were selecting [sic] actually looking at their knowledge, where, or their expertise, what they are good at and exploring, so very beneficial from library and research point of view. And then, along with that, of course, it includes spelling, teamwork and, you know, collaborating with the teachers and their group members. So these are the few very important skills to start with. And after writing, putting their words and

ideas in pictures, music; all these things reinforce ideas and appeal to different learning types. (Library teacher)

- **Summary**

Based on the responses given by participating teachers to the interview questions, it can be easily said that all of the teachers had a positive attitude towards the use of digital storytelling as a teaching tool in their classrooms. The widespread use of technology and the familiarity of the students with technological tools contributed to increased student engagement in the class. Furthermore, all of the teachers were of the opinion that the utilisation of technology made students feel more comfortable with their tasks and, in return, increased their outcomes. Consequently, all of the teachers expressed their willingness to utilise digital storytelling in their classes in future.

Chapter 5: Engaging Secondary School Students through Digital Storytelling

5.1 Introduction

As previously mentioned, five cases studies have been conducted at two different levels of schooling: primary and secondary. The findings are presented in chapters four, five, and six. In chapter four the primary level cases (ESL and Years 3/4) are presented, chapter five presents secondary level cases (Years 7, 9 and 11), while chapter six includes cross-case analysis of case studies. Accordingly, this chapter reports the findings of secondary level cases (Art, Science and VCAL). Three different methods have been utilised for data collection: observation, evaluation rubric and teacher interviews. The overall conclusions are extracted by integrating these findings.

5.2 The participants

This study, as previously mentioned, consists of five primary and secondary school case studies from different curriculum areas (Science, Art, English, Library and VCAL) at EPIC. These case studies were conducted during third and fourth terms in 2012 to integrate digital storytelling into the curriculum in the primary and secondary stages of education. The following sections present the participants in three secondary school classes: Art, Science and VCAL.

5.2.1 Digital storytelling in an Art class

The first practice case examines the role of digital storytelling in enhancing student engagement and outcomes in an Art class. Participants were Year 7 students, and the subject was Art. There were a total of 25 students. They worked in groups of 5 which constituted 5 groups. For the purpose of this study, the teacher did not assign a specific topic for digital story creation. Instead, she opted to use the entire concept of digital story as a form of Art. Students had the freedom to choose their topics and present them in an artistic manner. In this respect, this case study differs from others which focus on a specific topic.

5.2.2 Digital storytelling in Science class

The second practice case examines the role of digital storytelling in enhancing student engagement and outcomes in the Science class. Participants were Year 9 students, and the subject was Science. There were a total of 17 students. They worked in groups of 4 to 5 students which constituted 4 groups. Unique to this case, the teacher used digital story based on actual curriculum content; she asked her students to create a digital story about the Earth's Crust.

5.2.3 Digital storytelling in VCAL class

The third practice case examines the role of digital storytelling in enhancing student engagement and outcomes in the VCAL class. This class has students from Year 11, who study for the Victorian Certificate of Applied Learning (VCAL) course, which gives practical work-related experience, as well as literacy and numeracy skills and the opportunity to build personal skills for life and work. Students who complete the VCAL are likely to go on to a Technical and Further Education (TAFE) institute, start an apprenticeship, or get a job after completing school. The VCAL course has several compulsory strands and this case was

performed in the Personal Development Skills (PDS) strand (Victorian Curriculum and Assesment Authority, 2010).

There are 4 students in this class who work in pairs constituting 2 groups. For the purpose of this study and in line with the objectives of the PDS strand (Victorian Curriculum and Assesment Authority, 2010); digital storytelling is used to improve teamwork skills, self-confidence and other skills for life and work. Each group was asked to create a digital story based on their favourite sport.

5.3 Using digital storytelling to enhance student engagement

To examine the quality of student engagement in authentic learning tasks using digital storytelling, classroom observations were carried out. The findings of the classroom observation for the secondary cases (Art, Science and VCAL) are presented in the following sections.

As mentioned in section 4.3, classroom observation has been conducted to examine the level of student engagement in authentic learning tasks using digital storytelling.

5.3.1 Observation in an Art class

For this case, 15 observations have been completed, as the students spent 15 instances which constitute 15 full class periods. The teacher started by introducing digital storytelling to her students, asking them to choose their topics and start thinking about their stories.

Students started to discuss their story; however, some groups had started the storyboard, while others were not interested in writing. No one in this case study completed their story board. All groups started story creation on the computer in the second week. Students came up with very big ideas, like action movies. Initially the students thought that they would act in these stories and there would be no text or image component to deliver a message. The

teacher explained digital story in detail and asked them to keep their story plans simple and realistic.

The teacher asked them to look for material to match their stories, and explained copyright issues. As mentioned, even though students had started their storyboards, they did not complete them. They were interested in working on the computer rather than writing. The main activities students were busy with follow: looking for information to use for the digital story, or recording a video for the story or recording their narration. This was valid from the beginning and continued after the selection of topics.

Students started early on with Moviemaker software, creating and editing their digital story, because the majority of students were familiar with the software. In order to edit images and videos, students extensively utilised other software such as Photoshop.

Before the final presentation, one group presented their digital story to the class to get feedback from the teacher and students. The teacher asked them to add more information and more pictures and cut some videos; she also advised them not to use more than 30% of the entire digital story in the video.

As previously mentioned, the observation tool has been conducted to examine the quality of student engagement in authentic learning tasks using digital storytelling, and specifically focus on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and modes of learning.

5.3.1.1 Class collaboration

Several aspects of class collaboration have been observed:

1. Individual students working alone.
2. Pairs of students.
3. Small groups (3+ students).
4. Whole class.

5. Student presentations.

Timed observations of class collaboration (See section 3.5.1) indicated that students were working in groups most of the time. In the first instance the whole class was working together for the first 20 minutes. This is due to the fact that the teacher spent time explaining digital storytelling, what was involved, and choosing the groups. After that each group worked on their own story and received help from the teacher, depending on their needs.

Figure 5.1 plotting the mean of the Class Collaboration (CC) considering all the five aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol).As we can see in Figure 5.1, from instance 2 to 14 each group was working on their story with some help from the teacher. In this case, the group immediately started using the software and creating their digital story.

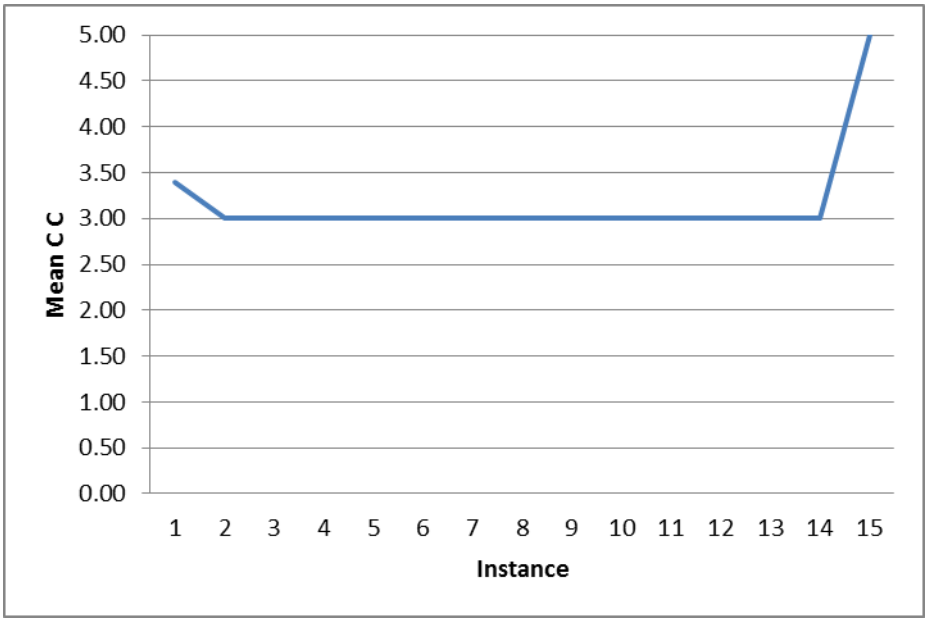

Figure 5.1 Class collaboration for Art class

The last instance (15) was allocated to presentation and teacher evaluation. Class collaboration shown in Figure 5.1 illustrates the level of collaboration throughout the case study. The first instance reveals a higher level of class collaboration since the teacher took some time to explain the task and the concepts at the beginning; students then worked in

groups to create their digital story using Moviemaker software and received individual assistance from the teacher. This was the case for the remaining instances except for instance 15, in which students showcased their digital stories to their classmates and evaluated the work of others.

Overall, the class collaboration was at its peak where the entire class was engaged in working in their groups. It is also observed that even students from different groups worked together and helped each other in editing their photos and video, since some students have very good skills in computer software and could therefore explain to others. This took the load off the teacher and increased collaboration levels. The downside was the occasional loss of discipline in the class.

5.3.1.2 Knowledge gain

Several aspects of knowledge gain have been observed:

1. Receipt of knowledge.
2. Applied procedural knowledge.
3. Knowledge construction.
4. Other (specify).

Timed observations indicated that knowledge gain occurred mainly through knowledge construction. Figure 5.2 plotting the mean of the Knowledge Gain (KG) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.2 shows, for the first instance there was a mixed type of learning where the first three options co-existed and applied procedural knowledge was dominant. This is due to the fact that, during this period, the teacher introduced digital storytelling to the class; students then worked in their groups, and received help from the teacher based on their needs.

In instances 2 to 14, each group constructed knowledge on software usage and digital story creation. In the last instance (15), as explained above, the presentation of digital stories contributed to applied procedural knowledge gain.

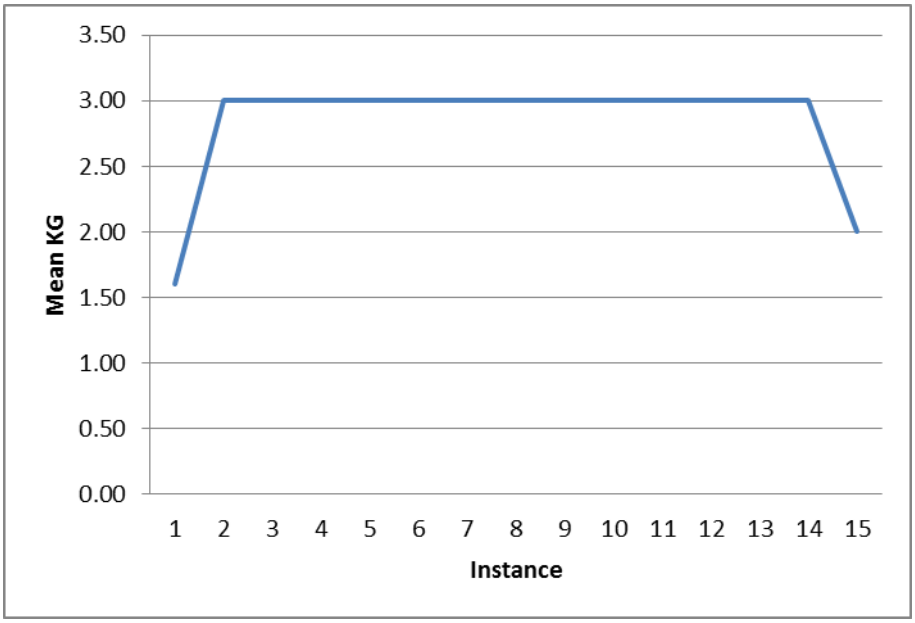

Figure 5.2 Knowledge gain for Art class

5.3.1.3 Student roles

Three different aspects of student roles have been observed:

1. Passive/ little response.
2. Active response.
3. Co-construct meaning.

Timed observations of student roles indicated students were mainly engaged in co-construct meaning, where they initiate dialogue with the teacher and construct their own meaning from the lesson activity. Figure 5.3 plotting the mean of the Student Roles (SR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.3 shows, there was a mixed student role for the first instance, where first and second options co-co-existed. During this period, student roles yielded towards a passive response since students were not interested in writing. As previously mentioned; the

beach group worked on their story by preparing various components (e.g. video recording, narrative recording and images) from 2 to 14 instances. During the presentation of digital stories, students actively participated in terms of presentation, discussion and evaluation.

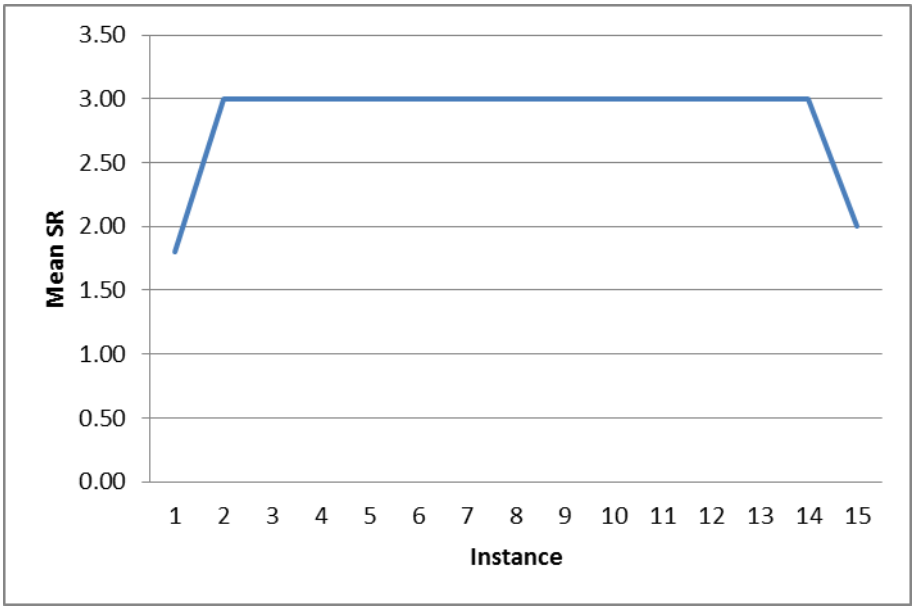

Figure 5.3 Student roles for Art class

5.3.1.4 Teacher roles

Three different aspects of teacher roles have been observed:

1. Leads class.
2. Observes student/s.
3. Facilitates/Scaffolds learning.

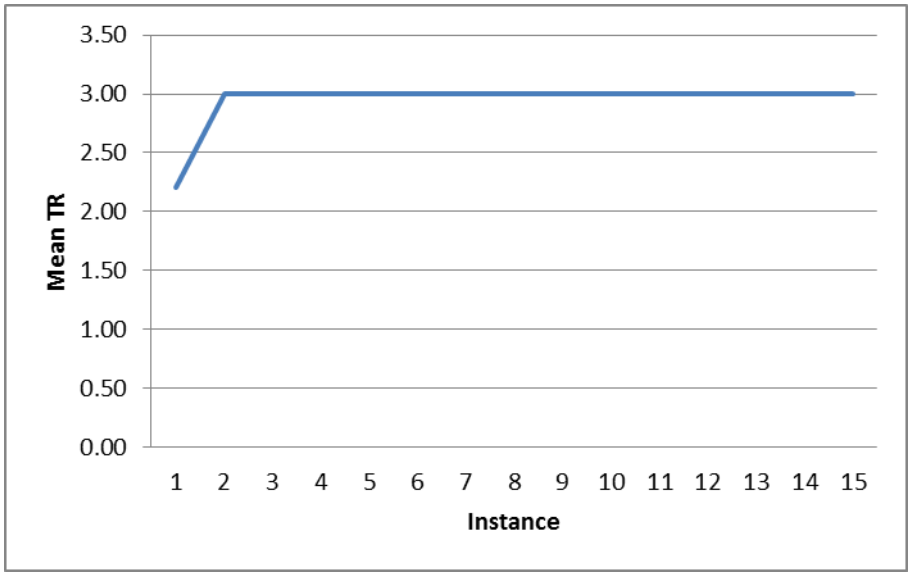

Figure 5.4 Teacher roles for Art class

Figure 5.4 plotting the mean of the Teacher Roles (TR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.4 shows, timed observations of teacher roles indicated that for the first instance, the teacher led the class by directing learning and providing information or explanations. For the remaining instances, students did most of the work including troubleshooting technical problems and assisting each other with digital problems. During this period the teacher was scaffolding the learning, as required.

5.3.1.5 Student engagement

Three different aspects of student engagement have been observed:

1. Low engagement.
2. Moderate engagement.
3. High engagement.

Figure 5.5 plotting the mean of the Student Engagement (SE) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 5.5 shows that

timed observations of student engagement indicated engagement had almost peaked. In the first instance student engagement was moderate since the teacher asked students to spend this time writing their storyboard. In instance 2, student engagement was high, as they moved to the computer lab and spent the full period searching for suitable story content. In instances 3, 4 and 5 student engagement levels were moderate since the teacher had asked them to complete their storyboard, and as previously mentioned, students were not interested in writing.

Starting from the instance 6, students started working with Moviemaker software and this yielded an absolute high level of engagement. This is because students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their own story. Therefore, student engagement was high until the very end.

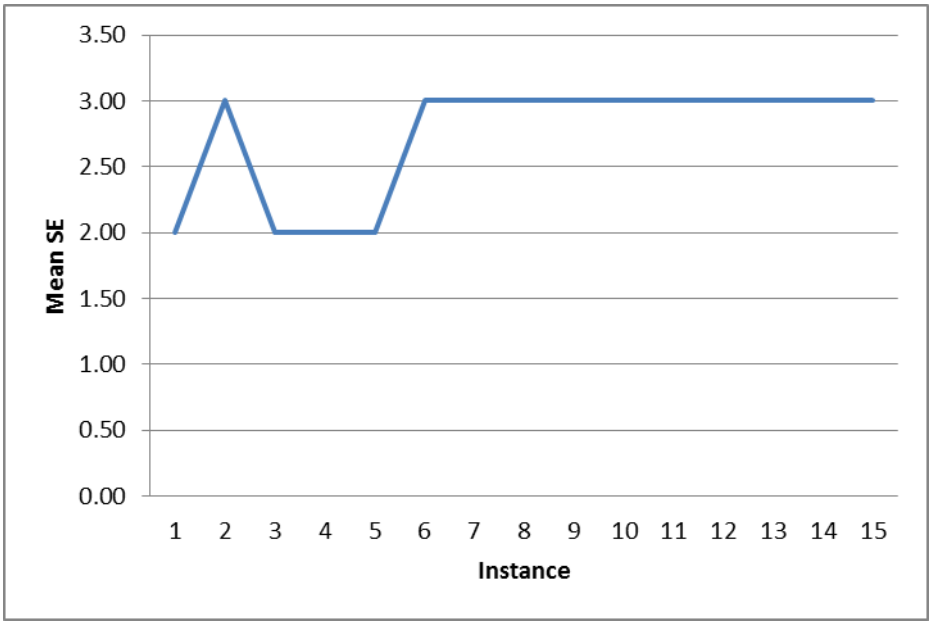

Figure 5.5 Student engagement/instance for Art class

It is observed that student engagement increased or decreased, depending on technology integration. When students worked on the computer their engagement level increased, and they lost interest when working on their writing.

The average distribution of student engagement levels in a single instance is given in Figure 5.6. As shown, throughout the entire class, student engagement was between moderate and high.

The highest engagement level was achieved when each group started working together, following the teacher's briefing. Strikingly, the student engagement level remained between moderate and high until the very end of the class. This is due to the utilisation of technology and students' enthusiasm. When classical teaching methods, such as writing, were replaced by innovative teaching methods, student engagement soared.

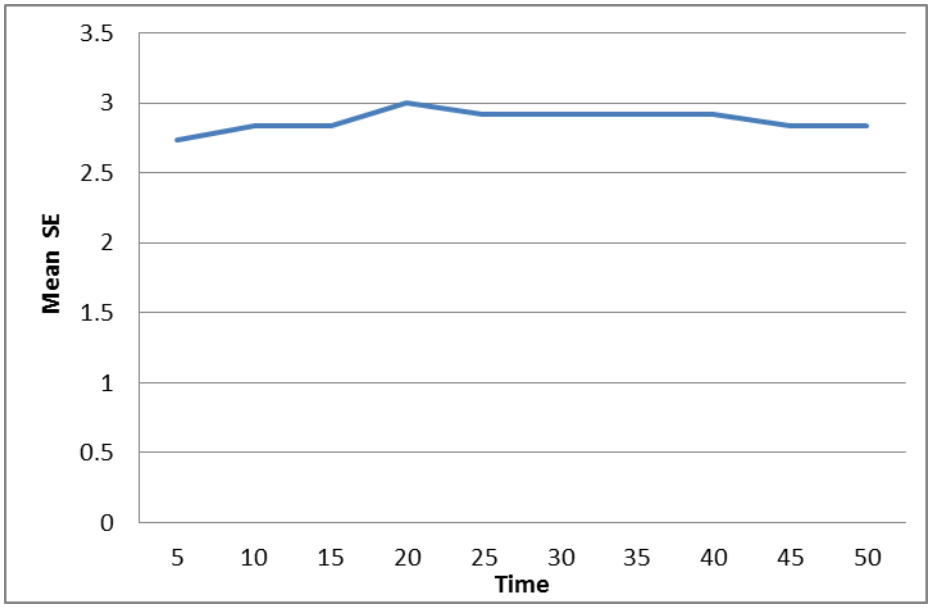

Figure 5.6 Student engagement/time for Art class

5.3.1.6 Technology integration

Four aspects of technology integration have been observed:

1. Not used.
2. Add-on.
3. Partially integrated.
4. Fully integrated.

Figure 5.7 plotting the mean of the Technology Integration (TI) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the

observations (Refer Appendix A: Classroom observation protocol). As Figure 5.7 shows, the first instance did not incorporate any technology integration as the teacher used traditional teaching methods to explain the tasks to students. Starting from instance 2, the teacher asked her students to take three instances to complete their storyboard; this is why the computer was not used in these instances. Starting from instance 6, the technology integration reached its peak at option 4 as fully integrated, where computer or related technology was extensively used by students and teacher. Students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their story.

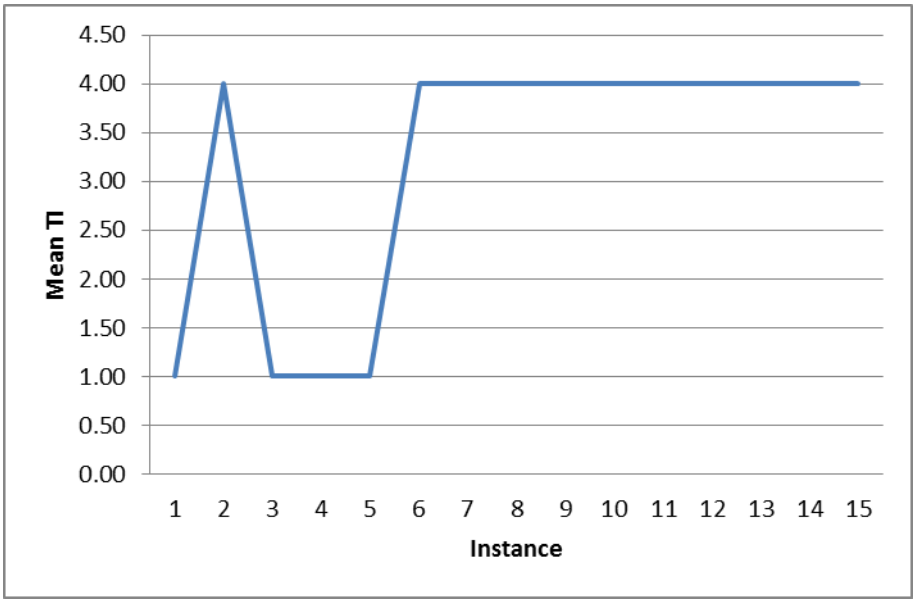

Figure 5.7 Technology integration for Art class

Similar to previous cases, student engagement and technology integration observations show there is a strong correlation. In other words, the higher the level of technology integration the better the student engagement is. This is an expected result since the students are interested in using computers and the internet for any purpose. Therefore, introduction of technology to the classes increased the interests of the students in the subject matter. The same statistical analysis approach was assumed and there was a strong, positive correlation between the two variables $r = 1$, $n = 15$, $p < .001$. In a unique manner, this case study yielded a

correlation level of exactly 1, which means the technology integration pattern is identical with student engagement.

5.3.1.7 Modes of learning

Two aspects of learning modes have been observed:

1. Teacher-led.
2. Student/s-led.

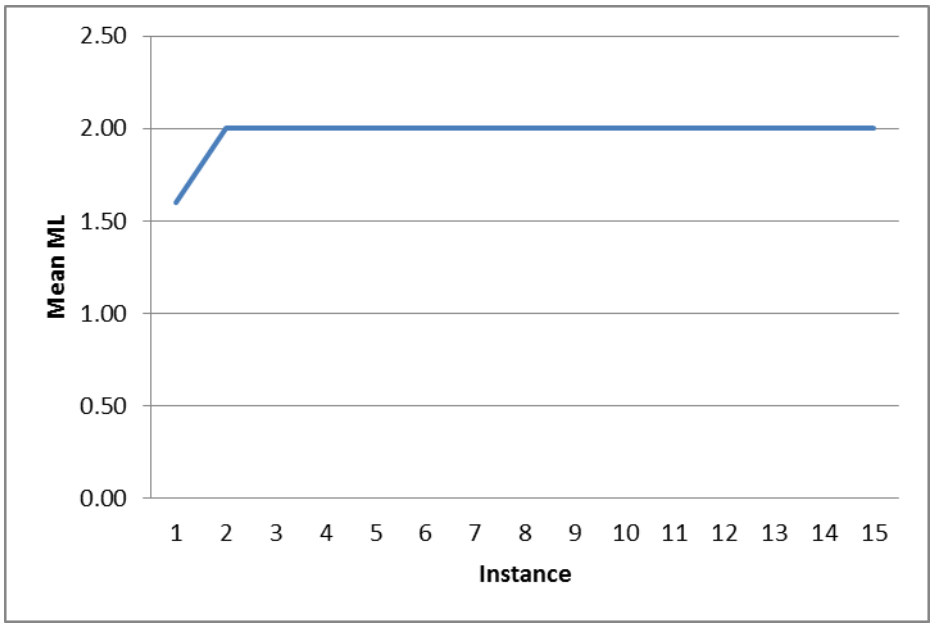

Figure 5.8 Modes of learning for Art class

Figure 5.8 plotting the mean of the Modes of Learning (ML) considering the two aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 5.8 shows timed observations of modes of learning indicated that instance 1 can be classified as a mix of teacher- and student-led teaching. From instance 2 until the end (15), students started working in groups which yielded a purely student-led teaching. Therefore, the mode of learning was student led, where students dominated interactions. A student-led mode of learning continued until the final presentation of digital stories by the students.

5.3.1.8 Summary

In sum, the stories presented on presentation day show that student outcomes were satisfactory. The type of learning mainly observed was knowledge construction related to software usage and digital story creation. Students were initiating a dialogue with others to construct their own meaning of the story. This appeared as a dominant co-construct learning mode. In these activities, the teacher acted as a scaffold for learning.

Student engagement observations show that engagement level was always high, except when the teacher asked students to write the storyboard. It is also observed that student engagement is exactly the same with technology integration pattern. Since students are very interested and skilled in technology, the introduction of technology increased their engagement levels. Also it is observed that students worked as a team, and helped each other even when they were in different groups; thus the collaboration was high. This contributed to student engagement in class, and helped students develop their technical skills and learn from each other.

A specific example of this case is the collaboration between students in class. This was not only limited between members of the same group, but rather different groups were helping each another in using the software or editing components. This took the load off the teacher and she only had to scaffold the learning process where the students were leading and active.

5.3.2 Observation in Science class

As mentioned in section 4.3, classroom observation has been conducted to examine the level of student engagement using digital storytelling. For Year 9, observations were completed over 7 full class periods.

The teacher had already explained the task from the last class, and asked students to prepare for the next session. Some had already started collecting information online and all students were familiar with Moviemaker software.

Due to prior knowledge, some groups finished their digital stories in 3 or 5 instances instead of 7. The first group presented their story to the class in instance 3 and the digital story was well organised and presented, with comprehensive information about the topic, and created in a very effective and interesting way.

On the last day, the remaining groups presented their digital stories to the class. The students came up with professional digital stories. Teachers were satisfied with what the students had created and learnt, evaluating the digital story using the rubric.

As previously mentioned, the observation tool examined the level of student engagement in authentic learning tasks using digital storytelling, and specifically focused on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and modes of learning.

5.3.2.1 Class collaboration

Several aspects of class collaboration have been observed:

1. Individual students working alone.
2. Pairs of students.
3. Small groups (3+ students).
4. Whole class.
5. Student presentations.

Timed observations of class collaboration indicated that students were working in groups most of the time. Figure 5.9 plotting the mean of the Class Collaboration (CC) considering all the five aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As we can

see in Figure 5.9, in instance 1 the whole class was working together for the first 15 minutes. Again, this was due to the fact that the teacher spent this time reminding the students about the topic, and what they needed to do. Each group then worked on their own story.

From instance 2 to 6 each group worked autonomously. Similar to the previous case (Year 7), groups immediately started using the software and created their digital story. In other words, they skipped the step of storyboard.

Instance 7 was allocated for story presentations and teacher evaluation. Class collaboration, shown in Figure 5.9, illustrates the level of collaboration throughout the case study. Therefore, class collaboration was at its peak where the entire class was engaged in watching student presentations.

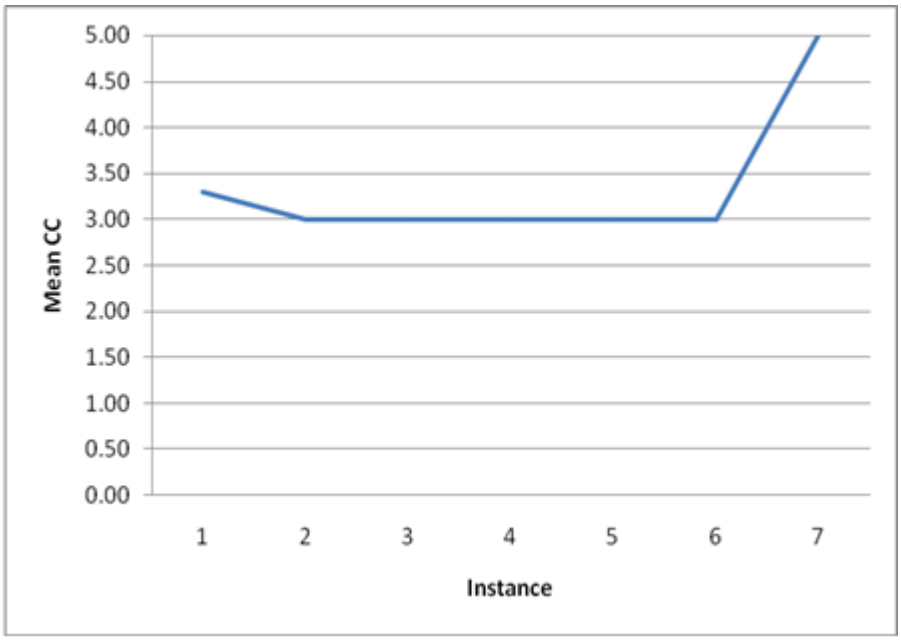

Figure 5.9 Class collaboration for Science class

5.3.2.2 Knowledge gain

Several aspects of knowledge gain have been observed:

1. Receipt of knowledge.
2. Applied procedural knowledge.
3. Knowledge construction.

4. Other (specify).

Timed observations indicated that knowledge gain occurred through knowledge construction. Figure 5.10 plotting the mean of the Knowledge Gain (KG) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.10 shows, there was a learning mix in instance 1, where the teacher also took part in the activity for the first 15 minutes.

From instances 2 to 6, each group worked on its digital story creation, as they acquired knowledge on software usage earlier. In the last instance (7), which is explained above, the presentation of digital stories contributed to applied procedural knowledge gain.

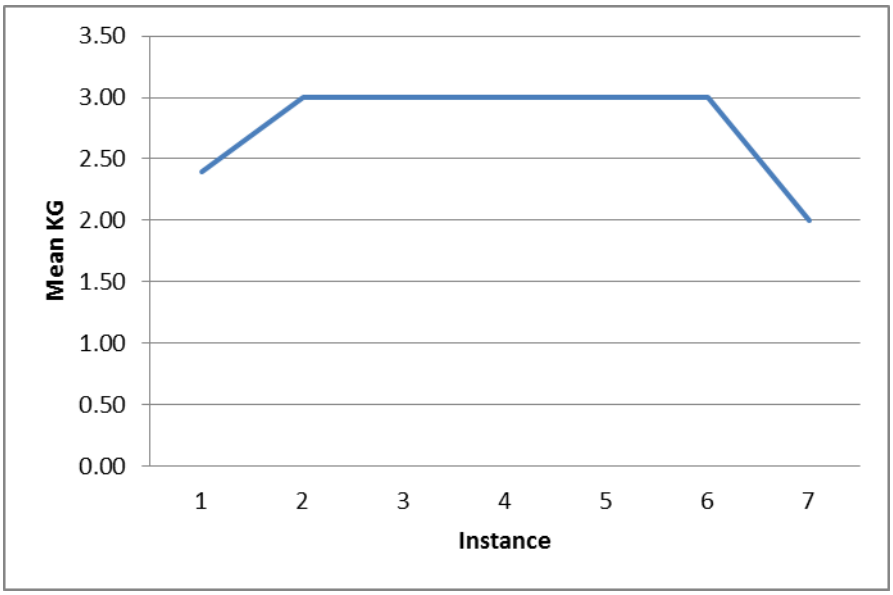

Figure 5.10 Knowledge gain for Science class

5.3.2.3 Student roles

Three different aspects of student roles have been observed:

1. Passive/ little response.
2. Active response.
3. Co-construct meaning.

Timed observations of student roles indicated students were mainly engaged in co-construct meaning. They worked as independent groups and constructed their own meaning from the lesson activity. Figure 5.11 plotting the mean of the Student Roles (SR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.11 shows, there was a mixed student role for instance 1, where the second and third options co-existed.

As previously mentioned, between instances 2 and 6 each group worked on their story by preparing various components for their digital stories. Due to their knowledge on the topic, students played a much more active role in this case. During the presentation of digital stories, students actively participated in terms of presentation, discussion and evaluation.

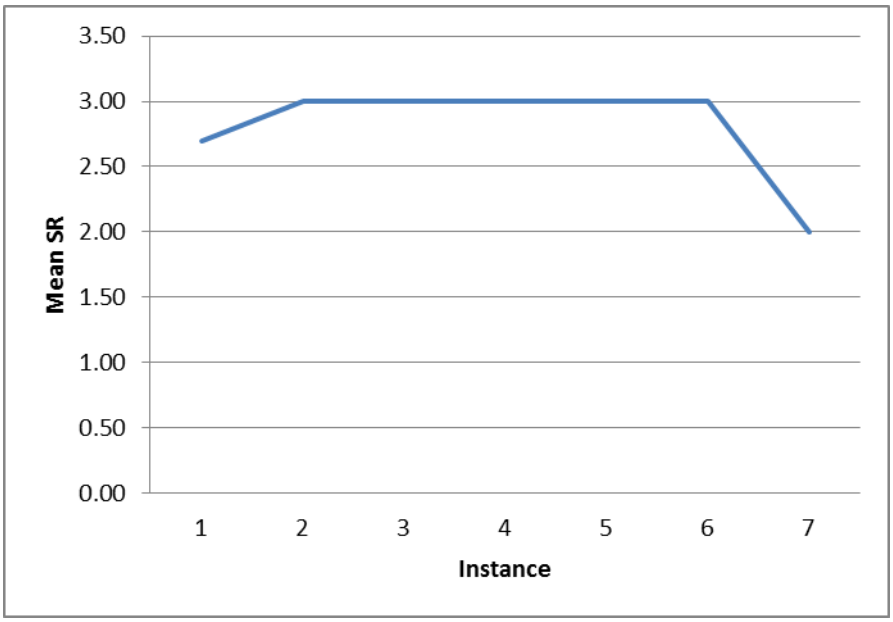

Figure 5.11 Student roles for Science class

5.3.2.4 Teacher roles

Three different aspects of teacher roles have been observed:

1. Leads class.
2. Observes student/s.
3. Facilitates/Scaffolds learning.

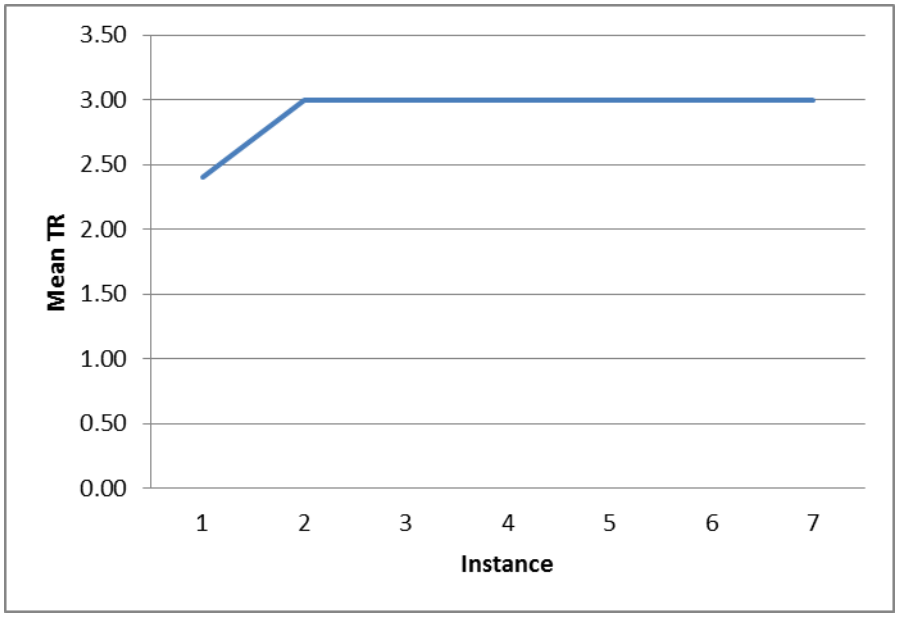

Figure 5.12 Teacher roles for Science class

Figure 5.12 plotting the mean of the Teacher Roles (TR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.12 shows, the timed observations of teacher roles indicated that for instance 1, the teacher led the class for the first 15 minutes only. The students worked independently the rest of the time. Therefore, the teacher was simply scaffolding the learning.

5.3.2.5 Student engagement

Three different aspects of student engagement have been observed:

1. Low engagement.
2. Moderate engagement.
3. High engagement.

Figure 5.13 plotting the mean of the Student Engagement (SE) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 5.13 shows that

student engagement was high. However, there were local peaks when some groups showcased their completed stories. This is true for instances 3, 5 and 7.

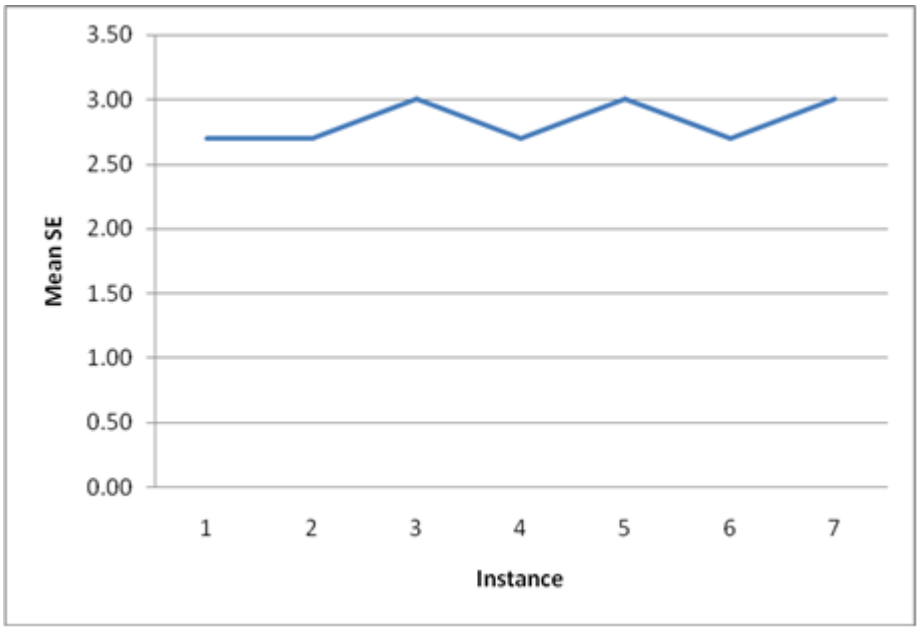

Figure 5.13 Student engagement/instance for Science class

The average distribution of student engagement levels in a single instance is given in Figure 5.14. As shown, throughout the entire class, student engagement was between moderate and high. The first part of the class shows less engagement, where the students spend some time chatting and joking. The highest engagement level was achieved on the mid-20 minutes when the teacher asked them to focus on their work. Towards the end of the class, students were tired and lost interest in the work. Despite this, the student engagement level was kept between moderate and high until the very end of the class. This is due to the utilisation of technology and students' enthusiasm.

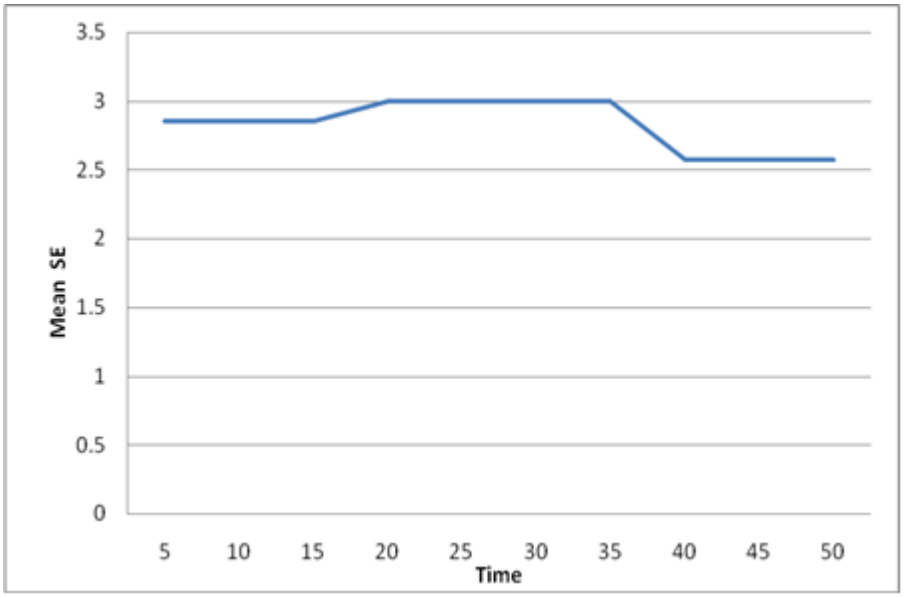

Figure 5.14 Student engagement/time for Science class

5.3.2.6 Technology integration

Four aspects of technology integration have been observed:

1. Not used.
2. Add-on.
3. Partially integrated.
4. Fully integrated.

Figure 5.15 plotting the mean of the Technology Integration (TI) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.15 shows, there was no technology integration for the first 15 minutes when the teacher used traditional teaching methods to remind students of their tasks. From instance 2, the class had full technology integration. Students were working on computers to search for photos, music and videos over the internet and used Moviemaker software to create their own story.

In this case, technology integration was 100% throughout, except for the first 15 minutes of instance 1. Therefore, it is not realistic to measure the relation between student

engagement and technology integration. There is a clear increase in student engagement with technology integration.

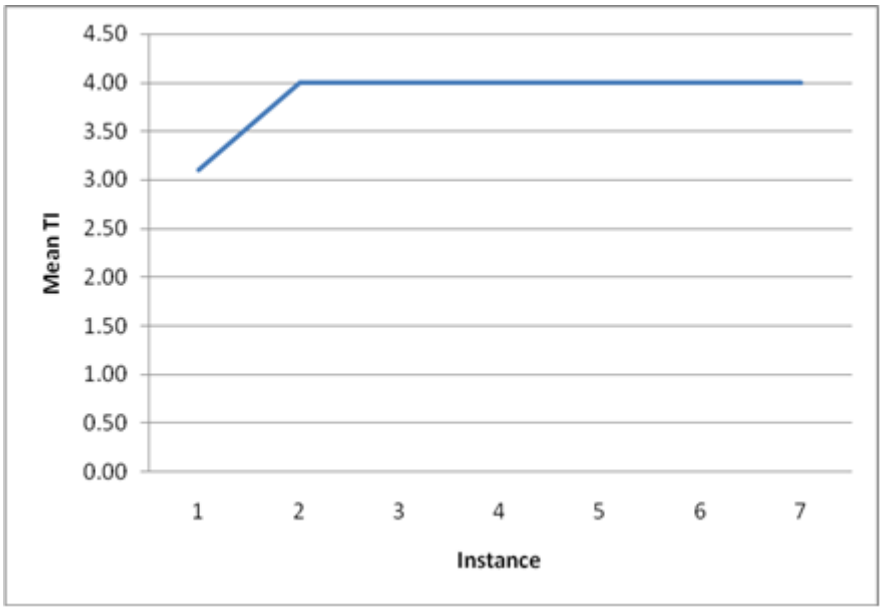

Figure 5.15 Technology integration for Science class

5.3.2.7 Modes of learning

Two aspects of learning modes have been observed:

1. Teacher-led.
2. Student/s-led.

Figure 5.16 plotting the mean of the Modes of Learning (ML) considering the two aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.16 shows, timed observations of modes of learning indicated that instance 1can be classified as a mix of teacher- and student-led teaching. From instance 2 until the end, student-led teaching was observed due to independent student groups. Students did all of the work and helped one another when needed. There was no teacher-led mode of learning, except for the first 15 minutes.

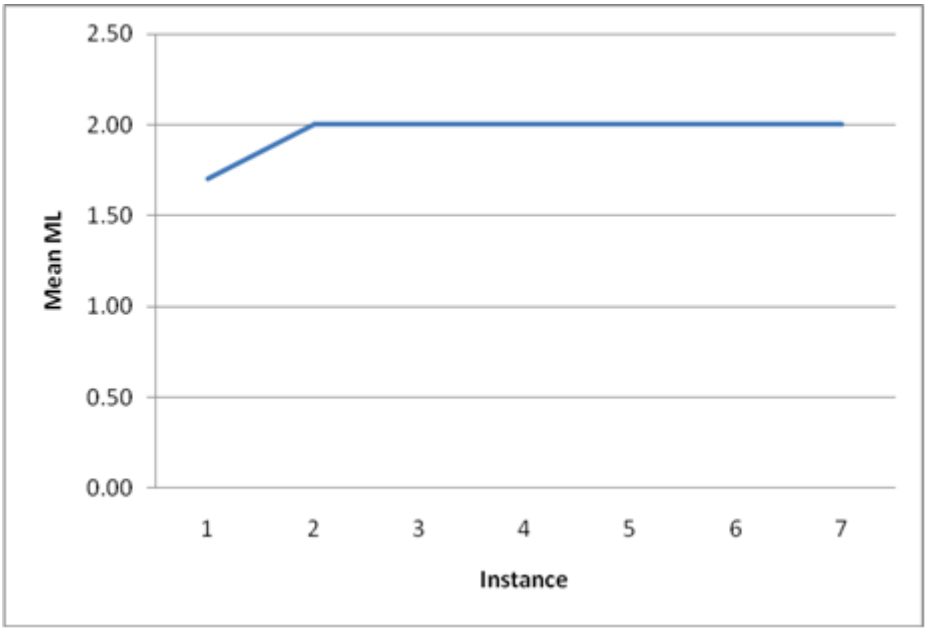

Figure 5.16 Modes of learning for Science class

5.3.2.8 *Summary*

In sum, the stories presented throughout the case study show that student outcomes were very high. The main observation of knowledge gain was knowledge construction related to software usage and digital story creation. Prior student knowledge facilitated tasks and software usage. Students did not require any assistance from the teacher and several groups completed their digital stories before presentation day.

Observations show that level of student engagement was consistently high. A specific example of this case is that the students had several presentations on different days throughout the case period. All presentations strongly contributed to student engagement.

5.3.3 Observation in VCAL class

For this case 12 observations were completed over 12 full class periods. The teacher started the lesson by talking about digital storytelling and asked the students to form groups. There were two groups in this case. In order to encourage them to take part in this study, the teacher gave the students the freedom to choose their own topic. Also, she offered different ideas

about possible topics. In the end, students chose to create a digital story about their favourite sport.

In the beginning it was challenging for the teacher to encourage students and engage them with the task. The teacher worked hard, encouraging students to think about possible topics, and even searched the internet for some sample clips.

In the next step, the teacher showed the students how to search for photos and videos on the internet, and explained the concept of copyright. Student engagement and interest gradually increased as they used the internet and searched for videos on various websites. The teacher assisted them in connecting these materials with their stories by discussing their story topics.

One group was working autonomously, bringing new materials that related to their story. They constantly saved their work in Word and built on it. Contrary to this, the other group was not interested in the task at all. They did not prepare anything for the class and only worked when the teacher was standing near them and forcing them to do some work. Teacher follow-up offered motivation and improved their engagement. This group chose to present basketball in their story. They wanted to include their own video, recorded as they were playing basketball. This was the only step for this particular group that increased their level of engagement.

Once the photo clips and videos were selected, the teacher introduced Moviemaker software. She explained how to import photos or music, add title and transition, and/or other effects. The teacher helped each group every step of the way in creating a digital story. Once the digital stories were complete the students burnt it to a CD and submitted to the teacher. The last session was dedicated to the presentation of final products. The students were very happy with their work and they invited their peers from other classes to attend and watch the

video session. This clearly contributed to their self-confidence and interpersonal skills. The teacher evaluated the digital stories by means of a rubric.

As previously mentioned, the observation tool was conducted to examine the level of student engagement in authentic learning tasks using digital storytelling, and specifically focusing on: class collaboration, knowledge gain, student roles, teacher roles, student engagement, technology integration and modes of learning.

5.3.3.1 Class collaboration

Several aspects of class collaboration have been observed:

1. Individual students working alone.
2. Pairs of students.
3. Small groups (3+ students).
4. Whole class.
5. Student presentations.

Timed observations of class collaboration indicated that students were working in pairs most of the time. Figure 5.17 plotting the mean of the Class Collaboration (CC) considering all the five aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As can be seen in Figure 5.17, in instances 1, 2 and 3 the whole class was working together for the first 15 to 20 minutes. This is due to the fact that the teacher spent time explaining digital storytelling, and the tasks that needed to be performed. Groups then worked on their own story, receiving help from the teacher, depending on their needs.

From instances 4 to 11, each group was working with some help from the teacher. In the beginning the groups were looking for information, and recorded their videos. Once this step was taken, the group started using the software and creating their digital story. The last instance (i.e. 12), was for story presentation and teacher evaluation. The overall class

collaboration was poor. This was due to the fact that one group worked autonomously while the teacher helped the other group.

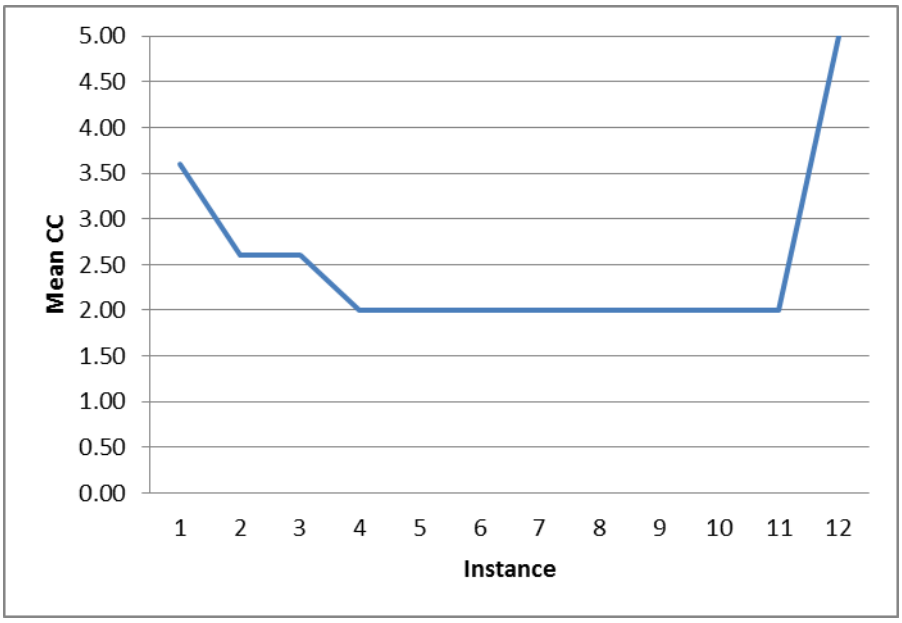

Figure 5.17 Class collaboration for VCAL class

5.3.3.2 Knowledge gain

Several aspects of knowledge gain have been observed:

1. Receipt of knowledge.
2. Applied procedural knowledge.
3. Knowledge construction.
4. Other (specify).

Timed observations of knowledge gain indicated the main type of knowledge gain was knowledge construction. Figure 5.18 plotting the mean of the Knowledge Gain (KG) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.18 shows, for instance 1, 2 and 3 there was a learning mix, where the first three options co-existed and applied procedural knowledge was dominant. This is due to the fact that, during this period, the teacher taught the fundamentals and components of digital storytelling to the class. One of the groups was working alone which represents the second and third options.

However, the other group required constant scrutiny by the teacher and this represents the first option.

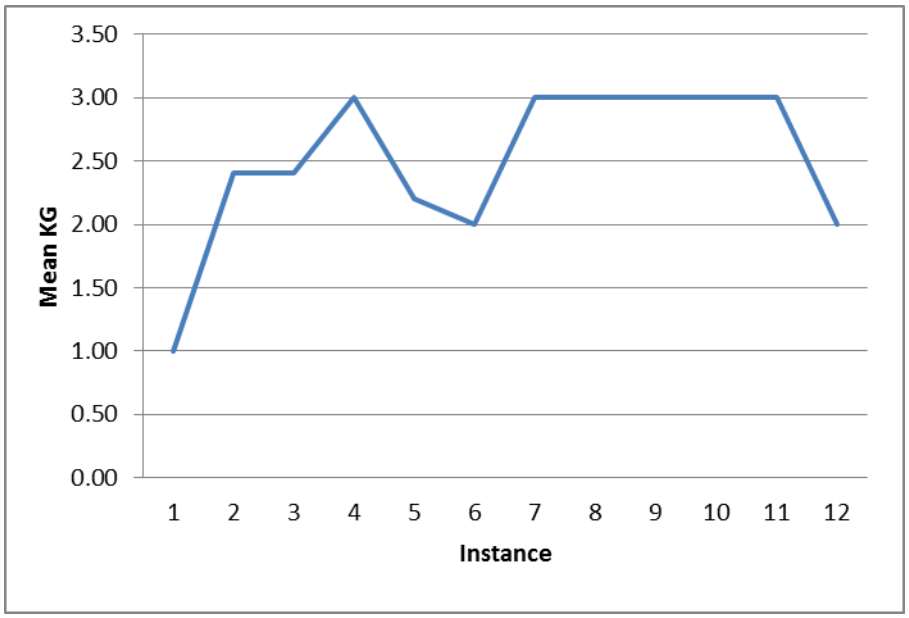

Figure 5.18 Knowledge gain for VCAL class

After receiving the basic information, from instances 4 to 11, each group constructed knowledge based on software usage and digital story creation. There were two exceptions during this period. During instance 5, one group was working alone while the teacher was occupied with the other group. In instance 6, the second group recorded their video while playing basketball. These scenarios represented a very different knowledge gain in the class. After recording the video, the second group also started working on their own. This yielded a constant knowledge gain profile from week 7 to 11. In the final week, which is explained above, the presentation of digital stories contributed to applied procedural knowledge gain.

5.3.3.3 Student roles

Three different aspects of student roles have been observed:

1. Passive/ little response.
2. Active response.
3. Co-construct meaning.

Timed observations of student roles indicated that students mostly engaged in co-construct meaning, where they initiated dialogue with the teacher and constructed their own meaning from lesson activity. Figure 5.19 plotting the mean of the Student Roles (SR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.19 shows, for instances 1, 2 and 3 there was a mixed student role in which the first and the second options co-existed. During this period, the teacher taught the fundamentals and components of digital storytelling to the class; the students responded actively by providing input to open-ended questions and participating in discussions led by the teacher.

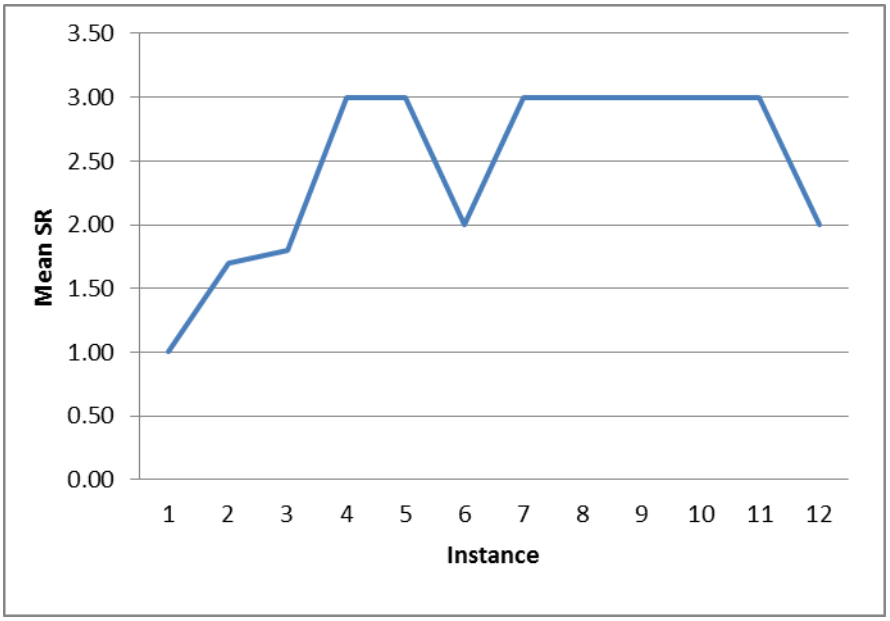

Figure 5.19 Student roles for VCAL class

During instances 2 and 3, and after receiving the basic information, one group worked on software and the other relied on help from the teacher. On the 6th instance, the problematic second group recorded their videos. This changed their role to 'Active Response' as can be observed in Figure 5.19. Between instances 7 to 11 each group worked on their story and further constructed knowledge by receiving feedback from the teacher. During the presentation of digital stories, students actively participated in presentation, discussion and evaluation.

5.3.3.4 Teacher roles

Three different aspects of teacher roles have been observed:

1. Leads class.
2. Observes student/s.
3. Facilitates/Scaffolds learning.

Figure 5.20 plotting the mean of the Teacher Roles (TR) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol).As Figure 5.20 shows, timed observations of teacher roles indicated that for instances 1, 2 and 3 the teacher led the class by directing learning and providing information or explanations for at least 15 minutes. In addition the teacher manages behaviour, provides materials, or solves computer problems in order to get students on task.

From instance 3 the teacher facilitated the learning. As previously mentioned, the only exception occurred in instance 6, where students were recording their video and the teacher was observing (i.e. the second option).

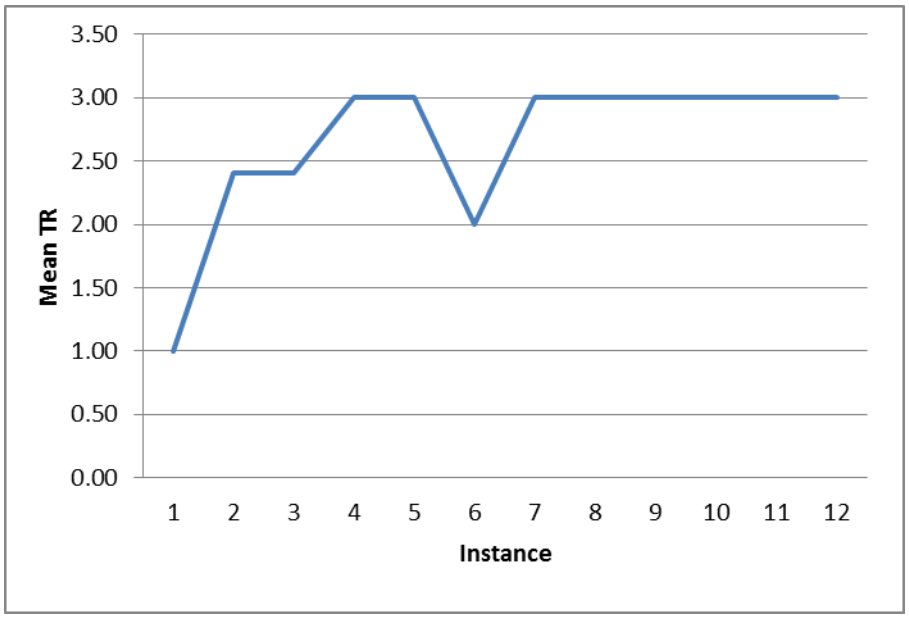

Figure 5.20 Teacher roles for VCAL class

5.3.3.5 Student engagement

Three different aspects of student engagement have been observed:

1. Low engagement.
2. Moderate engagement.
3. High engagement.

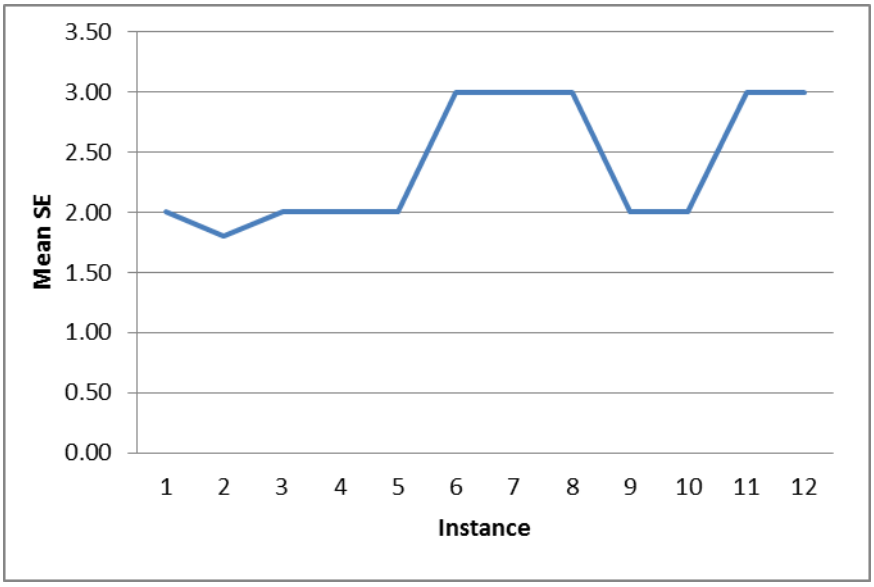

Figure 5.21 Student engagement/instance for VCAL class

Figure 5.21 plotting the mean of the Student Engagement (SE) considering all the three aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 5.21 shows that timed observations of student engagement indicated students were moderately engaged most of the time. The teacher did her best to increase the engagement level. As previously mentioned, the real difference was in instance 6 when students took an active role in recording their video and this continued until instance 9. There was high engagement when students invited their peers and showcased their works in instance 12.

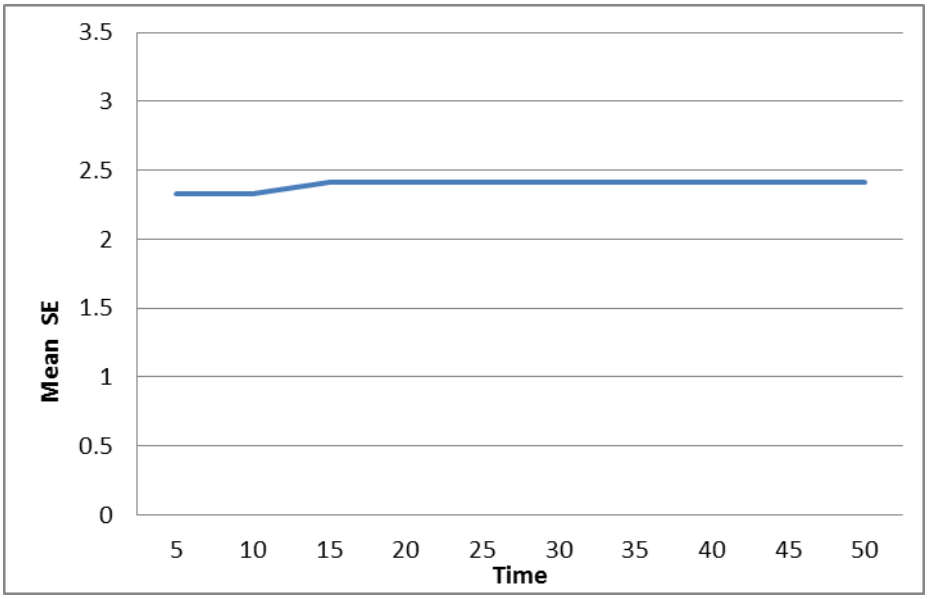

Figure 5.22 Student engagement/time for VCAL class

The average distribution of engagement levels in a single instance is given in Figure 5. 22. As shown, throughout the entire class, student engagement was moderate. Strikingly the student engagement level remained constant until the very end of the class. This is due to the exceptional performance of the teacher who led the class and engaged the students.

5.3.3.6 Technology integration

Four aspects of technology integration have been observed:

1. Not used.
2. Add-on.
3. Partially integrated.
4. Fully integrated.

Figure 5.23 plotting the mean of the Technology Integration (TI) considering all the four aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). As Figure 5.23 shows, instance 1 did not integrate technology for the first 30 minutes when the teacher used traditional teaching methods to explain tasks to her students. After that time she used the internet to show sample videos. From instance 2, students worked on computers to search for

photos, music and videos over the internet and use Moviemaker software to create their own story.

Similar to the previous case, technology integration was 100% for all instances except the first 30 minutes of instance 1. Therefore, it is not realistic to measure the relation between student engagement and technology integration. The only comparison can be made within the first 30 minutes, when clearly there was an increase in student engagement with technology integration. In this study, the use of a video recording device was observed. The students who had a very low engagement level were highly engaged while recording videos for their stories.

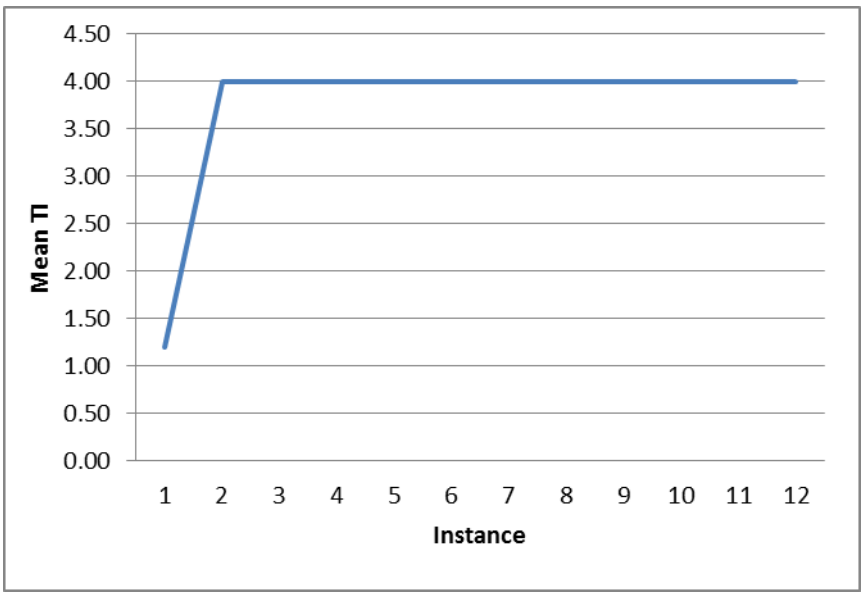

Figure 5.23 Technology integration for VCAL class

5.3.3.7 Modes of learning

Two aspects of learning modes have been observed:

1. Teacher-led.
2. Student/s-led.

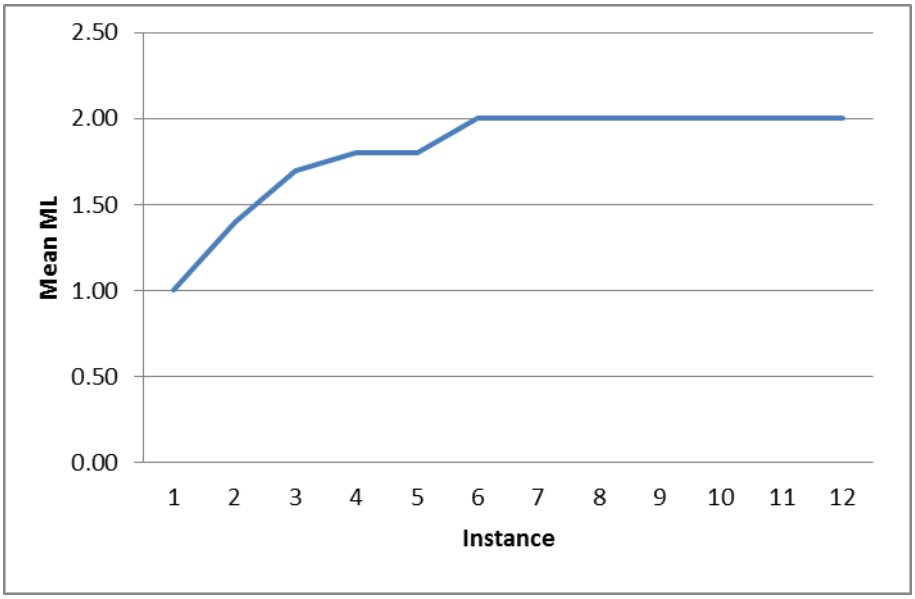

Figure 5.24 Modes of learning for VCAL class

Figure 5.24 plotting the mean of the Modes of Learning (ML) considering the two aspects discussed above on y-axis and their respective instances on x-axis from the observations (Refer Appendix A: Classroom observation protocol). Figure 5.24 shows that timed observations of modes of learning indicated that instances 1 to 5 can be classified as a mix of teacher- and student-led learning.

Starting from instance 6, students worked alone and the mode of learning was purely student led, where they dominated interactions. A student-led mode of learning continued until the final presentation of the digital stories by the students.

5.3.3.8 Summary

In sum, classroom observation indicates that the outcome of one group was satisfactory while the other group was not interested in the tasks. This is also demonstrated by the stories presented on presentation day. The observations indicated that the main type of learning was knowledge construction related to software usage and digital story creation.

Students were mainly engaged in co-construct meaning. This was achieved with constant efforts by the teacher to progress students. In these activities, the teacher led the

work for one group and fulfilled the role of facilitator for the other. The teacher worked effectively to supervise students and keep them engaged during story creation.

Observations indicated that student engagement levels were moderate. Although no conclusive relation can be drawn between student engagement and technology integration, it was observed that video recording increased the engagement level of some students dramatically.

A specific example of how the process can affect engagement levels was observed in the case study. One group was clearly not interested in any tasks. The teacher had to make an extra effort to engage this group. However, when it came to the video recording, engagement levels soared and this was evident in a number of instances. The students wanted to share their video on social networking websites and they invited their peers to the final story presentation.

5.4 The impact of digital storytelling on student outcomes

As previously mentioned, in addition to classroom observations, a scoring rubric assessed the quality of digital stories. This stage had two different aims: to assess the level of student engagement and document the provision of better education outcomes through digital storytelling. Level of engagement is a quantity that can be measured with the help of a scoring rubric. In the following sections the evaluation of outcomes for secondary school cases (Art, Science and VCAL) are presented.

5.4.1 Evaluation of outcomes in an Art class

As mentioned in section 4.4, in addition to the classroom observations, a rubric has been used by teachers to assess the quality of the digital stories; therefore, in these cases also a panel of three reviewers evaluated the students' final digital stories by completing the rubric. Each reviewer has evaluated 5 digital stories in total which have been developed by students.

The data regarding outcomes are evaluated under four different categories: overall analysis of student scores, scores assigned by each teacher, difference between teachers' evaluations and overall scores on each criterion.

5.4.1.1 Overall analysis of student scores

The data presented in Figure 5.25 show task performances by students. As the score for each criterion ranged between 1 and 4; the theoretical range of the overall score was between 27 and 108. Students scored between 52 and 100. 64-86 zones were the most densely populated, since 4 out of 5 groups were placed therein.

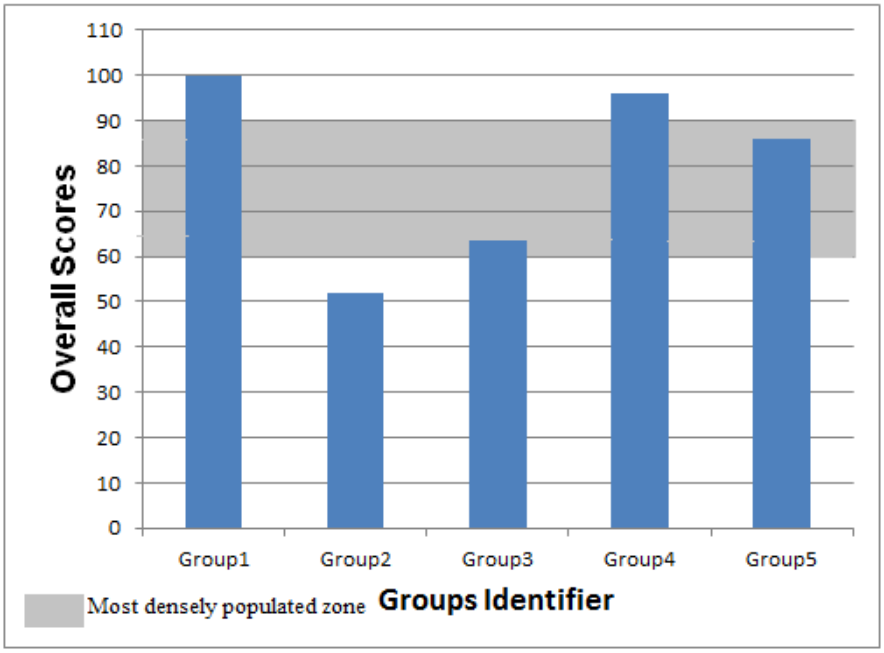

Figure 5.25 Overall scores for digital story quality for Art class

In addition, Table 5.1 shows that group 1 ranked highest (Total Score = 100; Mean Score = 3.70), followed by group 4 (Total Score = 96; Mean Score = 3.56). In strong contrast, the lowest scores is given to group 2 (Total Score = 52; Mean Score = 1.93). The average overall mean score is 2.95 with a standard deviation of 0.892.

Table 5.1 Descriptive statistics of overall student scores for Art class

Groups	Rank	Sum	Mean	Variance	Std. Deviation
Group 1	1	100	3.70	.217	.465
Group 2	5	52	1.93	.225	.474
Group 3	4	64	2.37	.473	.688
Group 4	2	96	3.56	.256	.506
Group 5	3	86	3.19	.464	.681

To examine whether there are differences among groups with respect to their overall scores, Kruskal-Wallis ANOVA has been conducted. The results confirmed there are significant differences among student groups with respect to their scores ($p < 0.000$). A p-value lowers than 0.05 indicates statistically significant differences.

5.4.1.2 Student scores assigned by teachers

While the previous section reported the overall scores, this section will focus on student group scores separately for each evaluating teacher. These results should not be confused with the results that will be reported in the next section, where we will focus on the differences between teachers. Here, the focus is still on differences between student groups.

As groups are evaluated on nine criteria (with a score range between 1 and 4), the theoretical minimum score for a student is 9 (= 9 x 1) and the theoretical maximum score is 36 (= 9 x 4). The results are shown in Figure 5.26, which indicates that separate group scores are consistent with the overall scores.

The results of Kruskal-Wallis ANOVA confirmed significant differences between student groups with respect to their score level as evaluated by Teachers ($p < 0.000$). A p-value lower than 0.05 suggests significant differences.

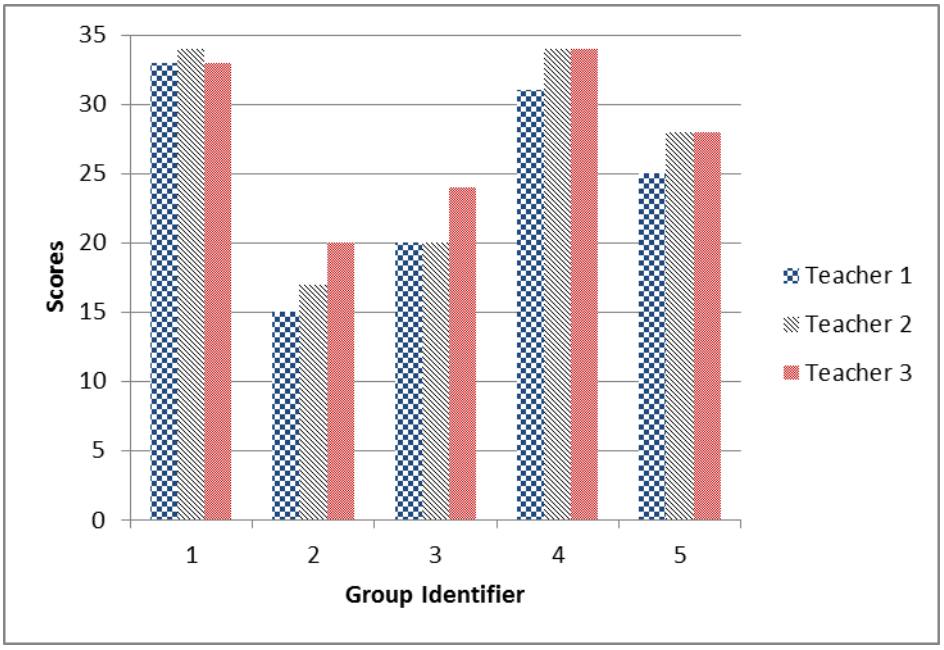

Figure 5.26 Student scores assigned by teachers for Art class

5.4.1.3 Differences between teachers' evaluations

In this section, the aim is to examine whether evaluation of groups are dependent on the teacher. Ideally, there should be a high correlation between teacher evaluations, which should not vary significantly across teachers. The results are shown in Figures 5.27, 5.28 and 5.29.

To examine differences among teachers with respect to group evaluations, Kruskal-Wallis ANOVA was conducted on the overall scores by way of comparison. The results indicated significant differences between teacher evaluations (p =.178).

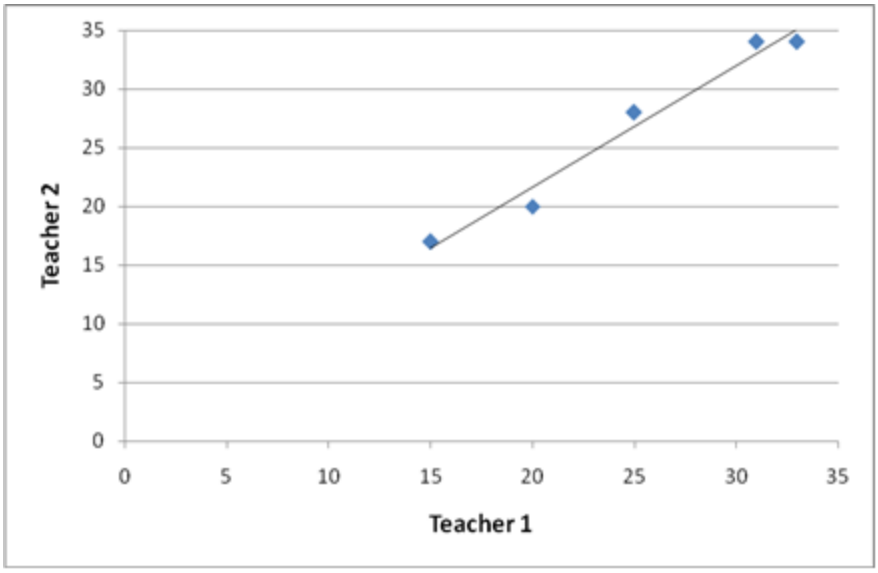

Figure 5.27 Correlation between evaluations of Teacher 1 and Teacher 2 for Art class

A p-value higher than 0.05 indicates no statistically significant differences between teacher evaluations.

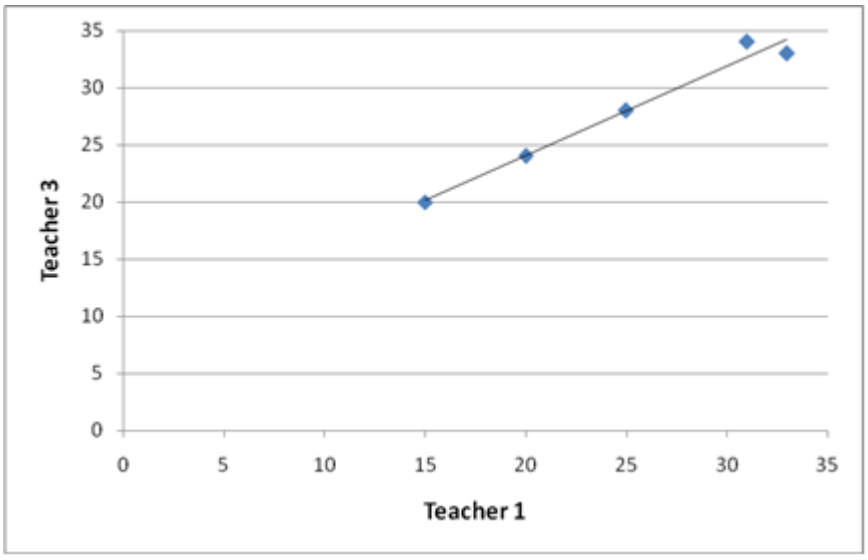

Figure 5.28 Correlation between evaluations of Teacher 1 and Teacher 3 for Art class

The focus will now shift to measure the extent of the relationship between teacher evaluations: more specifically, Pearson correlation between teacher evaluations. Figures 5.39, 5.40 and 5.41 consistently show a very high correlation between scores given by all three teachers. The Pearson correlation is at least 0.98, and highly significant.

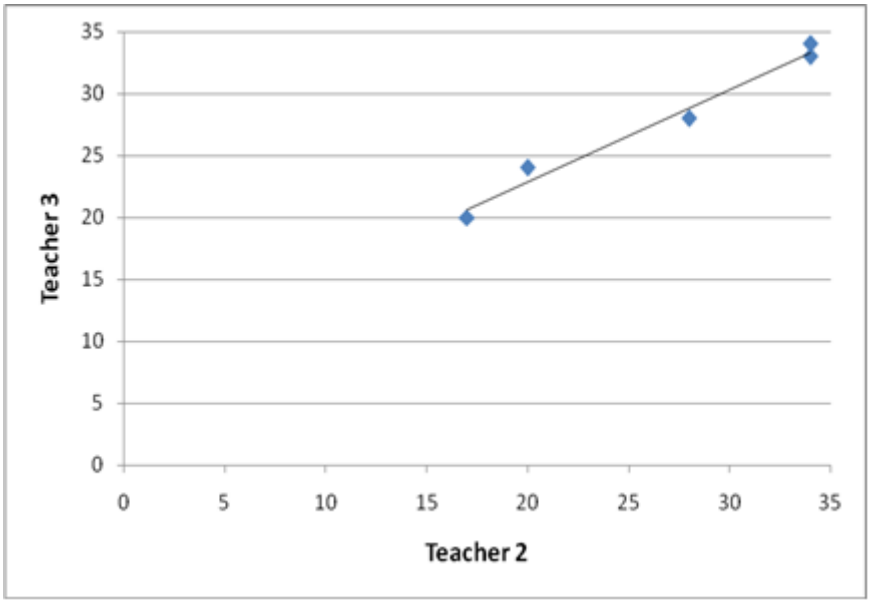

Figure 5.29 Correlation between evaluations of Teacher 2 and Teacher 3 for Art class

5.4.1.4 Overall scores on each criterion

In this section, the aim is to investigate how students perform on each criterion that measures student engagement. Ideally, there should be a high equivalence between criteria and a moderate level of variance for each criterion. Three teachers were asked to give an evaluation score between 1 and 4 for 5 groups. As such, the theoretical mean score for a criterion, aggregated over all students and teachers, varies between 1 and 4, and there are 15 observations for each criterion (= 3 x 5). Hence, the total N is 135 (= 15 x 9). The results are shown in Figure 5.30.

Figure 5.30 indicates that there is a high equivalence between the nine criteria. That is, there are few differences between criteria as the mean score for each of the nine criteria is around 2.9.

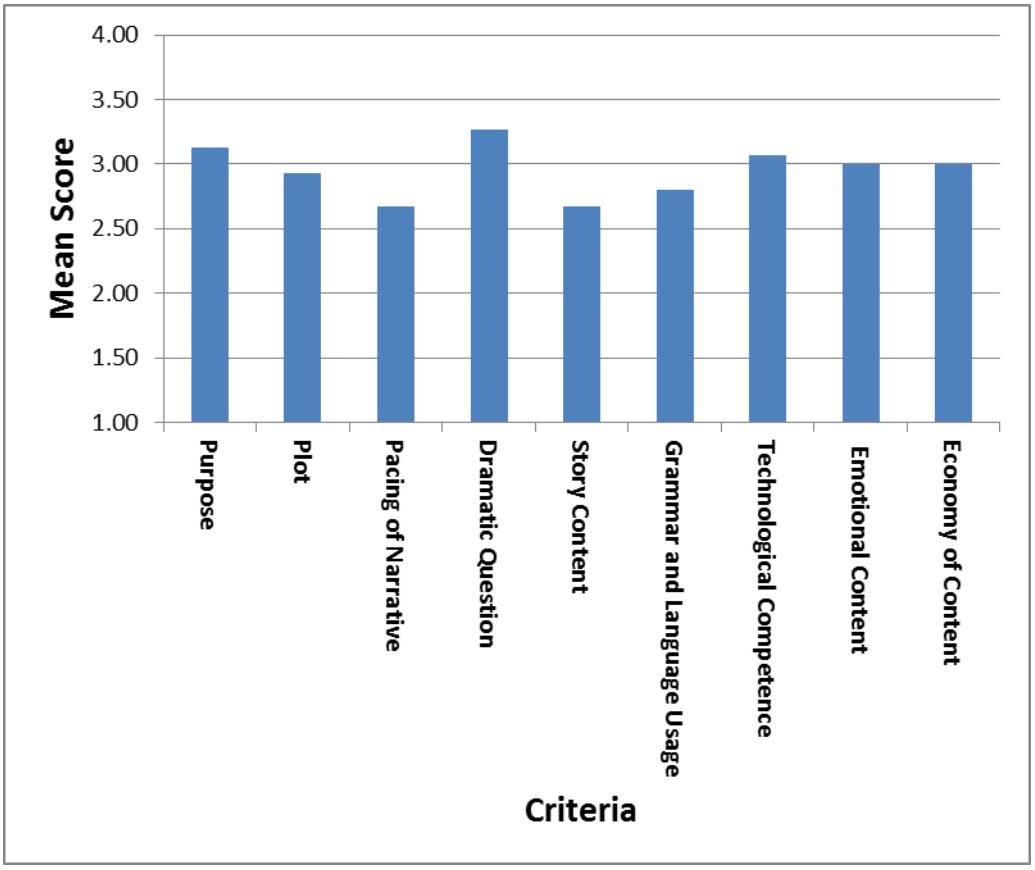

Figure 5.30 Mean score for criteria for Art class

In Table 5.2 it is shown that the criterion with the highest mean score is 4 (mean score = 3.27). Criterion 9 has the highest level of variance (=1.286). The criteria with the lowest mean scores are 3 and 5, both having the same mean score (=2.67) and standard deviation (=0.816).

To examine whether there are differences among the above criteria that measure group scores, Kruskal-Wallis ANOVA has been conducted. The results indicated no significant differences between various criteria (p = .580). A p-value higher than 0.05 indicates there were no statistically significant differences.

Table 5.2 Descriptive statistics of criteria scores for Art class

Criteria	Min	Max	Mean	Variance	Standard Deviation
Criterion 1	1	4	3.13	.84	.92
Criterion 2	1	4	2.93	.92	.96
Criterion 3	2	4	2.67	.67	.82
Criterion 4	2	4	3.27	.78	.88
Criterion 5	1	4	2.67	.67	.81
Criterion 6	2	4	2.80	.46	.68
Criterion 7	2	4	3.07	.78	.88
Criterion 8	2	4	3.00	.86	.93
Criterion 9	1	4	3.00	1.29	1.13

5.4.1.5 Reliability analysis

Reliability analysis is an essential requirement for test validity. Test validity is the degree to which a test measures what it is designed to measure. Hence, the aim is to examine to which degree the nine criteria measure the overall scores for digital story quality effectively. For this purpose, Cronbach's Alpha has been calculated which equals 0.946 and suggests our method is highly consistent and reliable. This method also revealed a Spearman-Brown coefficient of 0.918. Consequently, the reliability of this scale is very high.

5.4.1.6 Summary

In sum, from the rubric evaluation pertaining to this case study, the concept of digital story was clear to the majority of students and assisted with digital story creation. Moreover, student performance was satisfactory for digital story creation process and digital stories presented as final products. Students' low performance in "Pacing of Narrative" and "Story Content" is due to failure in completing their storyboards. Nevertheless, they passed "Purpose", "Dramatic Question", and "Technological Competence" criteria with flying colours. Students experienced camaraderie and helped each other throughout. There were

differences among competency levels of students. This was confirmed by the consistency of ratings between various teachers.

5.4.2 Evaluation of outcomes in Science class

The data collected regarding outcomes are evaluated under four different categories: overall analysis of student scores, scores assigned by each teacher, difference between teachers' evaluations and overall scores on each criterion.

5.4.2.1 Overall analysis of student scores

The data presented in Figure 5.31 shows the performance of students. As the score for each criterion ranged between 1 and 4; the theoretical range of overall score was between 27 and 108. Students scored between 88 and 102. 90-100 zones were the most densely populated since 3 out of 4 groups were placed therein.

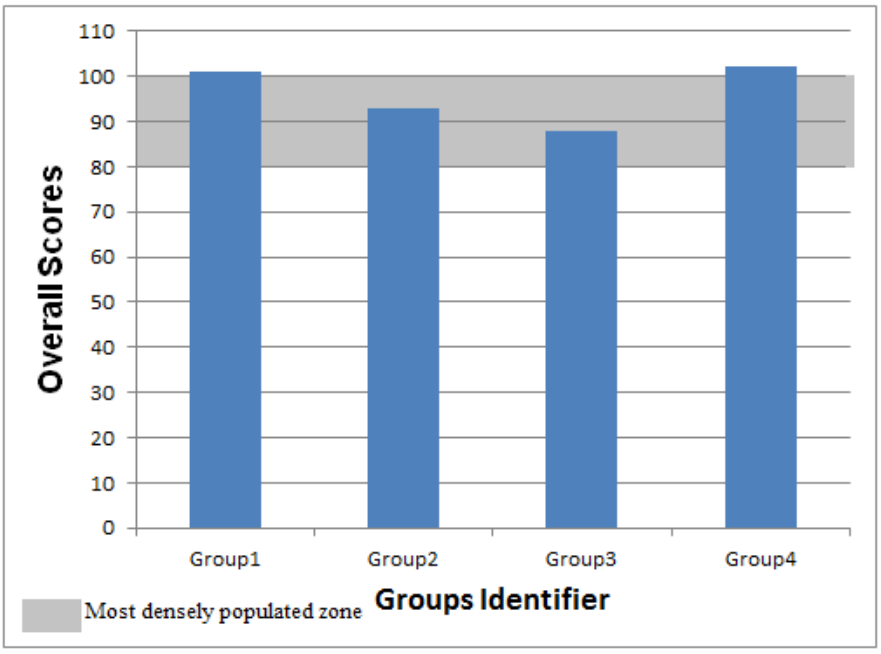

Figure 5.31 Overall scores for digital story quality for Science class

Table 5.3 shows that group 4 ranked highest (Total Score = 101; Mean Score = 3.78), closely followed by group 1 (Total Score = 101; Mean Score = 3.74). In strong contrast,

group 3 was given the lowest score (Total Score = 88; Mean Score = 3.26) and group 2 (Total Score = 93; Mean Score = 3.44). The average overall mean score is 3.56 with a standard deviation of 0.268. As such, there is less variation here than in previous cases.

Table 5.3 Descriptive statistics of overall student scores for Science class

Groups	Rank	Sum	Mean	Variance	Std. Deviation
Group 1	2	101	3.74	.199	.447
Group 2	3	93	3.44	.256	.506
Group 3	4	88	3.26	.276	.526
Group 4	1	102	3.78	.179	.424

To examine whether there are differences among groups with respect to their overall scores, Kruskal-Wallis ANOVA has been conducted. The results confirmed significant differences among student groups with respect to their scores ($p < 0.000$). A p-value lower than 0.05 indicates statistically significant differences.

5.4.2.2 Student scores assigned by teacher

While the previous section reported overall scores, this section will focus on student group scores separately for each evaluating teacher. These results should not be confused with results reported in the next section, where the focus will be on differences between teachers. Here, the focus is still on differences between student groups.

As the groups are evaluated on nine criteria (with a score range between 1 and 4), the theoretical minimum score for a student is 9 (= 9 x 1) and the theoretical maximum score is 36 (= 9 x 4). The results shown in Figure 5.32 indicate that the separate group scores are consistent with overall scores.

The results of Kruskal-Wallis ANOVA confirmed significant differences between student groups with respect to their score levels as evaluated by Teachers ($p < 0.000$). A p-value lower than 0.05 suggests significant differences.

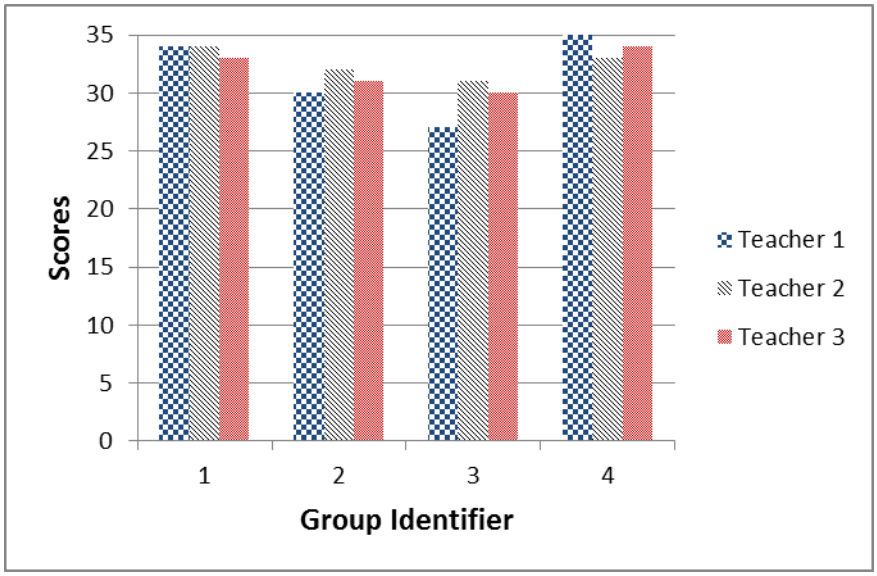

Figure 5.32 Student scores assigned by teacher for Science class

5.4.2.3 Differences between teachers' evaluations

In this section, the aim is to examine whether evaluations of groups are dependent on the teacher. Ideally, there should be a high correlation between teacher evaluations, which should not vary significantly across teachers. The results are shown in Figures 5.33, 5.34 and 5.35.

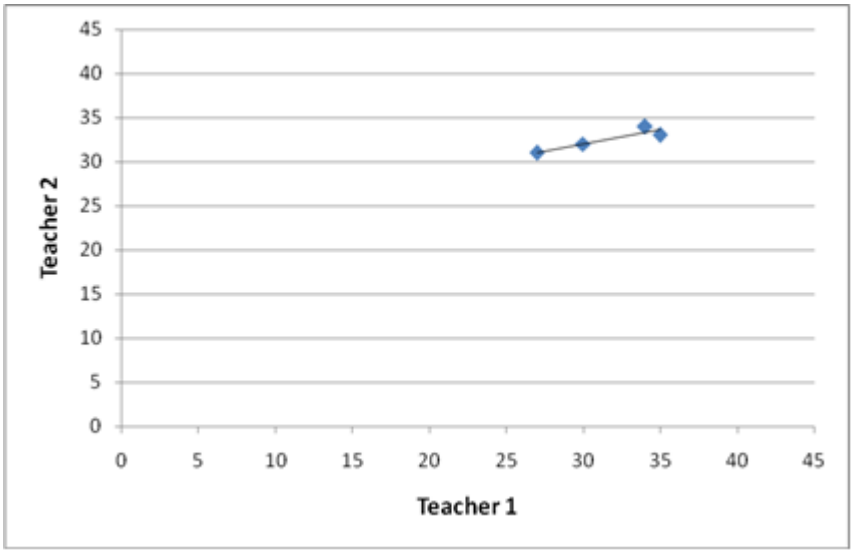

Figure 5.33 Correlation between evaluations of Teacher 1 and Teacher 2 for Science class

To examine whether there are differences among teachers with respect to their group evaluations, Kruskal-Wallis ANOVA was conducted on overall scores by way of comparison. The results indicated significant differences between teacher evaluations (p =.722). A p-value higher than 0.05 indicates there were no statistically significant differences.

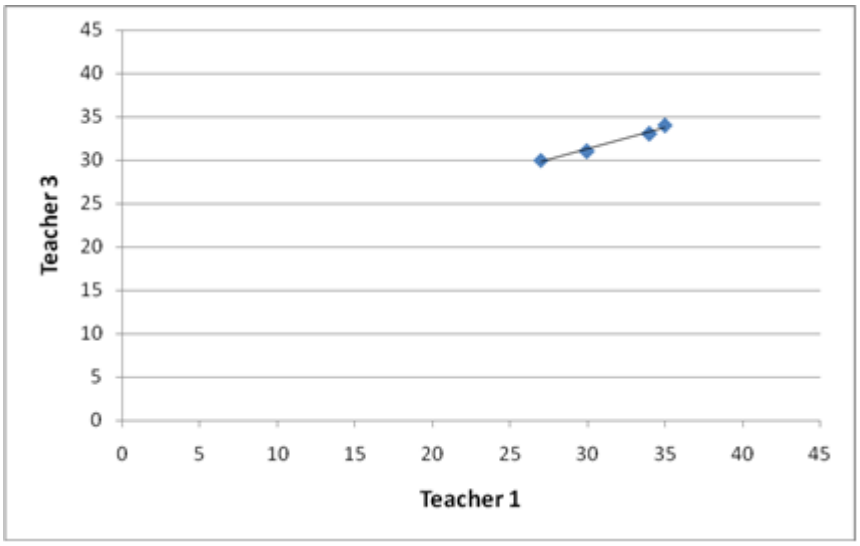

Figure 5.34 Correlation between evaluations of Teacher 1 and Teacher 3 for Science class

The focus will now shift to the extent of the relationship between teacher evaluations, more specifically, Pearson correlations. Figures 5.33, 5.34 and 5.35 consistently show a high correlation between scores given by all three teachers. The Pearson correlation is at least 0.849, and highly significant.

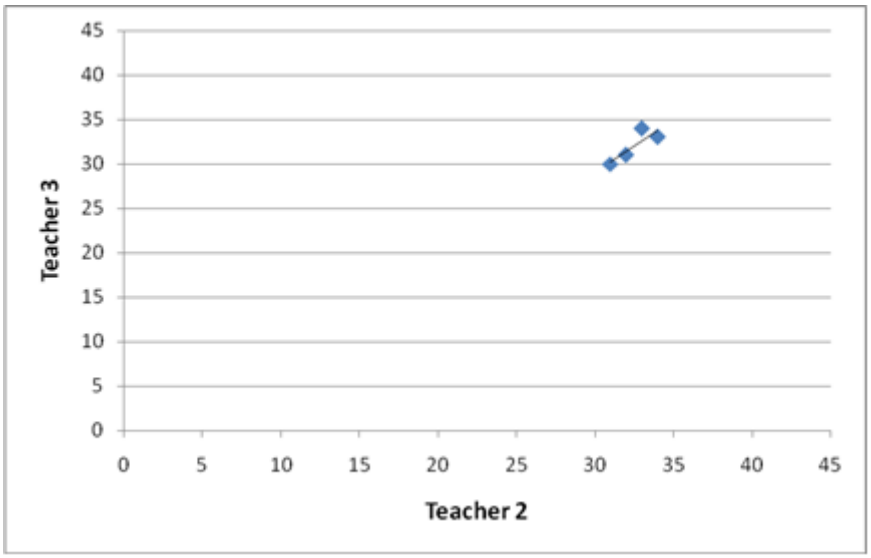

Figure 5.35 Correlation between evaluations of Teacher 2 and Teacher 3 for Science class

5.4.2.4 Overall scores on each criterion

In this section, the aim is to investigate how students perform on each criterion that measures student engagement. Ideally, there should be a high equivalence between criteria and a moderate level of variance for each criterion. Three teachers were asked to give an evaluation

score of between 1 and 4 for 4 groups. As such, the theoretical mean score, aggregated over all students and teachers, varies between 1 and 4, and there are 15 observations for each criterion (= 3 x 5). Hence, the total N is 135 (= 15 x 9). The results are shown in Figure 5.36.

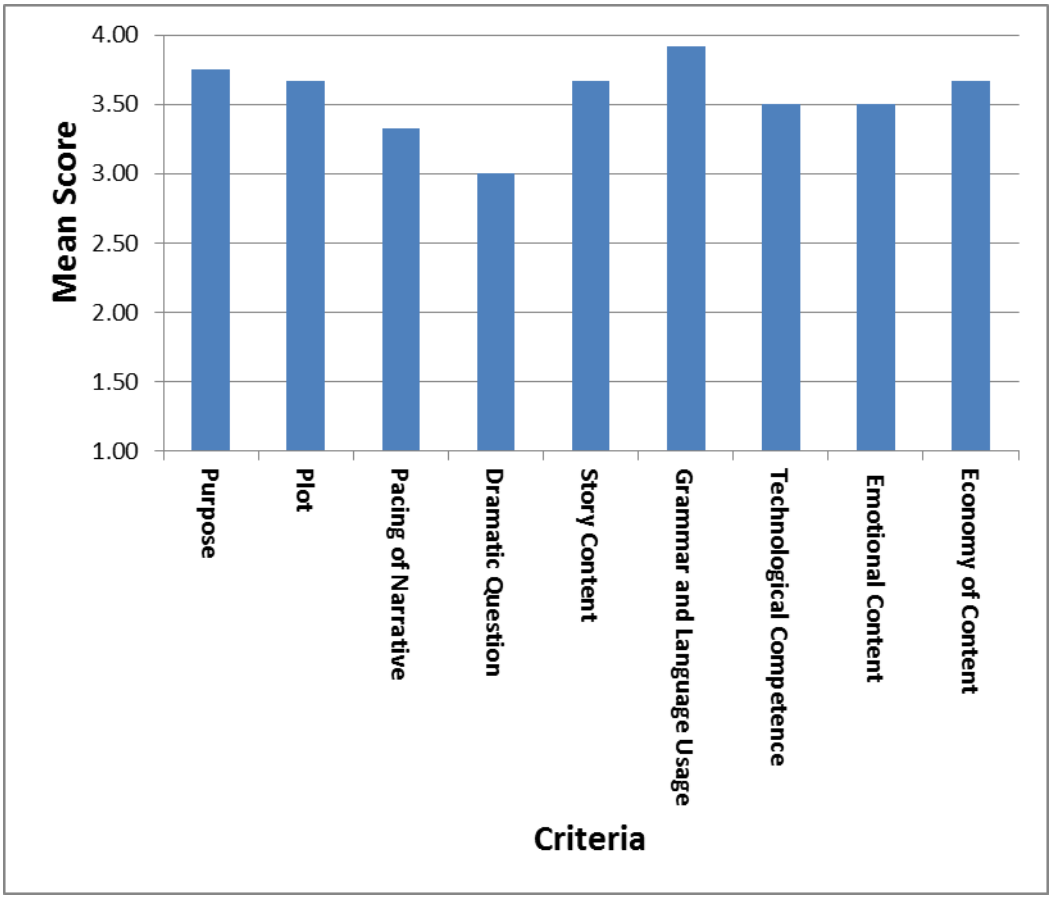

Figure 5.36 Mean score for criteria for Science class

Figure 5.36 indicates a high equivalence between criteria. That is, there are few differences as the mean score for each criterion is around 3.5. In Table 5.4 it is shown that the criterion with the highest mean score is 6 (mean score = 3.92). Criteria 7 and 8 have the highest level of variance (=.273) and criterion 4 and 3 respectively have the lowest variance.

To examine whether there are differences among criteria that measure group scores, Kruskal-Wallis ANOVA was conducted. The results indicated significant differences between various criteria (p = .002). A p-value lower than 0.05 indicates statistically significant differences.

Table 5.4 Descriptive statistics of criteria scores for Science class

Criteria	Min	Max	Mean	Variance	Standard Deviation
Criterion 1	3	4	3.75	.21	.45
Criterion 2	3	4	3.67	.24	.49
Criterion 3	3	4	3.33	.24	.49
Criterion 4	2	4	3.00	.18	.43
Criterion 5	3	4	3.67	.24	.49
Criterion 6	3	4	3.92	.08	.29
Criterion 7	3	4	3.50	.27	.52
Criterion 8	3	4	3.50	.27	.52
Criterion 9	3	4	3.67	.24	.49

5.4.2.5 Reliability analysis

Reliability analysis is an essential requirement for test validity. Test validity is the degree to which a test measures what it is designed to measure. Hence, the aim is to examine to which degree the nine criteria measure the overall scores for digital story quality effectively. For this purpose, Cronbach's Alpha has been calculated which equals 0.702 and suggests that our method is consistent and reliable. The Spearman-Brown coefficient was 0.657. Consequently, the reliability of this scale is high.

5.4.2.6 Summary

In sum, from the rubric evaluation pertaining to this case study, the concept of digital story was clear to the majority of students and assisted them with digital story creation. Moreover, student performance was satisfactory for digital story creation process and final digital products. Students' had low performance in "Dramatic Question" due to failure to complete their storyboards.

The results also show there is a considerable level of difference between students. The consistency of rating between various teachers was high; therefore teachers gave similar results to student groups.

5.4.3 Evaluation of outcomes in VCAL class

The data collected regarding outcomes are evaluated under four different categories: overall analysis of student scores, scores assigned by each teacher, difference between teachers' evaluations and overall scores on each criterion.

5.4.3.1 Overall analysis of student scores

The data presented in Figure 5.37 and Table 5.5 show the task performance of students.

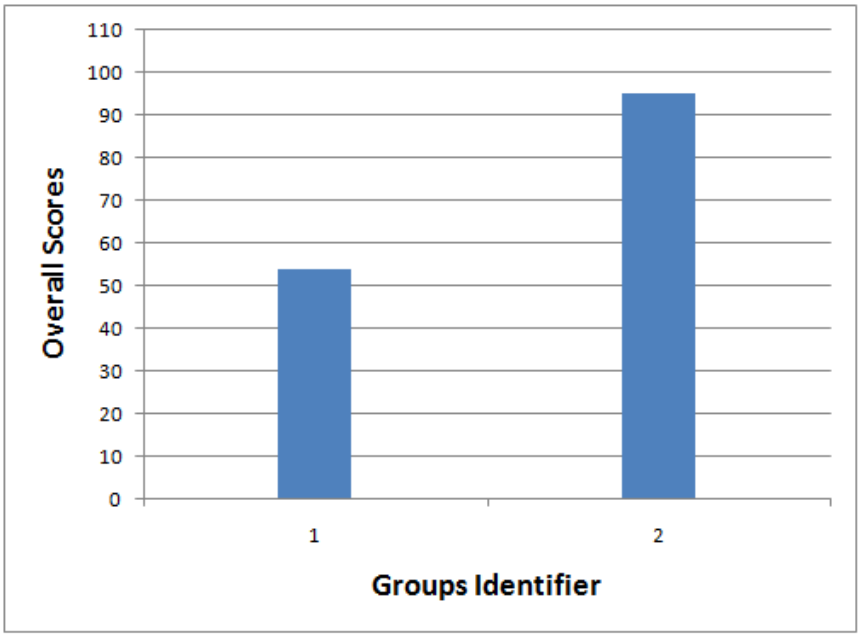

Figure 5.37 Overall scores for digital story quality for VCAL class

As the score for each criterion ranged between 1 and 4; the theoretical range of the overall score was between 27 and 108. Group 2 is ranked higher than group 1. For group 1 (Total Score = 54; Mean Score = 2.00), and group 2 (Total Score = 95; Mean Score = 3.52). The average of the overall mean score is 2.76 with a standard deviation of 0.910.

Table 5.5 Descriptive statistics of overall student scores for VCAL class

Groups	Rank	Sum	Mean	Variance	Std. Deviation
Group 1	2	54	2.00	.154	.392
Group 2	3	95	3.52	.336	.580

To examine whether there are differences among groups with respect to their overall scores, Kruskal-Wallis ANOVA was conducted. The results confirmed significant differences among student groups with respect to their scores ($p < 0.000$). A p-value lowers than 0.05 indicates statistically significant differences.

5.4.3.2 Student scores assigned by teacher

While the previous section reported overall scores, in this section the focus will be on student group scores separately for each evaluating teacher. These results should not be confused with the results that will be reported in the next section, where we will focus on the differences between teachers. Here, the focus is still on differences between student groups.

As the groups are evaluated on nine criteria (with a score range between 1 and 4), the theoretical minimum score for a student is 9 (= 9 x 1) and the theoretical maximum score is 36 (= 9 x 4). The results are shown in Figure 5.38, which indicates separate group scores are consistent with overall scores.

The results of Kruskal-Wallis ANOVA confirmed significant differences between student groups with respect to their score levels as evaluated by teachers ($p < 0.000$). A p-value lowers than 0.05 suggests significant differences.

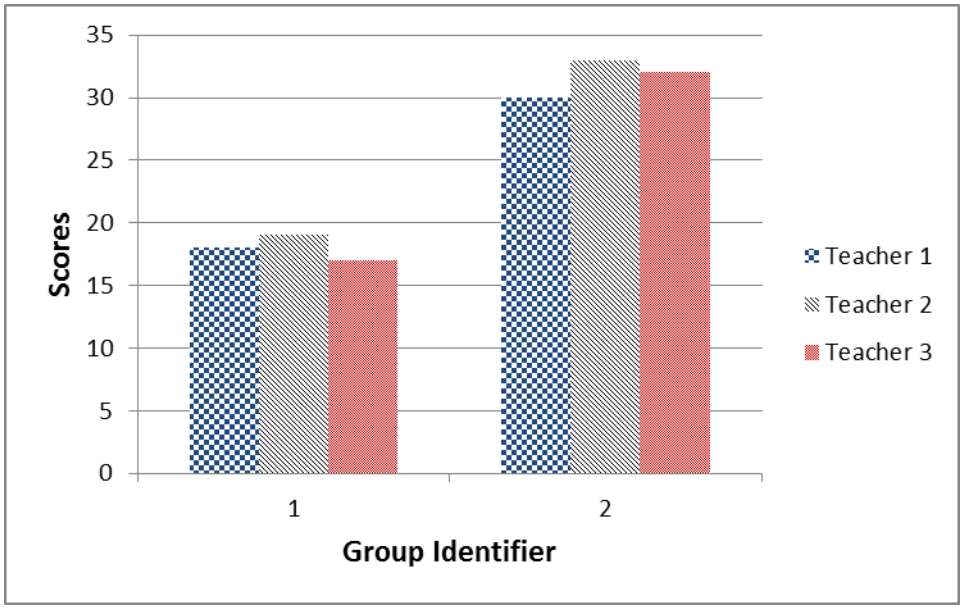

Figure 5.38 Student scores assigned by teacher for VCAL class

5.4.3.3 Differences between teachers' evaluations

In this section, the aim is to examine whether group evaluations are dependent on the teacher. Ideally, there should be a high correlation between teacher evaluations, and evaluations should not vary significantly across teachers.

To examine whether there are differences among teachers with respect to their group evaluations, Kruskal-Wallis ANOVA was conducted on the overall scores by way of comparison. The results indicated significant differences between teacher evaluations (p =.759). A p-value higher than 0.05 indicates there were no statistically significant differences. Because there were only two student groups, in this case we could not calculate correlations.

5.4.3.4 Overall scores on each criterion

In this section, the aim is to investigate how students perform on each criterion that measures student engagement. Ideally, there should be a high equivalence between criteria and a moderate level of variance for each criterion. Three teachers were asked to give an evaluation score between 1 and 4 for 2 groups. As such, the theoretical mean score, aggregated over all

students and teachers, varies between 1 and 4, and there are 15 observations for each criterion (= 3 x 5). Hence, the total N is 135 (= 15 x 9). The results are shown in Figure 5.39.

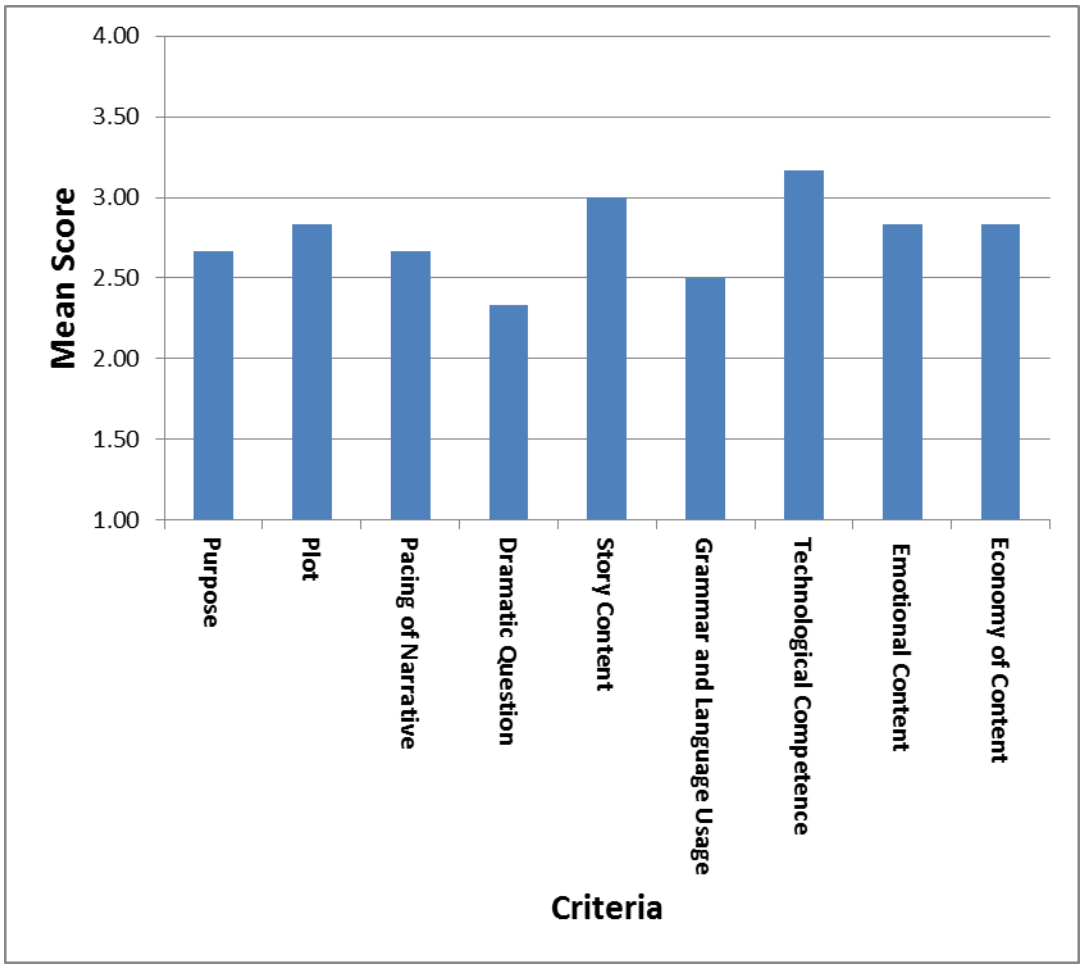

Figure 5.39 Mean score for criteria for VCAL class

Figure 5.39 indicates there are few differences between criteria as the mean score for each of the nine criteria is around 2.70. In Table 5.6 it is shown that the criterion with the highest mean score is 7 (mean score = 3.17) and the lowest mean score is 4 (mean score = 2.33).

To examine whether there are differences, Kruskal-Wallis ANOVA was conducted. The results indicated no significant differences between various criteria ($p = .909$): a p-value higher than 0.05 indicates no statistically significant differences.

Table 5.6 Descriptive statistics of criteria scores for VCAL class

Criteria	Min	Max	Mean	Variance	Standard Deviation
Criterion 1	2	4	2.67	.67	.82
Criterion 2	2	4	2.83	.97	.98
Criterion 3	1	4	2.67	1.5	1.2
Criterion 4	1	3	2.33	.67	.81
Criterion 5	2	4	3.00	1.2	1.10
Criterion 6	2	4	2.50	.70	.84
Criterion 7	2	4	3.17	.57	.75
Criterion 8	2	4	2.83	.97	.98
Criterion 9	2	4	2.83	.97	.98

5.4.3.5 Reliability analysis

Reliability analysis is an essential requirement for test validity. Test validity is the degree to which a test measures what it is designed to measure. Hence, the aim is to examine to which degree the nine criteria measure overall scores for digital story quality effectively. For this purpose, Cronbach's Alpha has been calculated which equals 0.965, which suggests our method is highly reliable. This method also revealed a Spearman-Brown coefficient of 0.944. Consequently, the reliability of this scale is high.

5.4.3.6 Summary

In sum, the student performance was satisfactory for digital story creation as well as digital stories presented as final products. Students had low performance in "Dramatic Question" criteria due to failure to complete their storyboards. On the other hand students had a good performance in "Technological Competence" due their competent computer skills.

The results show there is a considerable level of difference between the two student groups and all teachers perceived a significant difference. The consistency of rating between various teachers was high. In other words, teachers gave similar results to student groups.

Moreover, the criteria seem to form a highly reliable method for measuring group levels of student engagement: the scale yielded a satisfactory Cronbach alpha and a split-half reliability. Therefore, our method might be considered a highly reliable standardised measure to conceptualise group scores, however Spearman correlations could not be calculated because there were only two student groups.

5.5 Secondary school teachers' reflection on digital storytelling

As mentioned above in section 4.5, one-on-one interviews were conducted with primary and secondary school teachers to extract some insights which may not necessarily be reflected in observations or the evaluation rubric. With the motivation of providing consistent data, group of interview questions was asked to each teacher individually. The format utilised was a structured and open-ended interview.

The interviews were recorded and transcribed. Due to the small number of the participating teachers (five teachers), each open-ended question was hand-coded by the researcher. This section presents reflections pertaining to three secondary school teachers who participated in this study. These interview results were subjected to qualitative data analysis, and the following major themes have emerged which will be discussed and theorised in this chapter.

- **Effectiveness of digital storytelling in student engagement**

Similar to primary school teachers' opinions, secondary school teachers also found digital storytelling to be beneficial for increased student engagement in class. For instance, an arts teacher mentioned that her students found an innovative way of expressing themselves. According to this teacher, being able to include relevant topics also contributed to the engagement level:

> From my experience many of the students were engaged with the topic that we, they came up with, we came up with as a class, they had an opportunity to talk

> about things that were affecting them. The students that I use talk about bullying, they spoke about, I guess, racism towards them in the community and various different things. So in a way, it gave them a voice to say what they wanted to say through visual means. And most of them, I'd say, were extremely engaged [be]cause it was [a] different way of saying things for them. (Art teacher)

She observed that the use of digital storytelling increased students' interest so much so that they did not mind doing different things on the way.

> I think that my students were really engaged in the topic. They couldn't wait to get there, even if we had to change IT rooms. They didn't mind, they just did, they were really into it; they loved that part of art. Yeah, so I'd say that my students at the age were extremely engaged in the topic. They really enjoyed making. And they were very excited to show their digital stories at the end. Very excited. So, yeah, I'd say that age group were really engaged in the activity. Really engaged. (Art teacher)

A Science teacher considered digital storytelling as an unorthodox method of teaching and was of the opinion that this increased class engagement. "An incredible tool to engage students in class, it is very distinctive, very away from the traditional method, and it is something new for the students. Students always appreciate something new".

She further added that as long as the students are aware of the tasks expected from them. Furthermore, she really liked the fact that digital storytelling gave students freedom.

> I think I didn't see any student disengaged as long as students are aware of what's expected from them. The engagement is quite good because you give them the freedom of putting anything in there. There was no word limit, like in digitalization task there was no limitation of, you know, this many images. There was no limitation of how many questions. It was entirely up to them. So that made them be free of their work, they were controlling their work. The only expectation was the topic and we did not give any barriers to them. So it was based on their free choice basically. (Science teacher)

However, the VCAL teacher had a different experience with digital storytelling in class. She observed that some students were very tech-friendly while others were not. Therefore, with the integration of technology, some students were experiencing difficulties. She

concluded that all teaching methods, including digital storytelling, should cater for different needs.

> I think that every child learns differently. I think they have different needs. They have different learning styles; they have different likes and dislikes of subjects. They also work at a different pace. That's just generally. So my perception is, even with digital storytelling, it is vital to cater for the needs of every learner. Some people will be able to understand how to use software very quickly. Why? Because they got more access to it or they are better equipped at home and things like that. And then, there will be some people in the classroom that would require attention, require assistance from their peers and the teacher. …. So it is important that all the students are on the same page, that all on the same level as well. (VCAL teacher)

- **Effectiveness of digital storytelling in student outcomes**

Depending on their classes, the teachers had different observations regarding student outcomes. For example, the Science teacher observed students were learning without realising. Provided students were clearly informed about the task required of them, digital storytelling was a powerful tool.

> I think as long as they are aware of what is expected from them and how digital story works in terms of how digital story works. The outcome would be quite productive because in our current society that's what students are always engaged in, when you come to think about it students use most of their times on the computers. So this is another way of engaging them but by learning at the same time. They are learning without realizing, basically. So I think as long as they know what is expected of them, having digital story is something that we appreciate and enjoy. (Science teacher)

Although she had different ideas about student engagement, the VCAL teacher appreciated that digital storytelling allows young people to learn by doing. Therefore, once properly applied, digital storytelling will definitely increase outcomes.

> Generally speaking, people learn better by doing, so they learn better by doing rather than by the traditional chalk and talk method. Therefore, with the digital storytelling, I don't have a doubt that it will improve student outcome of course

> content if it is done properly. It is really important that it is done properly. And, I think that it is great that students in the 21st century have so much access to technology. Because it will and I know that it will improve learning outcomes, most certainly. (VCAL teacher)

On the other hand, the Art teacher thinks that digital storytelling is a different aspect of what can be done in art classes. It does not necessarily increase student outcomes, but provides a different way of expressing art.

> I am not sure, [whether digital storytelling] improves students' leaning outcomes… This is where many get stuck. Depends what your outcomes are. It depends, I mean like I said earlier, would be a success. Those that maybe don't experience success could perhaps experience success through this. Yeah, I am not really sure how it could improve my student learning outcomes from my department. For art, I am not really sure. Other than it is a different medium, they can experience success, expresses themselves differently. (Art teacher)

Referring to a real-life example, she expressed that utilisation of digital storytelling in Art lessons may have compensated for the removal of IT classes.

> My difference is last year I only had them for one term. So this is very different work for them. When I look at what I did last term, yeah it is quite different. Last term it was more work on paper works, culture work where this is more multimedia work. So I guess that for their outcomes would be, yeah, enjoyable. Cause those kids lost their IT lesson, replaced by art. So this is a great opportunity for them to learn something different in IT, develop their skills. (Art teacher)

- **Benefits and/or challenges of implementing digital storytelling in the classrooms**

The challenge identified by the Science teacher is learning the software. Furthermore, making up a story from a topic was unknown to students and this also posed a challenge for them.

> The benefits I identified were that the students like to use IT. So it was something they were appreciating. The challenges were mainly for those students that were not aware of the software. No one really said `oh, why do we have to do this?`, cause it was something new appreciated. The only challenge was for those

> students that were not aware of using movie-maker or the concept. The actual concept, the process of putting the digital story together. That was the main challenge. (Science teacher)

In addition, the Art teacher thinks the best performing students were those who combined various forms of media. Some students, according to the Art teacher, got too involved in filming themselves and this hindered them from creating a high-quality digital story. Consequently, if she were to do it again, she would not let students focus on filming themselves.

> But I think those that were the most successful looked at their own topic and went with it, with very little filming of themselves. So, like I said, in hindsight I would not encourage them to film themselves. For art and art content, when we look at art and media, I'd say we combined that, that went really well for an art media content in the art department which is why I was looking for... For me, it worked really well and I would probably do it again in future, meaning to combine media with arts. Arts media… so it went well for me. (Art teacher)

The VACL teacher touched upon the impact of technological infrastructure on the experience of digital storytelling in the classroom. According to her, one of the major challenges was lack of resources in the school. This, in turn, caused students to waste time and lose their enthusiasm:

> …One of the challenges that we have come across personally at this school is the lack of resources and accessibility to resources and to the ICT lab. That is one major challenge we faced. To the point where, you know, the USB was not reading, so that was really difficult. Then that becomes time wasting because we have to book another IT lab and find another place. So the limited resources as well as having access; I think that's one of the challenges that we faced as a school. (VACL teacher)

As for the benefits, she thinks that digital storytelling is the only tool which really engaged students in front of the computer. This is because digital storytelling gave them a chance to use the skills they already had and produce something they had never done before.

> Benefits, I think that for our kids for the students that I had, it was something different. I mean, so far up until this digital storytelling we have been doing a lot of work that required them to sit in front of a computer but not as engaging because they do things that they already know how to do. Things like researching things on the internet, go on to Microsoft Word typing, copying and pasting, you know things like that. Things that they can do. This was something new, something different. It was somewhat challenging for them at the beginning. I think but other than that, I think, it was, they were very engaged. (VACL teacher)

- **Subjects suitable for use with digital storytelling**

Based on their experiences in classes, the teachers were asked about the suitability of digital storytelling for integration with the subjects. The Art teacher was of the opinion that Social Studies and Humanities lend themselves to digital storytelling. Although she thinks most subjects would be suitable, she was sceptical about the use of digital storytelling in Maths.

> I think that, probably, the Art lent itself very well, because there is a lot of freedom with topics. I also think subjects like Social Studies and Humanities would do well, even History, which probably fits in there could probably lend itself very well. I am not sure about Maths. Even English, I'd say lends itself, would lend itself very well as well, and for primary school, the integrated topics that would also work really well with that. I am a bit baffled how Maths could use it. I am sure they could use it in most subjects. But I'd say those ones would be the strongest ones for digital storytelling. (Art teacher)

The Science teacher was happy with digital storytelling in Science. She also thought Social Sciences could be integrated easily.

> I think it was very suitable for this subject, Science. It was very suitable and for the topic I chose as well. For Earth Science, they were studying tectonic plates. So it was incredibly suited into this talk. I think it would be also suitable for subjects like Art, English, and Humanities. In my opinion they are probably the best subjects that it will work for. (Science teacher)

From a different perspective the VCAL teacher said that digital storytelling has to be used with less-engaging and more difficult subjects. However, she did not comment on the

feasibility of the matter. She thinks that with the use of digital storytelling, these challenging subjects can be made easier and more enjoyable.

> I think that every subject can make good use of this digital storytelling. Definitely, but I think that, my personal opinion is that subjects that are perhaps difficult for students, they are not as engaging such as, I don't know maybe this is my own experience, Maths. My experience, it requires so many formulas and there is a correct and there is a right answer. There is a process and then there is a right answer. Whereas with English, Humanities and subjects like that it is more open-ended. So I think that this could be used in subjects such as Maths such as Science. Because I know that a lot of students, nowadays, they are very visual, they are visual learners. And I think that when it is there, especially for subjects that they are not really interested in, that will engage them and ultimately, they will learn. (VCAL teacher)

- **Skills that can be improved using digital storytelling**

The ideas of teachers were taken on the fact that which skills can be empowered with the use of digital storytelling in classrooms. The Art teacher thinks that, much like art, digital story gives them the opportunity to express themselves in a different manner. So it effectively increases their communication skills.

> I think for the students that find, perhaps, writing an essay or expressing themselves like in a written form difficult, this can really help them succeed. This, having the opportunity to, say, tell a story visually, I noticed in class, those kids who couldn't write it as an essay could definitely put together a story and get their message across. … Because it is a different way of saying something, it teaches them you don't need to, not everything has to be written down. Things can be told in a different way. So I think that for those kids, I think it works very well for them. (Art teacher)

Science teacher views digital storytelling as an all-round skill development tool. According to her, the use of digital storytelling can reinforce various skills.

> I think it is based on cross-curriculum, it can extend different skills. It can extend English skills, grammar skills, it can extend your art skills, creativity, creative thinking. So these are all the main skills I think and also organisation as well. I

> think it can improve organisation because there is a narration based on digital story and how you organise that will help them develop the organisation skill. (Science teacher).

The VCAL teacher focused on the technology use perspective. She said that with digital storytelling, not only students but also teachers had the opportunity to improve their technological skills. This includes the use of electronic devices such as a personal computer, camera and/or recorder.

> I think that digital storytelling improves general use of technology, improves it. Even for us, of course, the more we use something the more practice we have of something, the better we get at it. And I think that's not only for, because your question is that how could it improve students and why? Which skills it improves? Better use of technology, and that doesn't only mean software on a pc, but that means cameras, recorders, ipad: all of these things. All of the technology that's used there and they are exposed to. (VCAL teacher)

- **Summary**

In sum, it is evident from teachers' reflections that they had a positive and optimistic attitude towards digital storytelling and its use in the classroom. They appreciated the idea that digital storytelling combines teaching with technological tools. They are of the opinion that students feel more comfortable with technology and this contributes to their performance in class and, in return, their learning skills. As expected, all of the teachers are willing to use digital storytelling in their classes in future.

Chapter 6: Cross-Case Analysis

6.1 Introduction

Individual case studies using mixed methods constitute the body of this research. Initial data for this study were collected through observations, the evaluation rubric, and teacher interviews. Five separate case reports have been explained above in detail. The case reports provide various experiences that aim to answer the research questions, and a cross-case matrix was developed for each research question. The intent of the study was not comparative, due to the fact that it was conducted in a single school and all five practice case studies pertain to different educational levels such as Years 3/4 in primary school and Year 11 in secondary school. In addition, the approach assumed in the implementation of this research was dependent on teachers. Therefore, in one class students worked autonomously, while in others they worked in groups.

Considering all the above parameters, the main focus of the research was not to perform a comparative analysis, but rather to evaluate the effects of digital storytelling on education. The intent was to capture the benefits of using digital storytelling to explore student engagement and outcomes, as well as teacher experience with digital storytelling.

6.2 Cross-case analysis of observation data

In the next section, the findings of cross-case analysis of observation data are presented.

6.2.1 Class collaboration

Cook & Friend (1995) define collaboration as a form of interaction between at least two equal parties who voluntarily engage in making decisions on a shared platform, while working towards a common goal. Collaboration is considered to be a crucial skill for young pupils since research has established that working in pairs or small groups can have beneficial

effects on learning and development. Furthermore, this collaborative learning can be supported with technology (Benford et al., 2000), as long as it is designed to remain inside the boundaries intended for reinforcing education (O'Malley, 1992).

Cross-case analysis for class collaboration yielded similar results to previous research performed by Sadik (2008). Despite the fact that no student had experience in multimedia authoring or its tools, students with technical skills performed more collaboration and communication. They did more work while directly using help applications and digital resources, such as the internet and/or libraries, instead of conventional printed media such as books. Furthermore, students were able to develop and improve their technical skills while planning their activities and projecting their ideas into the digital world. Specific consideration for class collaboration is given below in association with Figure 6.1.

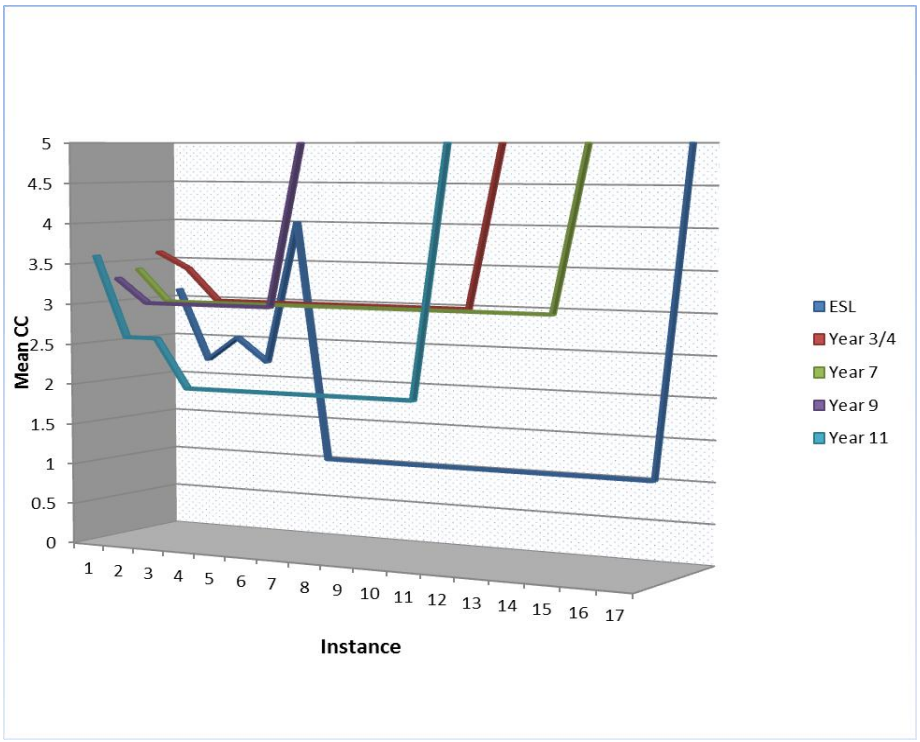

Figure 6.1 Class collaboration for the five case studies

As Figure 6.1 shows, the ESL class shows a high collaboration only in the beginning and at the end. This is due to the fact that students had different levels of language knowledge and their teacher asked them to work individually. Unlike other cases, this case had low class

collaboration in general. The collaboration level was high when the teacher was explaining the software and the tasks in the beginning and when the students showcased their work at the end. Years 3/4 follow the same pattern as ESL. The only difference is the students worked in groups rather than individually. This contributed to the level of class collaboration throughout the case study. Year 7 is very similar to Years 3/4.

However, in Year 7 collaboration was also observed where different groups helped each other in technical or grammar issues. This increased the level of communication in the class and sometimes led to loss of behavioural problems. Year 9 and Year 11 also followed the same pattern, where class collaboration was high during the teacher's briefing and during the students' presentation. Year 11 especially had poor class collaboration, where the teacher had to work with one group all the time, while the other group had to work on its own.

Therefore, when used in long-term projects, digital storytelling could increase students' collaboration and communication skills. This is supported by the findings of this research, as students constantly helped each other in solving problems and developing ideas.

6.2.2 Knowledge gain

Knowledge gain can be observed in three different forms. The first is 'Receipt of knowledge' which includes unassisted work, lectures, worksheets and questions. The second form is 'Applied procedural knowledge' where skill building and performance exist. It may be interactive or performed in front of a group. 'Knowledge construction' includes comprehension building, knowledge generation, inventing, pre-writing activities, clarifying questions, collaborative activities, problem solving, co-construction of meaning, organising and revising (WestEd, 2002). Figure 6.2 shows the distribution of these forms of knowledge gain for the five cases.

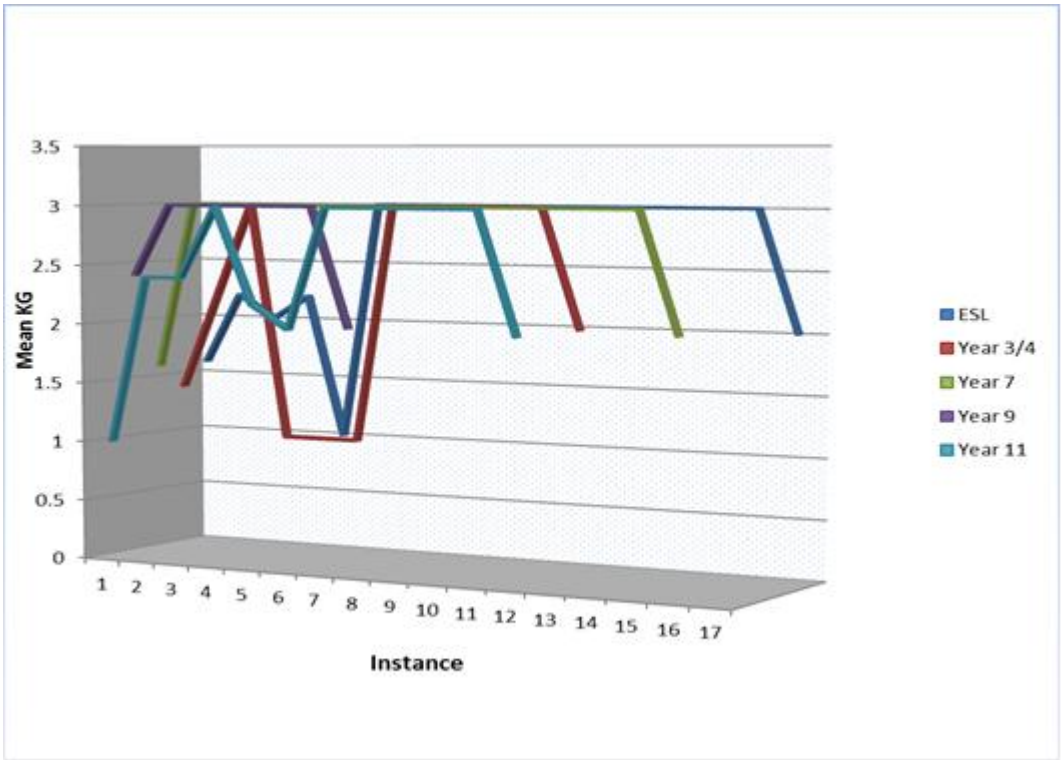

Figure 6.2 Knowledge gain for the five case studies

As Figure 6.2 shows, for all the cases the dominant type of learning was knowledge construction. Receipt of knowledge, applied procedural knowledge and knowledge construction co-existed for a certain amount of instances in the beginning, where teachers introduced digital storytelling and associated tasks. Once the students started working on their own, they constructed knowledge and software usage and digital story creation. The final instance which is the presentation of the final works contributed to applied procedural knowledge gain.

6.2.3 Student roles

Education theories developed in the 20th century consider teaching and learning more than mere interaction or transmission of knowledge (Daniels, 2001; Vygotsky, 1978; Wells, 1999). These theories consider teaching as a specific paradigm of teacher–student interaction, where the desired role of the adult is a collaborator and/or co-constructor. The learner's active position is strongly emphasised as it is indispensable for the development of lifelong

learning skills (Verenikina, 2008). The zone of proximal development (ZPD), developed by these researchers (Wells, 1999), is defined as the distance between what a student can do with and without help (Vygotsky, 1978). The main focus of the ZPD theory is to ensuring that students are actively engaged in learning, which will make them self-directed, lifelong learners in the long run. In this fashion teaching becomes co-construction of knowledge between the learner and the teacher. It also facilitates further transformation of that knowledge into individual knowledge of the student (Verenikina, 2008). Figure 6.3 shows that for all cases the use of digital storytelling ensured that this important teaching approach (i.e. co-construction) was utilised.

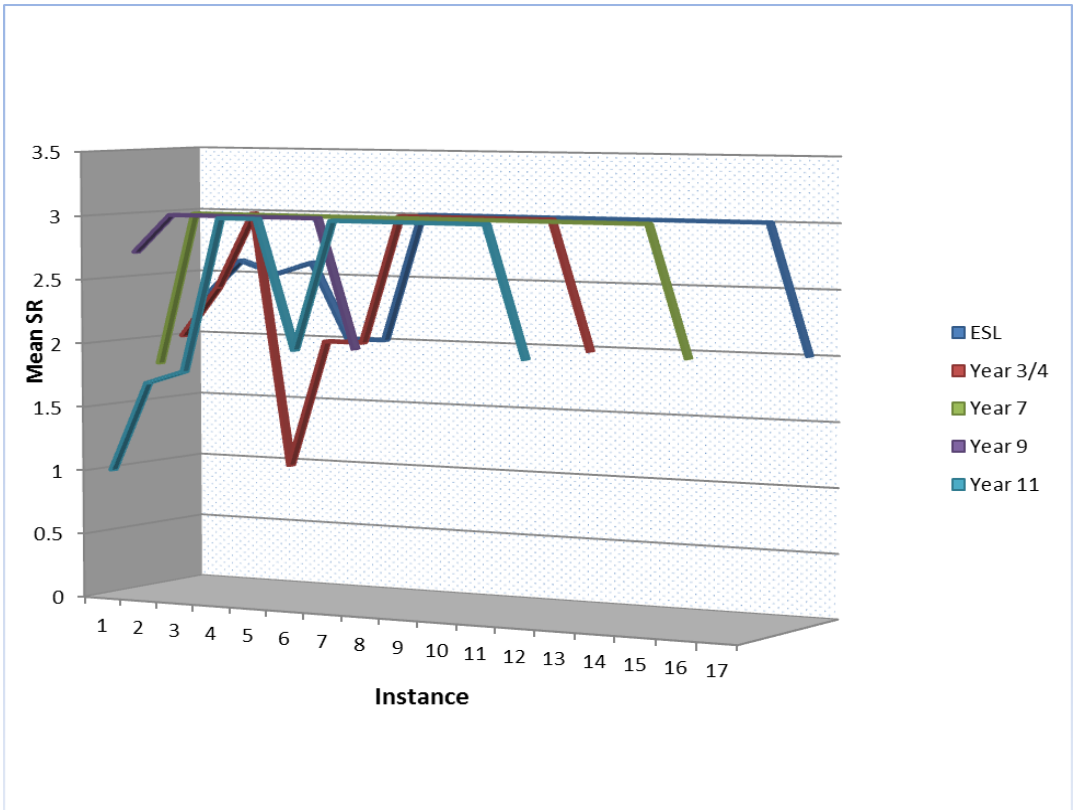

Figure 6.3 Student roles for the five case studies

As Figure 6.3 shows, in almost all cases, student roles initiate a dialogue with the teacher and co-construct meaning from the activity. In the beginning, a mixed student role was observed which included active response and co-construct meaning. Once the students started working on their own, the dominant student role was co-construct meaning. In some

cases, a different pattern was observed. For instance, in Years 3/4 the teacher opted to give software training to the students. During this time the students were mainly passive and listening to the teacher. On the other hand, in Year 11 one of the two groups was not working seriously. The teacher had to support them throughout and the student role can be classified as passive/little response.

6.2.4 Teacher roles

Figure 6.4 shows that the teacher role, in most cases, was to facilitate and scaffold the learning process. In the beginning, teachers led the class as they needed to explain the tasks, the software and digital storytelling. Once the students had the basic information and started working on their own, the dominant teacher role was facilitating/scaffolding learning. In some cases, a different pattern was observed. For instance, in Years 3/4 the teacher opted to give software training to the students. During this time she had an additional period where she was directly leading the class. On the other hand, in Year 11 the teacher had to support one group and lead them throughout the project. Thus she was leading one group while facilitating learning for the other.

Scaffolding can be described as the continuous support provided to a learner by an expert (Puntambekar, 2009). More specifically, scaffolding has been defined by Wood, Bruner, and Ross (1976) as the "adult [teacher] controlling those elements of the task that are essentially beyond the learner's capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence" (p. 90). The founder of this notion, Vygotsky, is the first to highlight the role of social learning in cognitive development. He further stated that such an approach enables the learning process to occur in a child's ZPD.

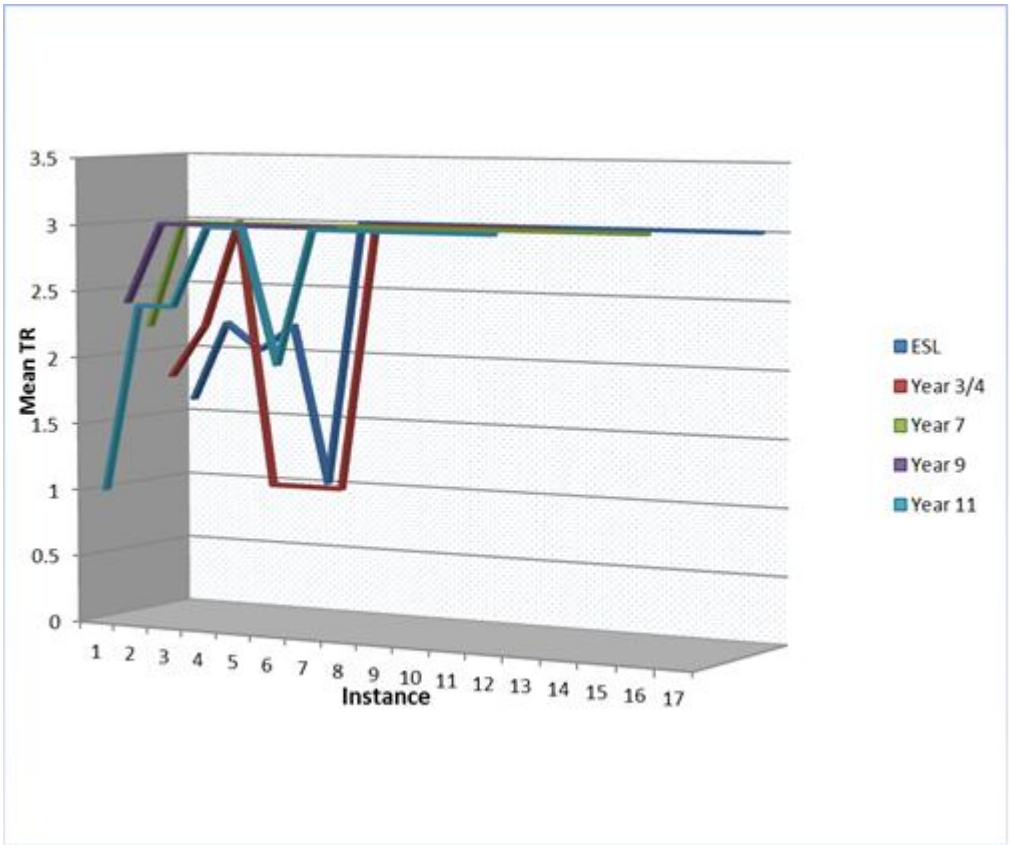

Figure 6.4 Teacher roles for the five case studies

The role of the adult (i.e. teacher) in scaffolding is one of the most critical aspects. The teacher is required to be highly knowledgeable about the content of instruction. Moreover he/she should act as a facilitator with the skills, strategies and processes associated with teaching. In addition to providing necessary support, the teacher assists learners in modelling, by highlighting the critical features of the task, and providing hints and/or questions to help learners ponder on the task (Dewey, 2007; Vygotsky, 1978; Wood, et al., 1976). Thus, in this approach and in the current study, the teacher's role has perceptual, cognitive and effective components (Stone, 1998).

The final and vital feature of scaffolding is the gradual reduction in support provided to students so as to enable them to take control of their own learning. As Rogoff (1990) puts it, the best scaffolding eventually leads learners to internalise the processes they are being helped to accomplish (Rogoff, 1990). In the original description by Wood and colleagues (1976), the responsibility is transferred to the learner, so the learner not only accomplishes a

task but also abstracts how to accomplish other tasks in future. The current study caters for all these benefits as the dominant teachers' role for all cases is scaffolding the learning task.

6.2.5 Student engagement

Learner engagement, otherwise known as student engagement, is considered to be one of the aspects of Learning Criteria for 21st Century Learners (The International Center for Leadership in Education, 2009). It can be defined as students' effort, investment, and strategies for learning, the work students do, and the ways students go about their work (Yazzie-Mintz, 2007)

Although student engagement is not the only objective of education, it is an essential part of overall student achievement and school success. Students are more likely to enjoy learning tasks if they retain and apply what they have learned (The International Center for Leadership in Education, 2009). According to Kuh (2003), student engagement is a reliable indicator of teaching and development. It is a building process where the more students work on a subject, the more they tend to learn about that subject. Likewise, the more students practice and get feedback on their work, such as writing, analysing, or problem solving, the more skilled they become.

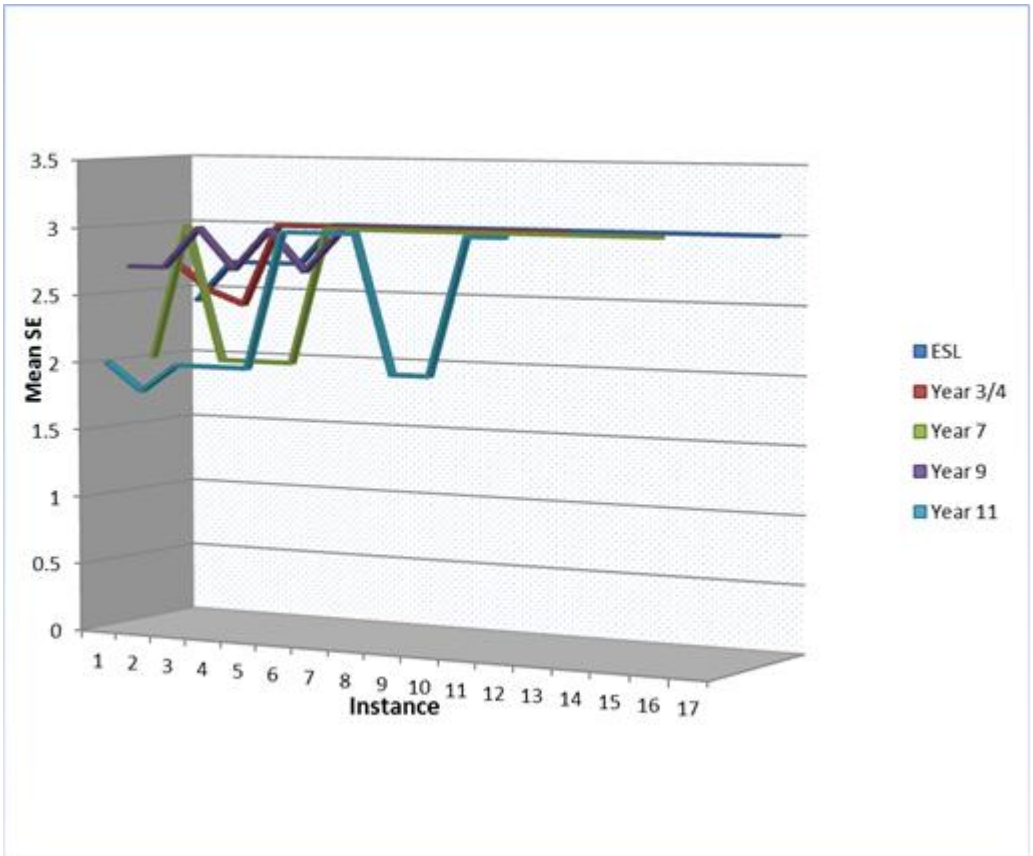

Figure 6.5 Student engagement for the five case studies

Observations of student engagement indicated that students were always engaged with the lesson, where the engagement levels varied between moderate and high. As Figure 6.5 shows, ESL and Years 3/4 students were always engaged in the classroom. Especially when they started using the software and searching for photos and videos, their engagement levels reached an absolute high. They were really engaged during presentations. These trends applied in all cases. The students liked using the technology, searching for materials over the internet and watching peer presentations. Nevertheless, there were different observations made for the remaining three cases. Year 7 students had a hard time getting engaged in the class when they had to finish their storyboard. In Year 9, the students showcased their finished works throughout the study. This proved to boost the engagement level in the class regularly. Finally, in Year 11, some students were not interested in any activity including digital storytelling. Thus their engagement level was low, but when these students started

recording videos of themselves for their story, their engagement levels increased significantly.

6.2.6 Technology integration

Student motivation can be influenced by a variety of factors such as parental involvement, teacher motivation and skills and effective use of technology. An environment where technology is used in innovative ways leads to improved learning and teaching because this creates a motivating classroom environment where student engagement is high (Wishart & Blease, 1999).

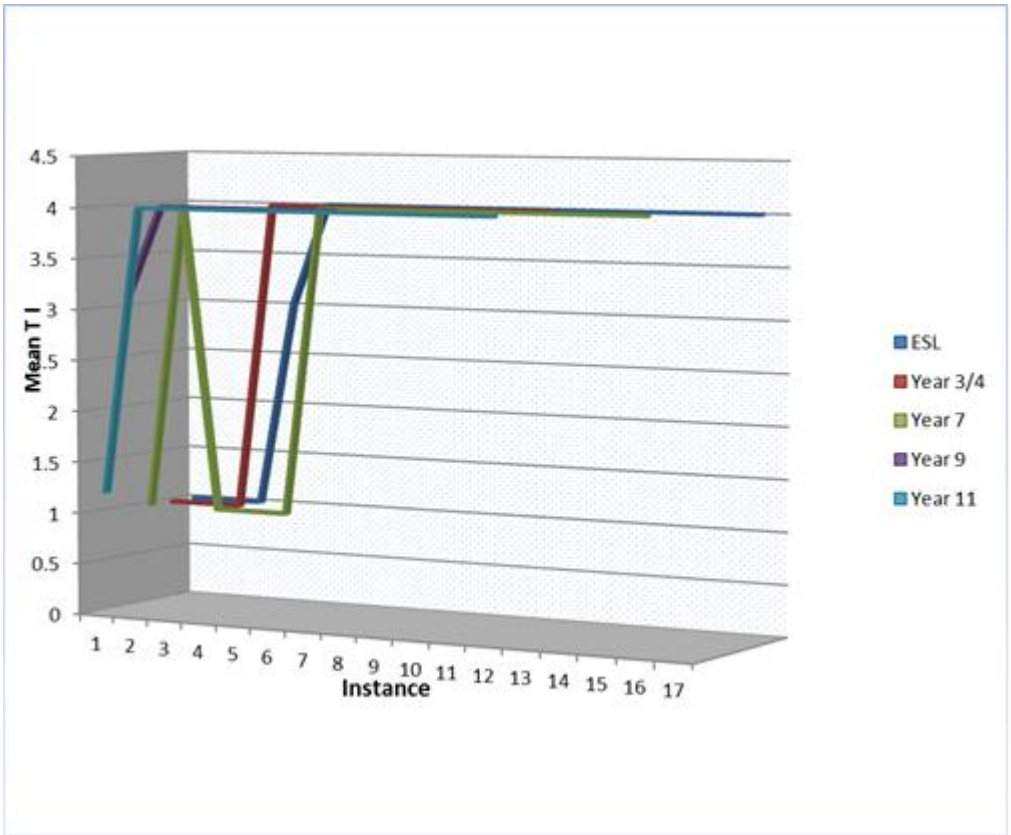

Figure 6.6 Technology integration for the five case studies

Technology is an essential part of digital story telling. Classical teaching methods were only used to inform students about the tasks and the use of software. As Figure 6.6 shows, the main difference between the cases is the duration of this classical teaching period. Primary school pupils (i.e. ESL and Years 3/4) required several instances, while a single instance was

more than enough for secondary school (i.e. Year 7, Year 9 and VCAL students). The rest were technology-integrated in all cases. Based on these findings it can be stated that digital storytelling facilitates the convergence of four student-centred learning strategies: student engagement, reflection for deep learning, project based learning, and the effective integration of technology into instruction (Barrett, 2006).

Moreover, digital storytelling effectively enables students to use technology in their learning tasks. This particularly happens when appropriate digital resources and appropriate editing tools are provided to further motivate them (Sadik, 2006).

6.2.7 Modes of learning

Bouman (2012) defines learning as the acquisition of knowledge or skills through experience, practice, or study or by being taught. He classifies learning under two main headings as follows:

Student-led learning is a process of learning information in which the students ask questions of one another, while they assist each other as peers in discussing the method used to acquire the answers to those questions. Students are allowed to work with one another in a student-centred environment.

Teacher-led learning is currently the most popular form of teaching students. This method involves the teacher holding all the information and sharing it with the students over time.

The most recent works in the literature favour student- over teacher-led learning since it leads to longer retention. This hinges on the fact that when students take a more active role in their learning process, this results in a more meaningful connection to the information (Bouman, 2012).

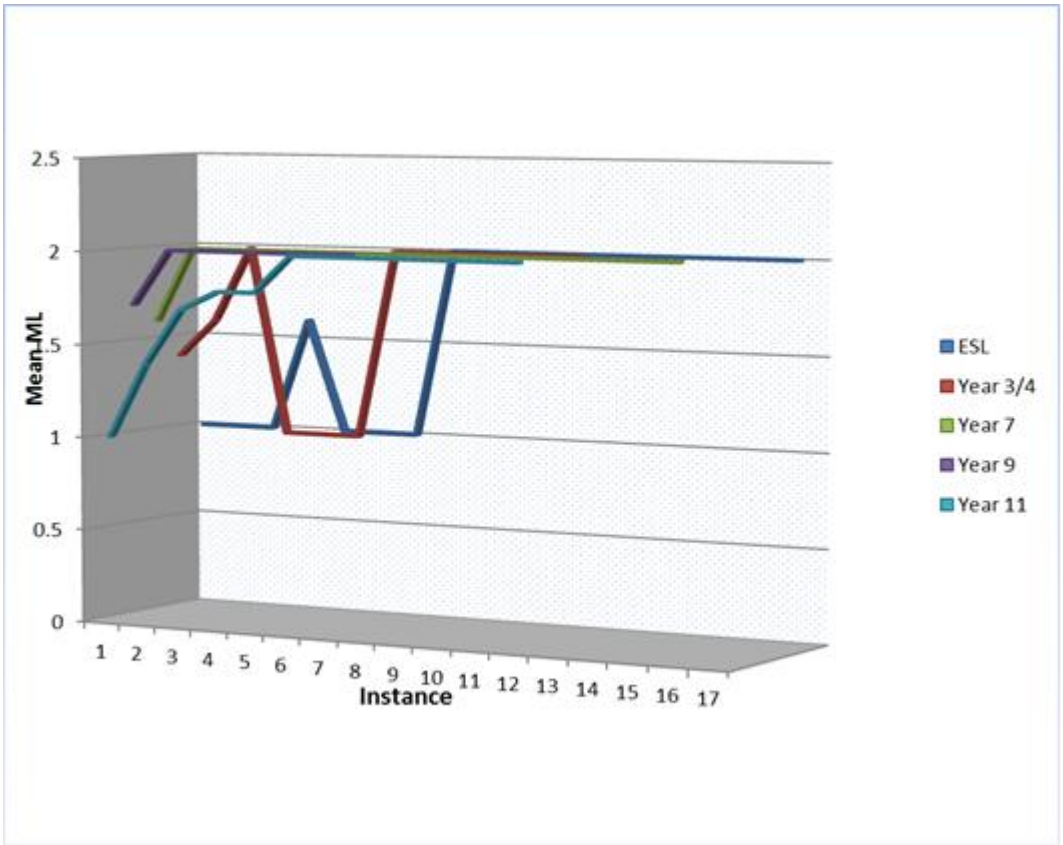

Figure 6.7 Modes of learning for the five case studies

As an overall analysis, and as Figure 6.7 shows, it is safe to say that the teacher-led mode of learning was dominant when the teacher briefed the students. On the other hand, when students reached the appropriate level to work on their own digital story, a student-led mode of learning was observed. Again, the main difference is between primary and secondary school students. Cases performed with primary school students show the ratio of teacher- to student-led instances is higher than that of secondary school students. The latter cohort had the ability to grasp the software rapidly and turn the mode of learning to student led.

The above findings are in agreement with the current literature encouraging the use of student-led learning. As students make more sense of the information they achieve a higher retention rate in their learning. This rate is directly proportional to the meaningful connection; that is, the stronger the bond the more likely students will remember (Bouman, 2012). The

use of digital storytelling helped student-led learning become dominant in the class and students are expected to have higher retention as they become more actively involved.

6.3 Cross-case analysis of rubric data

In the following sections, the findings of the cross-case analysis are presented.

6.3.1 Overall mean level of student scores

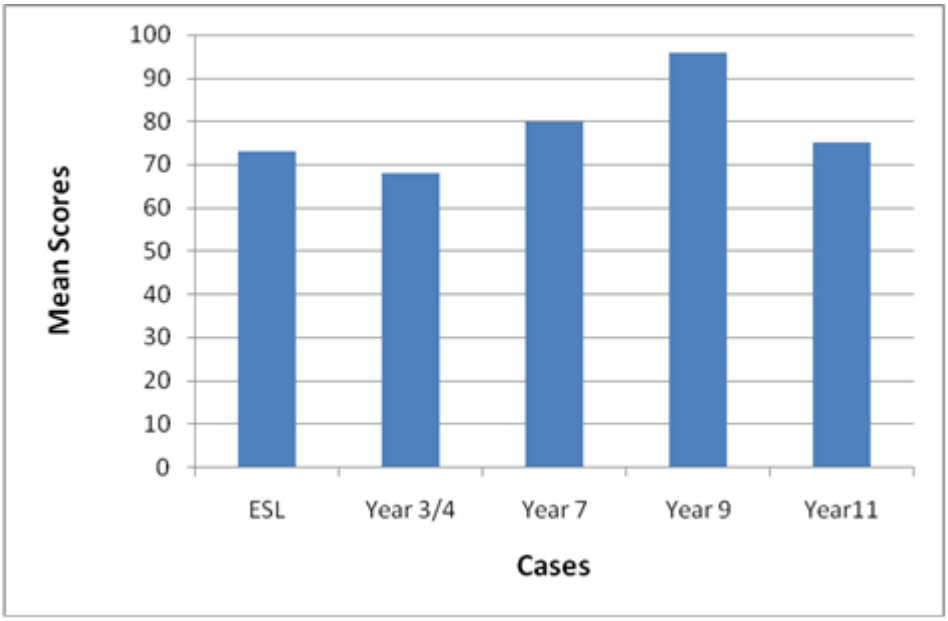

Figure 6.8 Overall scores for digital story quality for the five case studies

Figure 6.8 shows the mean of overall scores received by students for digital story quality for all cases. The overall scores were very close, despite the differences in age, subject, knowledge, technology use, etc. Nevertheless, the students in primary school (i.e. ESL and Years 3/4), received the lowest scores while those in secondary school had much better results. There are two reasons for this. Firstly, primary school students did not have any exposure to Moviemaker software while secondary school students had used it before.

Furthermore, age and ability to learn technological subjects have an impact. When compared with primary school students, secondary school students have the ability to learn faster and learn more. They use the internet and computer more than primary school students. This was apparent during the study where the primary school students only worked on their

stories in the class. On the other hand, secondary school students constantly worked on their stories, both inside and outside class.

It is observed that the subject does not impact student performance. However, the approach taken by the teacher proved to significantly impact students. This was observed in two cases. In Years 3/4, the teacher observed that students were struggling with their writing and opted to introduce software so students had a clear idea about what was required. This increased student performance and they performed well after this additional step.

In Year 7, the teacher asked the students to present their work when it was finished. Consequently, almost every fortnight there was a story presentation in class and this contributed to their engagement and performance.

Year 11, VCAL, students were a special case. There were two groups, one of which was working very well, while the other group was not interested in school. Although digital storytelling created some interest in the second group, especially during video shoots and presentation, it was not possible to engage them with the overall task. They did not work on the story creation, required the constant help of the teacher and received a very low mark.

6.3.2 Overall performance based on evaluation criteria

General analysis shows that primary school students performed well in story aspects such as purpose, plot, pacing of narrative, etc. This is because they planned their storyboard quite efficiently. The key to student success is the fact that they spent more time in writing and editing their story with help from the teacher, before actually starting the creation stage.

However, they did not perform as well in technological components, emotional content and economy of the story. Nor did they perform as effectively in the "Dramatic Question" and "Grammar and Language Usage" since their knowledge of English was limited.

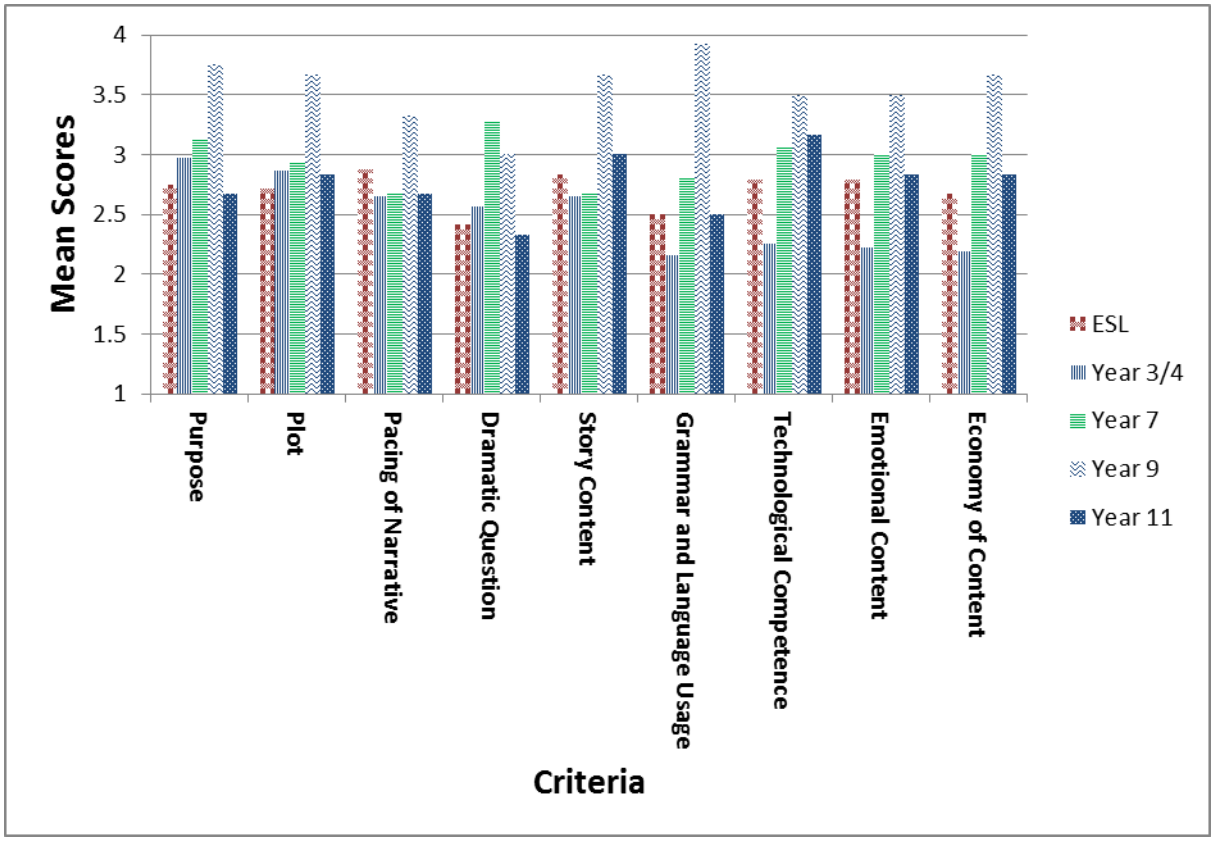

Figure 6.9 Mean score for criteria for the five case studies

On the other hand, secondary school students were a complete contrast. They performed not so well in the story aspects since they did not want to spend much time writing and storyboarding. This affected their scores in "Plot" and "Pacing of Narrative". Their competency in technology helped them receive high marks in technological components such as "Technological Competence", "Emotional Content" and "Economy of content". This can be traced back to their age group and knowledge in technology use.

6.4 Cross-case analysis of teacher interviews

Cross-case analysis of responses given by teachers show all teachers had a positive attitude towards the use of digital storytelling as a teaching tool in their classrooms. They observed increased student engagement in class when technological tools were integrated into teaching with digital storytelling. According to the teachers, this increase in student engagement and the use of technology make students more comfortable in class and this contributed to their

outcomes. This opinion was shared by all participating teachers except the Art teacher, who said that despite increased engagement level there was no evidence for the increase in student outcomes.

On the other hand, teachers who had issues with technological infrastructure were of the view that in order to reap the full benefits of digital storytelling, the educational institution has to provide the necessary ready-to-use technological tools. Thanks to their experience with digital storytelling in the classroom, all teachers expressed their intention to use it in future.

6.5 Summary

In sum, observations of student engagement indicate it was between moderate and high for all cases. This is due to the integration of technology with class content. Some cases, such as primary school, had high student engagement until the very last minutes of each session. Prior knowledge of computer and software contributes to student engagement in secondary school. Briefing on software usage causes students to lose interest in class. Once students fully grasp the software through hands-on experience, engagement increases significantly. In addition, it is also observed that going out of the classroom routine always increases engagement level. For instance, in Year 9, the students had several presentation sessions scattered throughout the case. This refreshed the students and increased their engagement periodically.

Student outcomes vary significantly, whether measured overall or separately for each evaluating teacher. However, there are certain items which are found to affect outcomes. For instance, students in primary school spent more time in completing storyboard creation than the actual creation of digital stories. Therefore, they performed well in story criteria such as ‘Passive Narrative’ and ‘Dramatic Question’. The remaining three cases, in contrast, either did not spend more time in storyboard creation or did not complete it. Therefore, despite pertaining to a higher age group, they scored less in story criteria as compared to students

from primary school. On the other hand, older students had better grasp of ‘English Language Use’ and ‘Technology Competence’. Consequently, they scored better.

Chapter 7: Results and Discussion

7.1 Introduction

In chapters four, five, and six the findings of the research were presented. In chapter four primary school cases (ESL and Years 3/4) were discussed. Chapter five reported on secondary school cases (Years 7, 9, 11), while chapter six included cross-case analysis for the five case studies. In this chapter, the overall findings are discussed with reference to the literature review in chapter 2.

The aim of this research project is to explore the impact of digital storytelling on student engagement and outcomes, exploring the potential of digital storytelling as an innovative teaching and learning approach. This research involves a multi-site case study of an Australian P-12 school. It explores the use of digital storytelling within the primary and secondary curriculum. Students and teachers had the opportunity to engage in innovative learning experiences based on digital storytelling in selected classrooms. Three different methods were utilised for data collection: observation, the evaluation rubric, and teacher interviews. As described in chapter 3, findings have been generated by integrating the results of the three data sets.

In this chapter, the most significant research findings will be addressed. The discussion is structured around the research questions outlined in chapter 3:

- How can digital storytelling be used to enhance student engagement?
- How can digital storytelling be used to improve educational outcomes?
- What are teacher perceptions about student learning through digital storytelling?

7.2 Using digital storytelling to enhance student engagement

The most significant research findings relating to the student engagement are discussed in the following sections.

7.2.1 Enhancing engagement

The findings of this research indicate that levels of student engagement fluctuate between moderate and high in this research. In other words, students were always engaged in the classroom. The use of software and conducting searches for digital media took these levels to an absolute high and mostly reserved for student presentations. In all cases students liked using technology, searching the internet, and watching other digital stories. There were some differences in implementation. For instance, Year 7 students had very low engagement levels when they had to complete their storyboards. Year 9 students had a constant, high level of engagement as they occasionally presented their completed works. Some Year 11 students' lack of interest in school curriculum presented as an engagement problem. However, the use of digital media managed to increase their engagement level. This finding is supported by Dupain and Maguire (2005) who argued that educators continuously need methods to engage students' interest with teaching material. With the aid of the latest developments in technology, classrooms welcome digital storytelling as a means of teaching, and students are motivated to conceive an academic concept and transmit their own.

The above findings are also in agreement with the current literature which encourages this new teaching approach, that is, digital storytelling permits students to utilise technology in an effective manner. Provision of appropriate resources and editing tools paves the way for student motivation and maximises the effect (Morris, 2011; Sadik, 2006). This encourages students to put more effort into their stories and to create quality products which can be shared with others in different media environments.

Focusing their research on the effects of digital storytelling to enhance learning strategies (e.g. student engagement, reflection for deep learning, project-based learning system, and technology integration), Xu, Park and Baek (2011) reported similar findings. Their research showed that overall students were more engaged and enthusiastic in the classroom. More rational findings are reported when the research is discussed from all aspects (i.e. the fact that some students are more engaged with digital storytelling while others are not).

Furthermore, Banaszewski (2005) reported similar enhanced results. In his research, it was found that technology based education engages students more than textbook teaching. In addition to lesson content, technical details, such as video editing and image addition, engage students more. This shows that some students are busy with the script while others are engaged with digital creation.

Yet another result confirming the above findings is reported by Gils (2005). This research showed that pupils are more engaged with the practical environment. Digital storytelling makes practice and training more engaging, diverse, and customised to their needs and challenges, which makes it more realistic. In this sense, it encourages students to focus on using English to communicate with classmates. Digital storytelling has the advantage of engaging three different senses: hands, eyes and ears. It also increases students' technical literacy.

Furthermore, this research found that students enjoyed using technology; and this was apparent in their increased level of engagement while learning the software or conducting video searches; also the presentation of digital stories engaged students until the last minute.

The research conducted by Robin (2008) focused on using digital resources and the internet to search for visual material. This activity kept the students engaged with the software, communicating with other team members, and recording, photo taking and

interviews. Presenting their digital stories to perfection, these students show similar engagement levels with the above findings.

This study found that using different technologies and digital tools on learning and teaching also enhanced student engagement. This is supported by Joseph (2006), who found that digital stories with high digital content could be created by a number of technologies (e.g. iMovie, Moviemaker and Photo Story 3). They can be published over the Web and this combines four different student-centric learning strategies: student engagement, reflection for thorough learning, project-based learning, and effective integration of technology into the education system. In short, using different software to develop digital stories with advanced technology not only helps students increase their engagement level but they can also develop technical and communication skills.

Pierotti (2006) however reported that students prefer using computers and digital tools such as cameras. A very high engagement level is observed when students are searching for photos and videos over the internet. This research states that digital storytelling is about making frozen pictures and photos move in time with Moviemaker software. According to Pierotti (2006) this shows the technical skills developed, not engagement skills.

Furthermore, the findings of this research indicate students had a hard time getting engaged in the class when they had to finish their storyboard; some students were not interested in any school activity including digital storytelling. Therefore they had a low engagement level. However, when these students started recording their own videos, engagement levels increased significantly.

Consequently, it is possible to use digital storytelling to integrate instructional messages with learning activities to create more engaging and exciting learning environments. This teaching approach enhances emotional interest and cognitive attention, and reflects consistent and reliable transfer of knowledge in line with modern learning theories. Considering

Barrett's findings, it can be concluded that digital storytelling combines student engagement and effective integration of technology into instruction, which are student-centred learning strategies (Barrett, 2006).

7.2.2 Fostering collaboration

The findings of this research show that a range of skills have been acquired by the students via the creation of their stories, especially when they work collaboratively and search digital content. More effort was required while using digital resources and applications (e.g. internet and/or libraries, as compared to conventional printed media such as books). Johnson and Johnson (1986) state that reaching a higher level of comprehension and thought as well as conservation of knowledge is supported by collaborative learning more than individual learning. Interaction between groups was also observed when they helped one another with linguistic and technological aspects. This also contributed to an increased level of communication in class.

The above findings are in agreement with Standley (2003) who found that the creation of digital stories encourages collaboration between students, which in turn leads to the utilisation of various capabilities. Moreover, when working in a group, individuals pay more attention to content.

In addition, VanderArk and Schneider's (2012) findings are similar to this research. According to them, the digital learning experience can promote collaborative studying and encourages students to share resources online. Moreover, digital learning also inspires students to form networks. As digital content forms the network and inspires students to share resources, it can be proved that digital content can improve the level of collaboration and increase resource sharing. Furthermore, digital content also ensures that different groups are helping each other, as networked digital content connects the whole class.

In accordance with Tech4Learning (2007), most of the powers of digital storytelling are generated from teamwork and collaboration in the classroom. Digital storytelling creates a collaborative environment in which students engage actively and participate fluently. They can also exchange their ideas. In this way, they are not only reaching their goals, but also helping others to reach theirs as well. For this reason, it can be said that class collaboration provided by digital storytelling offers the opportunity for students to enhance cooperation, collaboration and engagement.

These findings are in agreement with Hung, Hwand and Huang (2012); they found that digital storytelling instils confidence between group members. Through personal interactions, individuals improve their performance due to peer-supervision and reflection. Their skills are also enhanced by using databases and internet sources. The above researchers also concluded that digital storytelling based on technology is more effective than traditional teaching approaches.

In contrast, the research conducted by Banaszewski (2005) was not in favour of project based teaching. He found that intelligent tutoring system assists students in language skills, such as grammar and vocabulary, while story station supports writing skills. However, most of the effort directed towards creation of digital storytelling and technology does not equip students with future skills. While the real target in storytelling is developing good communication, digital storytelling focuses on technical skills.

Signes (2010) found that digital storytelling skills emancipate communication skills online and face-to-face. This supports the findings of our research. Digital story equips students with problem solving abilities, higher communication levels working in a group and better interpersonal skills. Therefore, suffice to say that digital storytelling improves technical, communication and linguistic skills simultaneously. Supporting this view, Robin (2008) stated that students who participate in digital storytelling projects have better

communication, organisational skills, and more confidence in terms of asking questions and expressing opinions.

As a result, this research implies that digital storytelling can increase collaboration and communication skills in students, if it is used in longitudinal studies. The fact that students always helped one another in problem solution and concept development reinforces this idea. Cooperation and collaboration levels are increased with digital storytelling, and therefore students have a higher engagement level when they are working in groups to create story.

7.2.3 Transforming learning

This research indicates that digital storytelling is suitable for a constructive approach to learning; students work on their own story after receiving basic instructions from the teacher. Students have their own individual approach based on their interactions and experiences and generate a novel perception by using different sources in their creation of digital story. These findings are supported by other researchers, such as Garrard (2011), who observed that digital storytelling supports constructivist learning and concluded that digital storytelling is a good method of teaching with positive impacts.

In addition, the findings of research conducted by Normann (2011) concur with this research. He concluded that digital storytelling is a perfect way of learning new things and to implement constructive approaches to education. Upon performing data collection and data analysis, he reported that the method of conducting lessons impacted the students' approach to learning activities. Teachers are the main players: they talk about project topics and software use. Students then create and present their own personalised digital stories. This, according to Normann (2011), is the most effective learning method.

Banaszewski (2005) stated in his thesis work focusing on digital storytelling that learners build knowledge, not teachers. The students increase their knowledge base when

they are engaged in a new external idea and construct it. The challenge is that rarely do students work from their own interests when doing an assignment.

Xu, Park and Baek (2011) reported findings that support the above view. They found that most teachers in educational institutions, from K-12 to higher education, plan to use technology in the classroom. Teachers direct students toward digital storytelling whereas the content is solely based on the students' interests or ideas. This makes technology a golden tool, where teachers brief students and students use the latest technology, story script and their own ideas to come up with the storyline.

The constructivist approach has several perspectives on learning since it recognises that human beings use their own personal vision in explaining the acquired information (Duffy, Lowyck & Jonassen, 2012). This can be supported by teachers in our study who believe that digital storytelling permits students to learn by doing, and by providing a flexible learning environment, this enables them to use their own personal skills.

In addition, the findings from this research indicate that facilitating or scaffolding the learning process is the main teacher role. At the beginning, tasks, software and digital storytelling are explained by the teacher which requires a teacher-led mode. Following this step, students have the necessary knowledge from which to start working autonomously with teacher supported learning.

Signes's (2010) research has the exact same result. He held the position that teachers should be limited to facilitating the discussion on themes presented in the story, while actual story development is carried out by the students, once they have received the idea from their teacher. The teachers' role is restricted to explaining digital story, the utilisation of technology in creating a digital story and implementation of storytelling. After receiving the foundation from the teacher, students work to build their story.

Robin (2008), who has a similar outlook on digital storytelling, found that a story created by the teacher will help students to enhance their abilities. The teacher thus builds the framework for discussing storytelling topics and makes conceptual and / or abstract subjects more comprehensible. Building on experience and knowledge with teacher support, students create their own story using iMovie and/or Moviemaker. Thus students improve their skill set with teacher support in project development.

There is significant support from Miller (2009) regarding this discussion. . Miller conducted interviews and surveys in high schools and colleges and stated that teachers act as an interface between students and digital story creation. They brief the students about fundamental concepts regarding storytelling. After receiving this support, students create and present their digital projects. Miller further reported that students imitate interactions with their teacher and use these interactions to help others, thus building their interpersonal skills and confidence.

The above findings can be verified by researchers such as Ross (2011) who argued that the implementation of the digital storytelling concept in learning means the student is the learner while the teacher is merely a facilitator. Tendero (2006) expressed that students focused on their teaching experience during field placement and produced a digital story based on this experience. It was possible for students to showcase works to their peers via reflection and classroom footage. This enabled teacher assistants to observe themselves as teachers. This may significantly impact their future careers in terms of digital storytelling, mentoring and handling the challenging teaching environment.

These findings suggest that teachers are glad to see that digital storytelling supports learning by doing. Students used their experiences and interactions to create their own interpretation and new understanding with digital story. This finding is in absolute agreement with the research outcomes of Freidus and Hlubinka (2002). According to them, teachers

working in first world countries prefer students to practice digital storytelling. Digital storytelling is performed by using the latest technology and teachers support students in a myriad of ways, such as social, inter-school interaction and communication as well as storytelling abilities. From this support students have the ability to create enjoyable stories (Freidus & Hlubinka, 2002).

Furthermore, research conducted by Miller (2009) agrees with the above findings. She argued that gaining experience in a field is only possible through learning by doing. The more stories they create, the better students will become in digital story creation. Creation of digital storytelling encourages students to communicate with their classmates and share ideas about how to improve story. They can also opt to work on a subject unknown to them and learn through story creation.

Czarnecki's (2009) research supports these findings as well. She stated that teacher interviews show there is constant talk among teachers about using storytelling in class, so students can learn technical knowledge and practice communication skills. In this way, they can acquire more experience and use storytelling in different fields (Czarnecki, 2009).

7.2.4 Building digital literacy

This research indicates that the utilisation of digital storytelling in education increases skills. Teachers witnessed that digital storytelling via technology integration assisted students and helped them overcome their problems. As supported by Ohler (2008), who viewed digital storytelling as a concept supporting creativity, students could solve crucial problems in unprecedented ways. Furthermore, teachers viewed digital storytelling as a valuable tool to increase research skills. A myriad of skills, such as spelling, writing, teamwork or collaborating with students and teachers, can be improved. Needless to say, the uptake of technology improves technical skills.

Miyaji (2010) confirmed this finding with a study on digital storytelling at university level. The qualitative data were collected with teacher and student interviews as well as experimental class observations. Miyaji concluded that digital storytelling helped university students improve their writing skills and technology proficiency as well as problem solving abilities. Three factors which showed the highest increase were: evaluating and creating cooperatively, clarifying problems and expressing opinions and interest in computers and technical skills in using computers.

Sadik (2008) arrived at a different conclusion in his research, where classroom observations and interviews showed that the use of technology is only effective if teachers have the expertise to customise for story creation.

In addition, the findings of teacher interviews indicate that digital storytelling is a golden tool to help students improve their technical skills and information literacy. Students have the opportunity to choose the skill they want to work on and improve it. This may include individual skills, such as spelling and writing, as well as interpersonal skills such as working in a team or collaborating with students and teachers. According to Yang and Wu (2012), teachers and students appreciated digital storytelling as an education tool as it increased enthusiasm, motivation in students and improved their analytical and technical skills.

Miller (2009) also found that in every class engaged in digital storytelling, one student always acted like a tutor. This student not only worked on the project, but also provided technical support to peers in terms of developing their stories. In this sense, students empower their strongest skills and improve them. Their research skills are also empowering during video searches, scanning images and selecting audio content for the story.

Furthermore, Wake (2012) had similar conclusions. His study focused on the use of digital storytelling in two rural areas with middle school students. Particularly, Wake studied

the positive effects of digital storytelling on students. He stated that it was easy to implement it in a classroom and students worked in groups to create a story about their view on rural towns. Definitely teamwork was emphasised, and interpersonal skills were developed through communication with peers and teachers.

Also, the findings indicated that teachers believe that the use of stories in education is very beneficial for countries receiving immigrants, such as Australia, because digital story incorporates all aspects of curriculum and all teachers should use this medium at some stage. One teacher commented on the school where they work with many students from non-English-speaking countries. The ability to express themselves through visual media, rather than words, facilitates communication for new students and builds confidence. These finding were supported by Benmayor (2008) who stated that digital storytelling can help learners to transfer their knowledge, skills and culture, thereby evolving their thinking process and helping them gain confidence. Accordingly, digital storytelling can be classified as an asset based pedagogy.

Signes (2010) conducted research on the practical uses of digital storytelling and the results matched our findings. Students reviewed patterns and correct pronunciation, which was the easiest approach for non-English speaking countries. They read out loud, recorded and shared over the internet. This was a good opportunity for self-expression and to build confidence for newcomers.

Another research study conducted at the University of Ploiesti, Romania by Cristina and Mihaela (2011) reported similar findings. They observed that digital storytelling is the most reliable approach to teaching English to young learners and kids. Listening and speaking skills are improved with storytelling. Students from non-English speaking backgrounds were taught integrated skills and this method enhanced their levels of communication and confidence.

Additionally, the findings ofteacher interviews indicated that, with digital storytelling, not only students but also teachers had the opportunity to improve their technological skills. This included the use of electronic devices such as personal computers, cameras and recorders.

Miller (2009) reported similar findings. She stated that digital storytelling is the best application for teachers to encourage students to increase their use and knowledge of technology and technical skills. Furthermore, in order to create these stories, not only the students but also the teachers are obliged to increase their technical proficiency (personal computers, digital cameras, recorders, etc.) This helped teachers keep up with the latest technology.

In contrast, Dogan & Robin (2008) reported a different outcome. Although middle school and high school teachers received training in digital storytelling and were well informed; less than half implemented storytelling.

7.2.5 Personalising the learning experience

The findings of this research indicate that digital storytelling can provide more diversity by personalising student's experience. It can help them improve their confidence, and contribute to social and psychological skills. It can also be used to support students with special needs such as ESL and VCAL students.

These findings are in line with other research outcomes. Van Gils (2005) found that personalised education is one of the main advantages of digital storytelling. He argued that learners can present their experiences, reflections and evaluate their achievements while creating digital stories. According to Ohler (2006), digital storytelling helped students to become active participants rather than passive consumers of information.

Academic efforts that focus on the benefits of digital storytelling are supported by government agencies. Several governing and regulatory authorities have been working on

improving the education system in terms of motivation, learning outcomes and professional integration. For instance, the Australian Curriculum in Victoria (AusVELS) was specifically designed to ensure that curriculum content and achievement standards established high expectations for all students (AusVELS, 2013). According to AusVELS each students is expected to enrich the learning experience, not only in a single aspect of the curriculum, but in all areas. It is known that students in Australian classrooms have varying needs based on individual's learning histories, abilities, cultural and educational backgrounds. In recognition of this fact, the Australian Curriculum Assessment and Reporting Authority (ACARA) is developing additional curriculum to promote learning outcomes of students with disabilities and/or to assist students from different linguistic and learning backgrounds (ACARA, 2013).

The Department of Education and Early Childhood Development in Victoria (2013) stated that utilisation of digital learning can enhance the education experience for both teachers and students. When used for a clear objective, technology assists students in improving their learning outcomes. In light of this finding, digital storytelling holds a key position in tackling the abovementioned diverse background and student profile in Australian schools.

This fact is recognised by the UNESCO program for the United Nations Decade of Education for Sustainable Development. It considers storytelling to be one of the modules which can be used to equip students with professional learning and teaching skills. This helps students achieve a wide range of knowledge, skills and values, which is the objective of Education for Sustainable Development (UNESCO, 2010). The use of storytelling in Australian schools is bound to have a lasting impact, since it is defined by UNESCO (2010) as "a key teaching strategy for achieving the objectives of education for sustainable futures" (p.1).

Consequently, suffice to say that digital storytelling has, inter alia, the benefit of increasing student motivation, especially for those students who have difficulties with reading and writing, allowing personalisation of the learning experience, acquiring experience with in-depth and comprehensible reading and becoming more proficient at technical aspects of language. Digital storytelling can be used to develop personalised learning experiences for students, thereby responding to diverse individual needs.

7.3 The impact of digital storytelling on student outcomes

As mentioned in chapter 4, in addition to classroom observations, a scoring rubric has been used by teachers to assess the quality of digital stories. This stage had two different aims: to assess the level of student engagement and document the provision of better education outcomes through digital storytelling. The level of engagement is a quantity that can be measured with the help of a scoring rubric.

The evaluation rubric included nine criteria; in conjunction with the eLDiSt framework, these criteria have been classified in the eLDiSt framework under four different categories (see 7.3.1 below). The rubric has been used to collect the data while the eLDiSt framework was used to interpret the meaning of the data.

7.3.1 The e-Learning Digital Storytelling (eLDiSt) framework

As mentioned in the literature review, the eLDiSt framework comprises a number of Digital Storytelling Aspects (DSAs); which are divided into four categories: Story Aspects (SA), Learning Aspects (LA), Digital Creation Aspects (DCA) and Combined Aspects (CA).

The discussion will pass on the main findings related to framework aspects in order to understand the difficulties and challenges students faced when they created their digital stories; these findings will be used to finalise the eLDiSt framework.

7.3.1.1 Story aspects

Story aspects for an engaged story are outlined in chapter two. These aspects are related to the structure of the story and the methodology used to create it. These include: plot, pacing of narrative, the dramatic question, story characters and emotional content.

The findings of this research indicate primary school students performed well in story aspects such as purpose, plot, pacing of the narrative, etc. The majority had planned their storyboard quite efficiently. The key to student success is the fact that students spent more time writing and editing their story with help from the teacher, before the creation stage. As a result they received high marks for "Pacing of Narrative" and "Plot" criteria. The teacher also helped students use suitable vocabulary and correct grammar in their stories, despite their weakness in English. However, students did not perform as effectively in the "Dramatic Question" criterion, since some of them were not able to clearly state the main point that contributed to the overall meaning of the story. This caused the stories to lack a striking "Dramatic Question" conveyed through digital story.

In agreement with our findings, Bull & Kajder (2004) found that students needed to write an initial script, and plan an accompanying storyboard before starting the digital story creation. Also Garrard (2011) pointed out that to balance the audio visual content with the narrative layers of the story, the storyteller needed to create a storyboard.

On the other hand, secondary school students were a complete contrast. They performed not so well in story aspects since they did not want to spend much time on writing the storyboard. This affected their scores in "Plot" and "Pacing of Narrative". Nevertheless, they passed "Purpose" and "Technological Competence" with flying colours. They had camaraderie and helped each other.

Similar findings have been mentioned by Sadik (2008), who found that when it comes to the organisation of the story, planning and storyboarding almost always occurred: scenes

varied in length and the unchanging behaviour of the pace could be distracting in some instances. While scenes had the same elements, some stories lacked beginning, middle or end.

The findings of this research mirror the viewpoint of Garrard (2011), who reported that the storyboarding process helped students work independently, by providing them with the necessary 'scaffolding'.

7.3.1.2 Learning aspects

Learning aspects relate to what is expected to be achieved through the story, in terms of learning outcomes, and the complexity of the language used to present the story, which includes purpose and language usage.

The findings of this research indicate primary school students scored average in "Purpose" and "Grammar and Language Usage" criteria. However, ESL students did not perform as effectively in grammar and language usage since their knowledge of English was limited. On the other hand, secondary school students passed "Purpose" and "Grammar and Language Usage" with good marks due to their proficiency in English.

According to Lambert (2007) it was imperative to identify the purpose of the story so that all parts contributed. The grammar and vocabulary used in the story can be anything from simple to complex.

7.3.1.3 Digital creation aspects

Digital creation aspects are linked to elements and the technology that is used to create and present the story, and these include story content, technological competence, production and presentation.

The findings of this research show that in terms of technological components, primary school students did not perform well while secondary school students had high scores. Their technical literacy helped them, which is directly related to their age group. The technological

competence is associated with the complexity of technology needed to create story. The risk here is that many students are more focused on the technology than the actual story. For this reason, sometimes the final product can be a good quality technical piece instead of a story with a clear message. Therefore, it is suggested to start with the story structure before considering the technological aspects (Ohler, 2006).

Sadik (2008) reported similar findings where it was observed that students used Photo Story software in a creative fashion. The biggest challenge for students proved to be synchronisation between audio and photos. Most stories had sound problems where the sound was either not audible or inappropriate for the visual content.

7.3.1.4 Combined aspects

Combined aspects are linked to economy and quality of digital storytelling elements. Considering these aspects, a good story should be told as simply as possible without excess content and the quality of the story should always be evaluated (Ohler, 2008). Combined aspects include economy of content and evaluation.

Similar to digital creation aspects the findings of this research indicate that because of their age and knowledge in computers and the internet, secondary school students received good scores for "Economy of Content"; however, primary school students received average scores but had generally used suitable content in their digital stories.

Consequently, the results of the rubric measurement indicated the majority of students were able to include the important aspects in their digital stories. However, there were significant differences between primary and secondary students: the latter cohort focused on digital creation aspects rather than the story.

Primary school students used the storyboard to scaffold their ideas and visualise their stories; therefore, their positive results on story aspects were significant. However, when it came to t digital creation they did not perform as well because of their age and lack of

computer skills. However, they were able to complete their digital stories on time with the help of the teacher in some cases.

The findings of this research indicate that age and ability to learn technological subjects have an impact. When compared with primary students, secondary students have the ability to learn faster and learn more. They use the internet and computer more than primary school students. This was apparent during the study where primary school students only worked on their stories in class. However, secondary school students constantly worked on their stories, both in and outside class.

Teachers observed that students were learning without realising. Provided they are clearly informed about the task required, digital storytelling can be powerful as an all-round skill development tool; the use of digital storytelling can reinforce various skills. Ryan and Prim (2010) found that performing the role of a digital story producer in a collaborative environment enhances concepts pertaining to learning and increases learning outcomes.

Teachers appreciated the fact that digital storytelling helped students in a task they previously found very difficult. Some teachers believed that digital storytelling increased and will continue to increase student outcomes. For example, one ESL teacher was glad that digital storytelling assisted students with challenging tasks. She was completely convinced that digital storytelling increased student outcomes including spelling skills, sentence formation and building and forming the entire text; the use of digital storytelling contributed to improving these skills substantially. This finding concurs with Yang and Wu (2012), who concluded in their comparative research that a digital storytelling learning environment yielded better outcomes than other lecture-based technology integrated teaching environments.

In contrast, the Art teacher saw digital storytelling as a different embodiment of what can be performed in class. . Rather than improving student outcomes, it gave them an

alternative path for expression. She mentioned that digital storytelling may have profound impacts on curriculum and business, as it compensated for students losing their IT classes for Art class replacement.

The experience with digital storytelling is highly proportional to the ability to grasp technological ideas. Secondary school students use the internet and personal computers more, and therefore they perform better than primary school students. This was observed by the fact that primary school students only worked in class while secondary school students worked in class and out of class.

7.4 Summary

In sum, the findings of this research affirm that digital storytelling is a good tool to engage students; this engagement is highly enhanced through the process of creating a digital story, and providing adequate support to students, particularly those with special needs such as ESL and VCAL students. In addition, the use of digital storytelling enhances various learning skills such as writing, design, library and research, technology and communication. Digital storytelling allows students to learn by doing, therefore, it is suitable for a constructive approach to learning, where teachers fulfil the role of facilitator and consultant. However, the findings also suggest there was no clear evidence for enhancing student outcomes. However, teachers had a positive attitude towards the use of digital storytelling as a teaching tool in their classrooms.

Chapter 8: Conclusion and Recommendations

8.1 Introduction

This research project aimed to explore the impact of digital storytelling on student engagement and outcomes. It focused on exploring the potential of digital storytelling as an innovative teaching and learning approach, and investigated the impact of digital storytelling on student learning. The research involved a multi-site case study of an Australian P-12 school. It explored the use of digital storytelling within the primary and secondary curriculum. In the selected classrooms students and teachers had the opportunity to engage in innovative learning experiences based on digital storytelling. In this chapter conclusions will be drawn from key findings discussed in the previous chapter. The most significant findings will be presented as well as contributions to knowledge, limitations and recommendations for future research.

8.2 Thesis overview

This thesis comprises eight chapters. Chapter one gave an overview of the thesis with the aims of the research and its contribution to knowledge. It also shed some light on research methodologies used in the research.

Chapter two presented a literature review that specifically addressed digital storytelling, and reviewed the current research literature in the field of digital storytelling. The literature review was based around technology integration, digital storytelling, types of digital stories, existing models of digital storytelling, educational contributions to and pedagogical benefits of digital storytelling, teacher reflection on digital storytelling, and digital storytelling and

curriculum. The literature review aimed to explore the topic and understand the viewpoints of researchers in the field.

In chapter three a detailed discussion of research methods and design tools required for this research were presented. This chapter explains the details pertaining to design and implementation of methodology directed to the investigation of relevant research questions; the research questions are clearly stated and an overview of the research is presented. Important concepts such as the case study approach, its advantages and selection of case studies for this research were examined. Qualitative and quantitative data are presented since the research design was built on integration of both data types. Following these fundamental concepts, the instruments utilised in this research, details of participant groups, data collection and the analysis approach were described, also the overview of the framework, and the different levels and aspects are presented. Thus a complete picture of research methods and design tools required for this research were depicted in chapter three.

The findings of case studies are presented in chapters four, five and six. In chapter four the findings of primary school cases (ESL and Years 3/4) are presented. In chapter five the findings of secondary school cases are presented (Years 7, 9 and 11), while chapter six includes the cross-case analysis for all five case studies. Three different methods were utilised for data collection: observation, the evaluation rubric and teacher interviews. The overall conclusions are extracted by integrating the findings of each method. Therefore, individual case studies were produced using mixed methods research. Initial data for this study were collected through observations, the evaluation rubric, and teacher interviews. Five separate case reports were prepared, which are explained in detail. These reports provide various experiences that aim to answer the research questions; a cross-case matrix was developed for each research question. The intent of the study was not comparative. This was due to the fact that the research was conducted in a single school and all five case studies pertain to different

education levels (i.e. Years 3/4 in primary school and Year 11 in secondary school). In addition to these differences, the approach assumed in the implementation of this research was dependent on teachers. Therefore, in one class, students worked autonomously, while in others they worked in groups. Considering all of the above parameters, the main focus of the research was not comparative, but rather to evaluate the effects of using digital storytelling on education. The intent was to capture the benefits of using digital storytelling in student engagement and outcomes as well as teacher experience with digital storytelling.

Chapter seven analysed the findings of this study with the literature from chapter two, and the discussion structured around the research questions outlined in chapter 3.

In chapter eight a brief summary of the most significant findings will be provided, as well as significant contributions to knowledge, limitations and recommendations for future research.

8.3 Research outcomes

This section will focus on the main conclusion derived from the discussion of main findings related to student's engagements and outcomes as well as the teacher perceptions about digital storytelling.

8.3.1 Using digital storytelling to enhance student engagement

8.3.1.1 Enhancing engagement

The findings of this research indicated that students were always engaged with the lesson, where engagement levels varied between moderate and high. This suggests that students liked using technology, especially when they started using the software; their engagement levels reached an absolute high.

On the other hand, students had a hard time engaging in class when they had to finish their storyboard. Some students were not interested in any school activity including digital

storytelling. Therefore they had a very low engagement level. However, when these students started recording videos of themselves for their story, their engagement level increased significantly.

8.3.1.2 Fostering collaboration

The findings of this research indicated that students work collaboratively and engage with digital content. They did more work while directly using applications and digital resources, such as the internet and/or libraries, instead of conventional printed media, such as books. The findings of this research pointed out that collaboration between groups was also observed, where different groups helped each other with technical or grammar issues. This increased their levels of communication.

In addition, the findings of this research extracted that when used in longitudinal studies, digital storytelling could increase students' collaboration and communication skills. This is supported by the findings of this research, as students constantly helped each other in solving problems and developing ideas. Thus digital storytelling enhances cooperation and collaboration in the classroom. Students are therefore more engaged when they are working together to create their digital story.

8.3.1.3 Transforming learning

The findings of this research showed that digital storytelling is a good practice for a constructive approach to learning; students were working on their own after receiving the necessary basic explanation from their teachers and applying it to their work. Teachers appreciated that digital storytelling allows students to learn by doing. Students were able to build their own interpretation, depending on experience and interaction, and generate a new understanding through the creation of digital story from various sources.

The role of teachers, in most cases, was to facilitate and scaffold the learning process. In the beginning, teachers led the class, as they needed to explain the tasks, the software and digital storytelling. Once students had the basic information and started working on their own, the dominant teacher role was facilitating/scaffolding learning.

8.3.1.4 Building digital literacy

Teachers indicated that digital storytelling helped students improve their writing skills and the integration of technology assisted students to overcome writing problems. Teachers mentioned that digital storytelling can increase library and research skills. Students have the opportunity to choose the skill they want to work on and improve that skill. This may include individual skills, such as spelling and writing, as well as interpersonal skills such as working in a team or collaborating with students and teachers.

Furthermore, the use of technology in class helps students improve their technical skills and information literacy. Teachers believe that the use of stories in education is very beneficial for countries receiving immigrants, such as Australia, because digital story incorporates all aspects of curriculum and all teachers should use it at some stage. One teacher commented that many students coming from non-English-speaking countries in the school where they work. The ability to express themselves through visual media, rather than words, facilitates communication for new students and builds confidence.

However, according to teachers, not only students but also teachers had the opportunity to improve their technological skills with digital storytelling, including the use of electronic devices, such as personal computers, cameras and recorders.

8.3.1.5 Personalising learning experience

The findings of this research show that digital storytelling allows for personalisation of the learning experience, acquiring an in-depth understanding, and becoming more proficient at the

technical aspects of language. Digital storytelling provides excellent support to those with special needs such as ESL and VCAL students. The findings of this research indicate that digital storytelling can help students to improve their confidence, and their social and psychological skills.

8.3.2 Impact of digital storytelling on student outcomes

As the latest report for the Programme for International Student Assessment (PISA) indicated that the use of technology in education can increase various skills of learners, the findings of this research also suggested that digital storytelling can enhance several learning skills including writing, designs, library and research, technology and communication.

In addition, digital storytelling can help students with tasks they previously found very difficult including spelling, sentence formation and building, and forming the whole body of a text; the integration of technology assisted students to overcome these writing problems.

However, age and ability to learn technological subjects have impacted as well. When compared with primary school students, secondary school students have the ability to learn more and faster. They use the internet and computers more than primary school students. This was apparent during the study, especially where primary school students worked exclusively on their stories in class. Secondary school students however constantly worked on their stories, both inside and outside class.

Furthermore, teachers observed that students were learning without realising. Provided that students are clearly informed about the task that is required of them, digital storytelling is powerful as an all-round skill development tool; the use of digital storytelling can therefore reinforce various skills.

8.3.3 Teacher perceptions about student learning through digital storytelling

Teachers had a positive attitude toward the use of digital storytelling as a teaching tool in their classrooms: both students and teachers had the opportunity to improve their technological skills, which included the use of various electronic devices, as previously mentioned.

Teachers indicated that digital storytelling increases and enhances the use of technology in the classroom, which helps students improve their technical skills and information literacy; digital storytelling can also be applied to subjects such as English and history, and in almost all the sciences including math, social studies and humanities.

Furthermore, teachers believe that the use of digital stories in education is beneficial for countries receiving immigrants, such as Australia, because digital story incorporates all aspects of curriculum and teachers should therefore use it at some stage. The ability for expression through visual media, rather than words, facilitates communication for new students and builds their confidence.

In addition, teachers fulfilled the role of facilitator, consultant, and scaffolded the learning process when they used digital storytelling in class.

8.4 Significance and contributions to knowledge

Since the main aim of this research is to investigate the impact of digital storytelling on student learning, the outcomes of this research will enable both teachers and students to tap into the power of digital storytelling and partake in more engaged teaching and learning. This study contributes to new understandings of how to create authentic and constructivist learning contexts that can be used in a range of educational settings. The research focuses on how to implement digital storytelling in the classroom, describing the digital story workshop, and explaining teacher roles and student tasks; therefore, this research gives a clear picture of how to integrate digital storytelling into schools. Therefore, it is expected that the new knowledge generated by this research will inform educational policy.

Furthermore, as explained in chapter two, a number of story development models have been created in the past to help educators achieve better learning outcomes with digital storytelling; however, none of these models provide a holistic pedagogical framework for engaging students with digital storytelling during various stages of learning. In order to develop such an approach, this research presented a new e-Learning Digital Storytelling (eLDiSt) framework for digital storytelling as a pedagogical model for constructivist learning. Therefore, the eLDiSt framework is designed primarily as a tool to help story creators in producing engaging digital stories, the framework is based on thirteen storytelling aspects and five levels, and each aspect advances in complexity as the learner's level advances from level one to five. It considers the needs and abilities of learners at different stages of learning, including learners from primary school to university, and even professional e-Learning content creators. With the help of this eLDiSt framework, digital storytelling can be used as an efficient and effective learning tool at various levels of education. Different aspects identified in this framework enable teachers as well as students to fully grasp the elements required for an engaging and educative digital story.

8.5 Limitations

Even though the findings of this research are important and have the potential to inform policy, practice and theory, generalisations could not be derived due to the following reasons. The research only included participants from one school, even though there were two levels: primary and secondary also limitations related to the participant sample used, since unequal numbers of students from primary and secondary schools took part in this research. However, this limitation could be removing by using multiple sites instead of one school, and the same participant sample if possible.

Another issue is related to the limited access to technology in the school; the students faced some technical problems while creating their digital stories, also there was lack of the

number of computers in the labs, there is a need to consider the level of access to technology that is required. However this limitation could be also could be removed by providing schools with the minimum technological that required for creating a digital story.

In addition, digital storytelling is a time consuming and it could take some time from the school academic year to finish. Also student and teachers need some training before they start the project. In order to use the class time effectively it is important to consider the different curriculum areas and the class level before starting the project; furthermore, other issues related to the teaching schedule, and the actual class time need to be also considered.

8.6 Recommendations for future research

The results of this research indicate that digital storytelling can provide a support to students with special needs, such as ESL and VCAL students. In addition, digital storytelling can help students to improve students' confidence, and can contribute to social and psychological skills of the students, also with digital storytelling, not only students but also teachers had the opportunity to improve their technological skills. The findings from this research suggested that digital storytelling can be potentially applied in many subjects such as English and history, also in almost all sciences including math, social studies, and humanities.

The findings presented in this thesis make an important contribution to knowledge in the digital storytelling field. However, it could be extended in several ways by removing some of the limitations assumed in this research. For example, by using multiple sites instead of one school, or by using the outcomes from this research to investigate other aspects related to the use of digital storytelling in classrooms.

One possible extension relates to the e-Learning Digital Storytelling (eLDiSt) framework, as testing and validating the proposed framework at different educational levels needs to be undertaken.Validating the eLDiSt framework through action research in different classrooms is an important direction for future investigations.

Technical research also needs to explore programming modes, environments and user interface design to facilitate story creation. Pedagogical research needs to focus on testing the efficacy of digital storytelling as a new teaching and learning paradigm, with a particular focus on the effectiveness of story creation as an innovative learning environment.

Therefore, moving from traditional learning towards a new learning environment, digital storytelling is a powerful tool for creating a constructive environment based on the principles of teaching and learning. This medium has the potential to engage learners in integrated approaches to learning with digital media. Thus, digital storytelling will enhance student engagement and provide better educational outcomes for learners.

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Appendices

Appendix A: Classroom observation protocol

Part 1: Pre-observation form

Date: _____ Grade: _____
Subject: _____ Topic: _____
Activity: _____ Time: _____

Purpose (objectives):

_____
_____
_____
_____
_____
_____
_____

Materials Used:

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Other Information:

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Minutes →		5	10	15	20	25	30	35	40	45	50	Notes
Class Collaboration	1 Individual students working alone 2 Pairs of students 3 Small groups (3+ students) 4 Whole class 5 Student presentations	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	
Knowledge Gain	1 Receipt of knowledge 2 Applied procedural knowledge 3 Knowledge construction 4 Other (specify)	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Student Roles	1 Passive/ little response 2 Active response 3 Co-construct meaning	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	
Teachers Roles	1 Leads class 2 Observes student 3 Facilitates/Scaffolds learning	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Student Engagement	1 Low engagement 2 Moderate engagement 3 High engagement	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	
Technology Integration	1 Not used 2 Add-on 3 Partially integrated 4 Fully integrated	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Modes of Learning	1 Teacher-led 2 Student/s-led	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	

	Explanation
Class Collaboration	1 **Individual students working alone:** Students work individually, but are allowed to contact others. 2 **Pairs of students:** Students work in pairs, and are allowed to exchange ideas. 3 **Small groups:** Students work in a group of three or more. 4 **Whole class:** The whole class works as one group. 5 **Student presentations:** Students present to the class, individually or in small groups.
Knowledge Gain	1 **Receipt of knowledge:** Includes unassisted work, lectures, worksheets, questions. 2 **Applied procedural knowledge:** Includes skill building and performance. It may be interactive or done in front of a group. 3 **Knowledge construction:** Includes such things as comprehension building, knowledge generation, inventing, pre-writing activities, clarifying questions, collaborative activities, problem solving, co-construction of meaning, organizing, revising. 4 **Other (specify):** Record other cognitive activities, e.g. classroom organizational activities such as preparing a work space.
Student Roles	1 **Passive/ little response:** Students mainly receive knowledge through activities such as lectures, directions, viewing video. Students may answer some questions at prompting of teacher. 2 **Active response:** Teacher leads the discussions; students provide input to open-ended questions and elaborated talk occurs. Can include student presentations and active engagement in solitary activity. 3 **Co-construct meaning:** Students initiate dialogue with fellow students or the teacher and construct their own meaning from the lesson activity.
Teacher Roles	1 **Leds class:** Teacher directs learning and provides information or explanations. 2 **Observes students:** Teacher manages behaviour, provides materials, or solves computer problems in order to get students on task. 3 **Facilitates/Scaffolds learning:** Teacher facilitates or provides suggestions. Students do most of the work and interact with one another, and teacher is clarifying, engaging, or motivating one-on-one or with a small group.
Student Engagement	1 **Low engagement:** Most of the students are not focused on the learning tasks. They may be doing things unrelated to the learning or confused about what they should do. 2 **Moderate engagement:** At least half of the students are focused on the learning tasks, but some are easily distracted or confused and a minority may not be on task. 3 **High engagement:** Nearly all of the students are focused on the learning tasks. Most of the activity in the classroom is relevant to the tasks.
Technology Integration	1 **Not used:** No use of computer or related technology for productivity. 2 **Add-on:** Limited use of computer or related technology by students and teacher. 3 **Partially integrated:** Moderate use of computer or related technology by students and teacher. 4 **Fully integrated:** Extensive use of computer or related technology by students and teacher.
Modes of Learning	1 **Teachers- led:** The teacher dominates interactions. Little interaction by students with the teacher or by students with other students. 2 **Student/s- led:** The students dominate interactions. Students interact with students about the lesson activities.

Part 3: Field notes form

Appendix B: The scoring rubric instrument

Teacher: **Grade:** **Student/Group:**

Criteria	Definition of the criteria	Average 1	Good 2	V. Good 3	Excellent 4
Purpose	Aim(s) and Objective(s)				
Plot	The set of events that make up the story				
Pacing of Narrative	The rate at which the events proceed				
Dramatic Question	Question which makes the main point of the story.				
Story Content	The elements used to create the story (Ex. photos, video, sound)				
Grammar and Language Usage	Complexity of the language.				
Technological Competence	The use of the technological tools				
Emotional Content	The range of emotions				
Economy of content	Optimization of contents and quality				
Final score					

Adapted from: University of Houston, (2011). The educational uses of digital storytelling, http://digitalstorytelling.coe.uh.edu/pdfs/samplerubric.pdf

Criteria	Definition of the criteria	Average 1	Good 2	V. Good 3	Excellent 4
Purpose	Aim(s) and Objective(s)	It is difficult to figure out the purpose of the story.	There are a few lapses in focus, but the purpose is fairly clear.	Establishes a purpose early on and maintains focus for most of the story.	Establishes a purpose early on and maintains a clear focus throughout.
Plot	The set of events that make up the story	The events of the story are fairly well chosen, but not contribute to the overall meaning of the story.	The events of the story are good chosen and try to contribute to the overall meaning of the story.	The events of the story are well chosen and contribute to the overall meaning of the story.	The events of the story are creatively chosen, and contributed to the overall meaning of the story.
Pacing of Narrative	The rate at which the events proceed	No attempt to match the pace of the storytelling to the story line or the audience.	Tries to make an accurate order for the events, but it is often noticeable that the pacing does not fit the story line.	The order of the events matches story line and relatively engaging for the audience.	The order of the events matches the story line and helps the audience really "get into" the story.
Dramatic Question	Question which makes the main point of the story.	Little effort is made to answer the dramatic question.	A dramatic question is hinted at but not clearly established within the context of the story.	A dramatic question is asked but not clearly answered within the context of the story.	A meaningful dramatic question is asked and answered within the story context.
Story Content	The elements used to create the story (Ex. photos, video, sound)	Little effort to use contents to create an appropriate atmosphere and/or to mix different multimedia content (ex. photo with video).	An effort was made to use contents to create the story and/or to mix different multimedia content (ex. photo with video), but it needed more work.	Contents create an atmosphere that matches some parts of the story. and different multimedia contents are mixed(ex. photo with video)	Content is clearly relevant to the story, very well chosen for content (photos, music, video...Etc).and matches different parts of the story.
Grammar and Language Usage	Complexity of the language.	Repeated errors in grammar and language usage greatly distract the audience from the story.	Grammar and usage were typically correct but some errors are present in the story.	Grammar and usage were typically correct and contributed to clarify the digital story.	Grammar and language usage were correct and contributed to clarify the digital story.
Technological Competence	The use of the technological tools	Little transitions, effects, audio, and edits are used and/or appropriate to the subject matter.	Some transitions, effects, audio, and edits are used and/or appropriate to the subject matter,	Most transitions, effects, audio, and edits are used and/or appropriate to the subject matter.	Transitions, effects, audio, and edits are utiliseutilised and appropriate to the subject matter,
Emotional Content	The range of emotions	Audience has little emotional engagement.	Audience lapse in emotional engagement.	Audience is emotionally engaged.	Audience is deeply and emotionally engaged.
Economy of content	Optimization of contents and quality	Little optimization (e.g. too much contents, too little quality)	Good optimization (e.g. contents is somewhat balanced with obtained quality)	Very good optimization with some shortcomings (e.g. contents balanced with quality)	Perfect optimization (e.g. required contents, best available quality)
Final score					

Appendix C: Teachers' interview schedule

My name is Najat Smeda, and I am conducting a research project that aims to explore the pedagogical benefits of digital storytelling. I would like to ask you some questions about your experiences with using Digital Storytelling in your class.

I hope to use the information that you are going to contribute through this interview to address the following research question: "*How can digital storytelling enhance the student engagement and provide better educational outcomes for learners?*" I will maintain confidentiality of all data collected. There will be no personally identifiable information about project participants.

The interview should take about 45 minutes. I would also like to record the talk so that I can capture accurate information, and I don't have to spend time taking notes. Ok, let us start.

The Interview Questions:

1. What is your view of digital storytelling?
2. To what extent can students be engaged in real learning tasks with digital storytelling?
3. Which skills do you think digital storytelling can improve in students and why?
4. What benefits and/or challenges you have identified after the implementation of digital storytelling in your class?
5. How effectively did the students combine the curriculum content with digital story components (such as photos, music and animation)?
6. In your opinion, which subjects lend themselves most to digital storytelling?
7. What is your perception of student engagement in creating digital storytelling?
8. How do you think digital storytelling can improve students' leaning outcomes?
9. To what extend does digital storytelling allow you to link informal and formal learning?
10. Would you like to make any other comments/suggestions?

Well, it has been a pleasure finding out more from you. Let me briefly summarise the information that I have recorded during our interview. I appreciate the time you took for this interview. Is there anything else you think would be helpful and you like to add?

Thanks again.

Appendix D: Information to participants

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

You are invited to participate

You are invited to participate in a research project entitled "Creating Constructivists Learning Environments with Digital Storytelling".

This project is being conducted by a student investigator Mrs. Najat Smeda as part of a PhD study at Victoria University under the supervision of Assoc. Prof. Nalin Sharda from Faculty of Health, Engineering and Science, and Dr. Eva Dakich, from Faculty of Arts, Education and Human Development.

Project explanation

The research project aims to explore the pedagogical benefits of digital storytelling, and investigate its impact on teaching and learning outcomes. This research project is expected to create new engaging learning environments with digital technologies, to exploit the pedagogical benefits of digital storytelling. The outcomes of this research project will help teachers and learners tap into the power of digital storytelling in order to facilitate new learning and partake in more engaged teaching and learning.

What will I be asked to do?

You will be asked to:

1. Sign and return the consent for participate in this research study.
2. Participate in three workshops.
3. Integrate digital storytelling into your curriculum. Teachers will provide help for their students in constructing and creating the digital story.
4. Evaluate students' digital story using a scoring rubric.
5. Take part in an interview.

What will I gain from participating?

As digital storytelling has the potential to engage and motivate learners, it can help teachers in building engaging learning environments for their students. The participating teachers will benefit by learning about the pedagogical advantages of digital storytelling. The outcomes of this research project will help teachers and learners tap into the power of digital storytelling and participate in more engaged teaching and learning. Your cooperation in this research project will also help create new knowledge that will be used to enhance educational outcomes in schools in general.

How will the information I give be used?

The information that you are going to contribute through the interview will be analysed to address the following research question: "*How can digital storytelling enhance the student engagement and provide better educational outcomes for learners?*" The researchers will maintain confidentiality of all data collected. There will be no personally identifiable information about project participants.

What are the potential risks of participating in this project?

The participation in this project may put extra workload on the participants. Considering the benefits that you will get from this project, we hope that extra workload is manageable and acceptable.

How will this project be conducted?

The following activities will be conducted during this research:

Phase-1: Teachers' workshop:

The student investigator will start by giving an orientation seminar followed by two workshops to teachers over the first two weeks. The main aims of these interactive workshops are as following:

- Introduce and describe the concept of digital storytelling.
- Introduce the Movie Maker software.

Phase-2: Digital Storytelling Classes:

Teacher and student will work together to create the digital storytelling step– by –step. The following points list in brief the main activities:

1. Brainstorm the story.
2. Create the storyboard.
3. Search the material for creating the digital story.
4. Use Movie Maker software to create the digital story.
5. Edit and finalise the digital story.
6. Present and evaluate the final digital stories.

Phase-3: Data Collection:

There will be three phases of data collection. In the first phase, classroom observation will be conducted to investigate issues related to the integration of technology into teaching and learning, it will be used to understand how can digital storytelling enhance the student engagement and provide better educational outcomes for all learners, as well as to explore how can digital storytelling be used as a pedagogical approach, and how it can create a link between formal and informal learning.

In the second phase, when students complete their digital story, teacher will use the evaluation rubric to assess students' success and level of engagement in authentic learning using digital storytelling.

In the third phase, interviews with participating teachers will be conducted to gain additional perspectives on the investigated issues. Interviews with teachers will be used to discuss their experiences in using digital storytelling, and to seek explanation on issues that arise from observation. The interviews generally involve open-ended questions resulting in 'rich' data, which needs further analysis and input by the researcher. Interviews will be used to explore how can digital storytelling be used as a pedagogical approach, and how it can create a link between formal and informal learning, also interviews will focus on the factors that influenced teachers when they integrate a new technology in their curricula and classroom such as a digital storytelling and their experience with it.

Who is conducting the study?

School of Engineering and Science,

Faculty of Health Engineering and Science,

Victoria University, Melbourne. Australia

Chief Investigator: Assoc. Prof. Nalin Sharda

School of Engineering and Science,

Faculty of Health Engineering and Science

Phone: (03) 9919 4678

Email: Nalin.Sharda@vu.edu.au

Associate Investigator: Dr. Eva Dakich

School of Education,

Faculty of Arts, Education and Human Development

Phone: 0400976105

Email: Eva.Dakich@vu.edu.au

Student investigator: Mrs. Najat Smeda

School of Engineering and Science,

Faculty of Health Engineering and Science

Phone (03) 99194854

Email: Najatabdallaha.smeda@live.vu.edu.au

Any queries about your participation in this project may be directed to the Chief Investigator listed above.

If you have any queries or complaints about the way you have been treated, you may contact the Research Ethics and Biosafety Manager, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 or phone (03) 9919 4148. In case this study causes any discomfort or concern please contact Dr Carolyn Deans Lecturer in psychology, St Albans camps of Victoria University, Ph: 99192334.

Appendix E: Consent form

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of a study entitled "Creating Constructivists Learning Environments with Digital Storytelling". This project is being conducted by a student investigator Mrs. Najat Smeda as part of a PhD study at Victoria University under the supervision of Assoc. Prof. Nalin Sharda from Faculty of Health, Engineering and Science, and Dr.Eva Dakich from , Faculty of Arts, Education and Human Development.

The research project aims to explore the pedagogical benefits of digital storytelling, and investigate the impact of using digital storytelling on teaching and learning outcomes. This research project is expected to create new engaging learning environments with digital technologies, to exploit the pedagogical benefits of digital storytelling, the outcomes of this research project will help teachers and learners tap into the power of digital storytelling in order to facilitate new learning and partake in more engaged teaching and learning.

As digital storytelling has the potential to engage and motivate learners, it can help teachers in building engaging learning environments for their students. The participating teachers will benefit by learning about the pedagogical advantages of digital storytelling. The outcomes of this research project will help teachers and learners tap into the power of digital storytelling and participate in more engaged teaching and learning. Your cooperation in this research project will also help create new knowledge that will be used to enhance educational outcomes in schools in general.

The information that I am going to give through the interview will be analyses to address the research questions, there will be no personally identifiable information.

CERTIFICATION BY SUBJECT

I,.....of.....
certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study: "Creating Constructivists Learning Environments with Digital Storytelling" being conducted at Victoria University by: Assoc. Prof. Nalin Sharda.

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by: Mrs. Najat Smeda, and that I freely consent to participation involving the below mentioned procedures:

1. Teachers' workshops:

   I will attend the workshops given by the student investigator. The main aim of these workshops is to introduce and describe the concept of digital storytelling, and explain the Movie Maker software.

2. Digital Storytelling Classes:

   As a teacher I will facilitate my students in creating digital stories based on the workshops. Student involvement is restricted to their use of digital stories upon the teachers' request, and the student investigator will only observe the class. Therefore, The student investigator will not interact, demand or ask anything from the students.

3. Data Collection:

   As a teacher I will use the evaluation rubric to assess students' success and level of engagement in authentic learning using digital storytelling, also I will participate in an interview to give my opinions and feedback based on my experience with digital storytelling. The researcher is allowed to create an audio recording of the interview for further research.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Any queries about your participation in this project may be directed to the researcher

Chief Investigator: Assoc. Prof. Nalin Sharda

School of Engineering and Science,

Faculty of Health Engineering and Science

Phone: (03) 9919 4678

Email: Nalin.Sharda@vu.edu.au

If you have any queries or complaints about the way you have been treated, you may contact the Research Ethics and Biosafety Manager, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 or phone (03) 9919 4148. In case this study causes any discomfort or concern please contact Dr. Dr Carolyn Deans Lecturer in psychology, St Albans camps of Victoria University, Ph: 99192334.

Appendix F: Letter of approval from EPIC

EAST PRESTON ISLAMIC COLLEGE

P.O.Box: 8217,
NORTHLAND SHOPPING CENTER,
EAST PRESTON VIC. 3072

55-57 TYLER STREET
EAST PRESTON VIC. 3072
TEL: (03) 9478 3323 FAX: (03) 9470 1255

TO WHOM MAY IT CONCERN

This letter serves as our approval to participate in a research project entitled "Creating Constructivists Learning Environments with Digital Storytelling".

This project is being conducted by a student researcher (Mrs. Najat Smeda) as part of her Ph.D. study at Victoria University under the supervision of Assoc. Prof. Nalin Sharda and Dr. Eva Dakich.

We authorise Mrs. Najat Smeda to collect data for her research project at our school. We allow her to give workshops to our participating teachers about the importance of digital storytelling, tools required to create digital stories, and the software that will be used to create the digital story.

We allow her to conduct observation and to interview our participating teachers. We acknowledge that participation in the above research project is voluntary, and that participants may withdraw at any stage.

Yours Faithfully,

[redacted]

Ekrem Ozyurek OAM
Principal

Appendix G: Parents' consent form

PARENTS CONSENT FORM

Dear Parents;

We are conducting a research about digital storytelling at our school. This is a part of Mrs. Najat Smeda's PhD study at Victoria University. The main aim of this project is to explore the benefits of digital storytelling on teaching and learning outcomes. This research project is expected to create new engaging learning environments with digital technologies. The outcomes of this research project will help teachers and learners tap into the power of digital storytelling in order to facilitate new learning and contribute in more engaged teaching and learning.

As a part of this research, the student researcher Mrs. Najat Smeda hopes to carry out case studies with the aim of evaluating the impact of digital storytelling on education outcomes. During her research, she wishes to observe the students working with digital story creation process. She will not interact, or ask anything from the students. Student will use digital stories upon their teachers' request, and the student researcher (Mrs. Najat Smeda) will only observe the class.

We are looking forward for our students to participate in this research. We believe it will be an interesting and beneficial process for both your child and our school.

We would be grateful if you could detach the permission slip and return it indicating whether or not your child can take part in this project. We will also be grateful if your child could also complete the permission slip below.

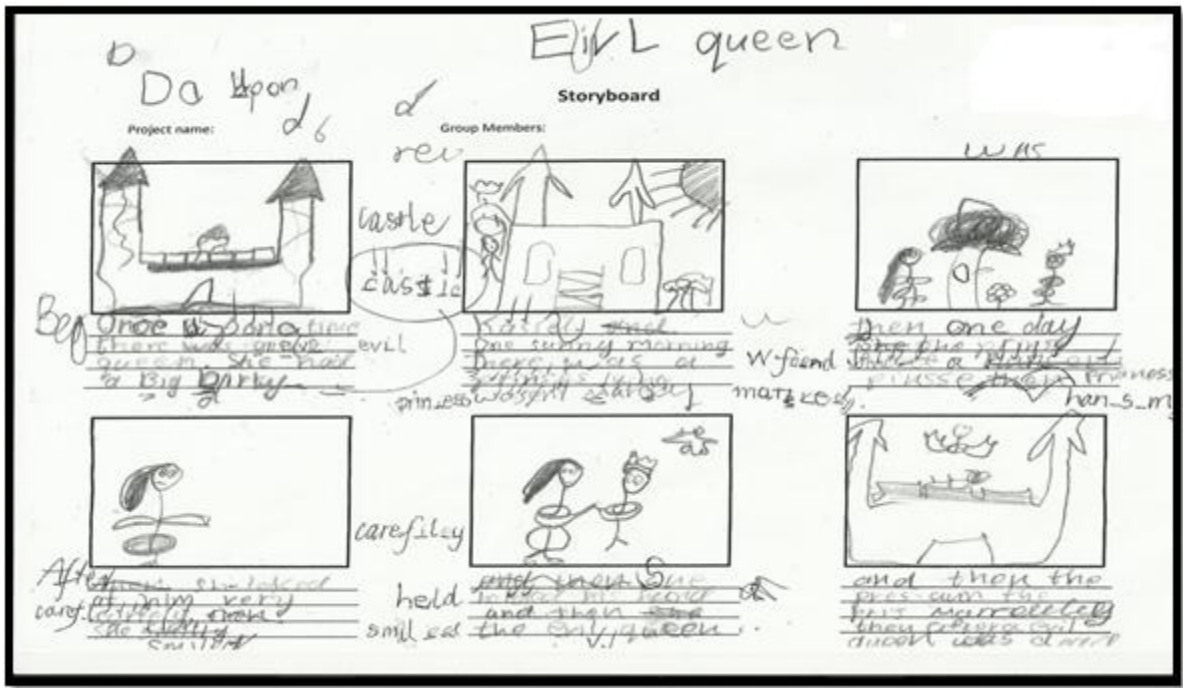
If you have any questions, please do not hesitate to contact us.

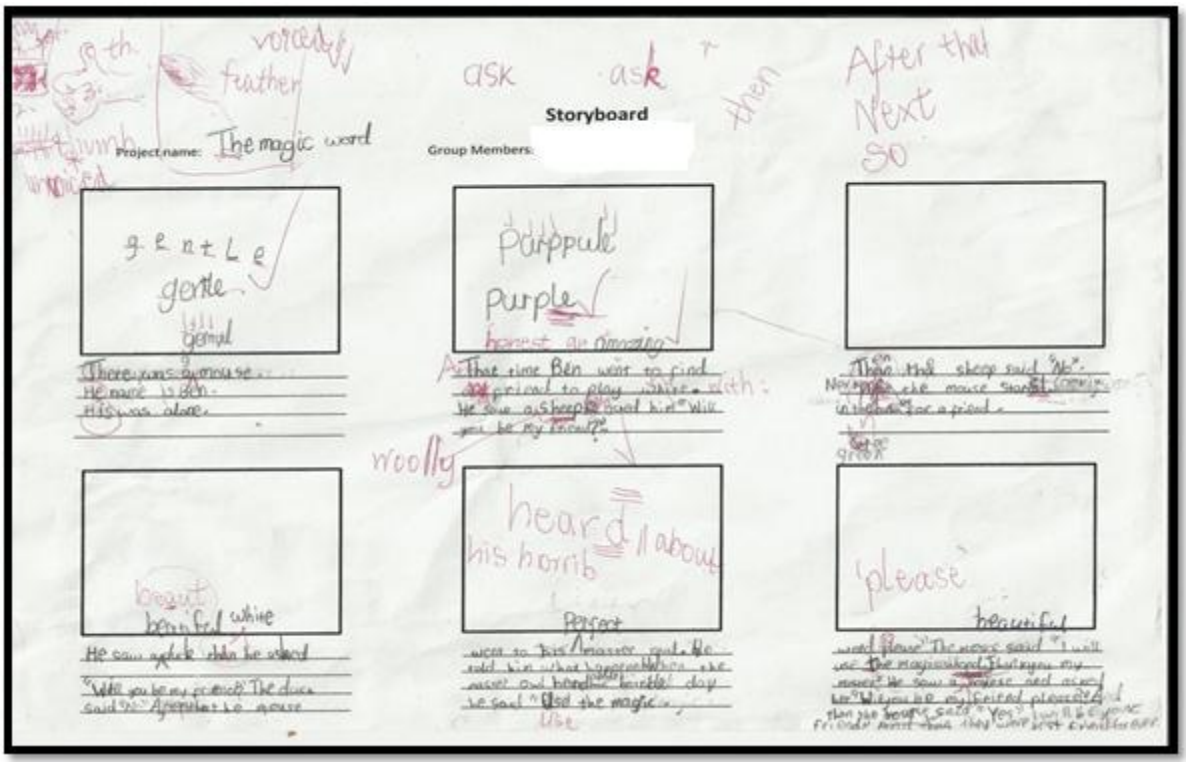
Thanking You,

Parent
Circle as appropriate
I do / do not give permission for ---------- to be part of this project.
Parent name ---------- Signed: ----------

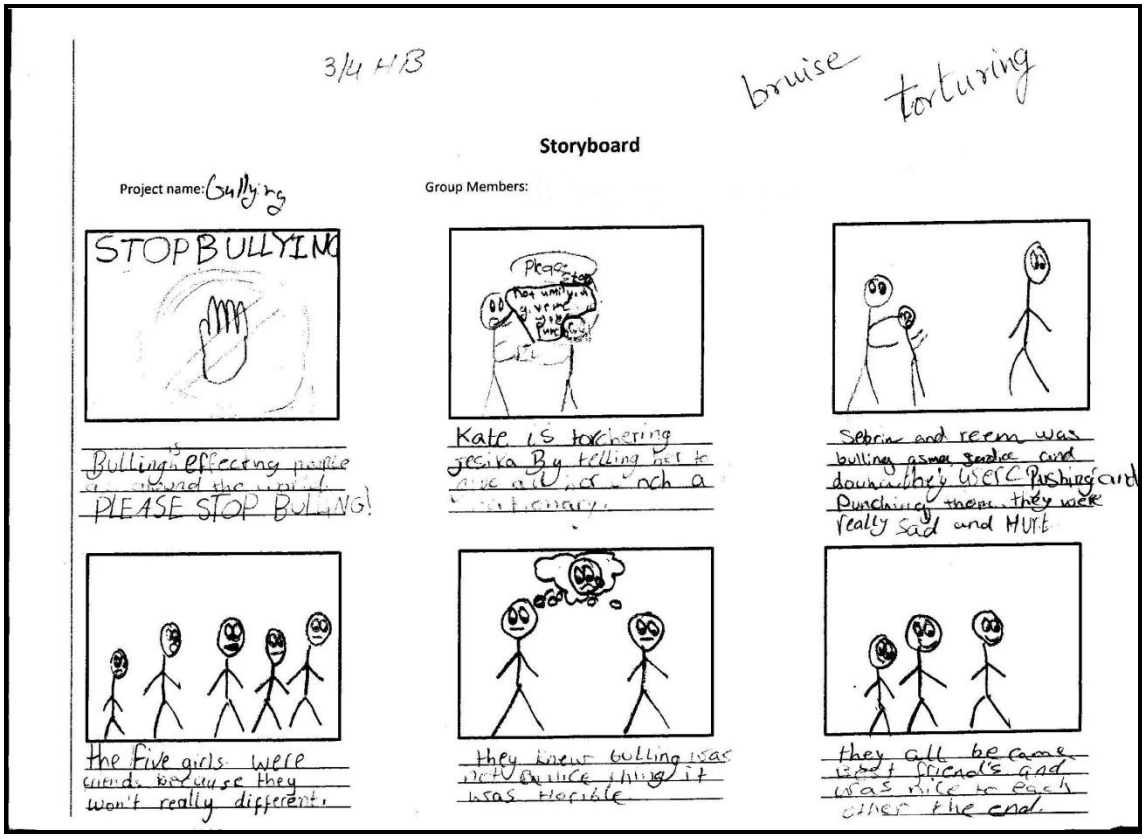
Child
Circle as appropriate
I---------- Wish / do not wish to take part in this project. Signed: ----------

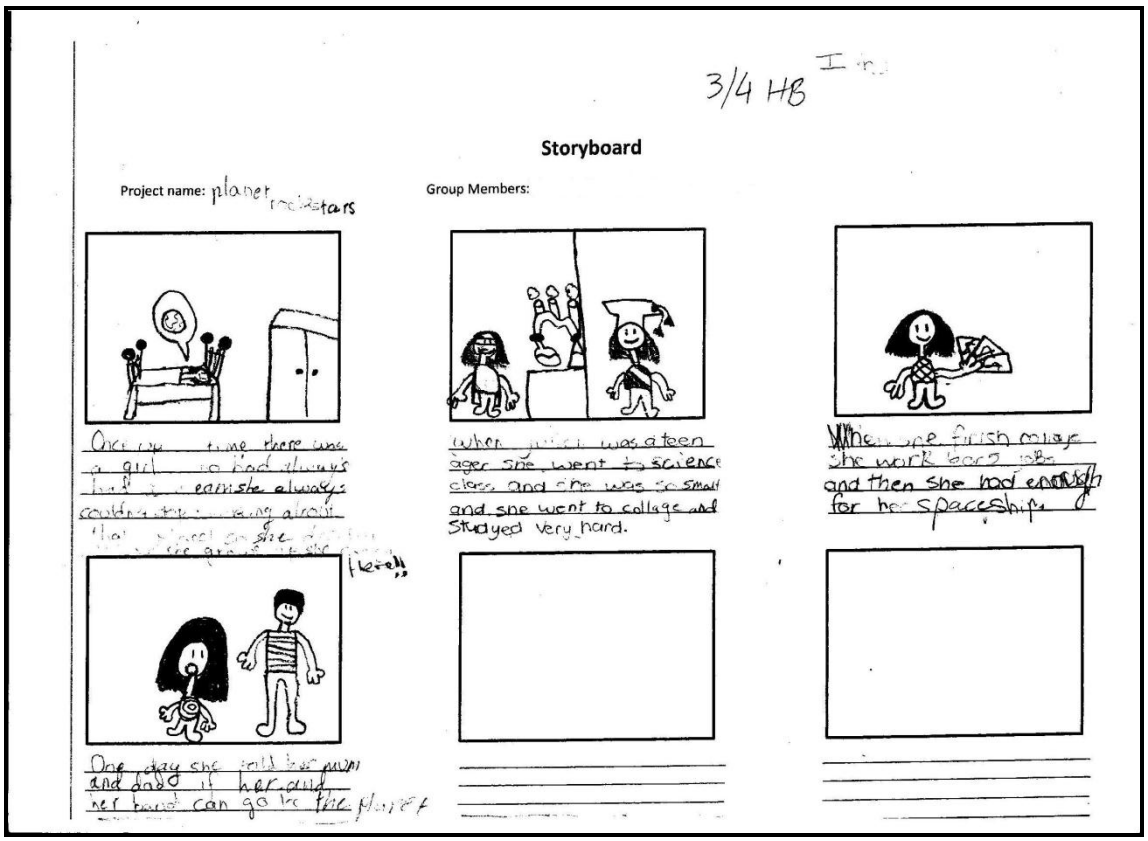
Appendix H: Examples of storyboard for ESL class

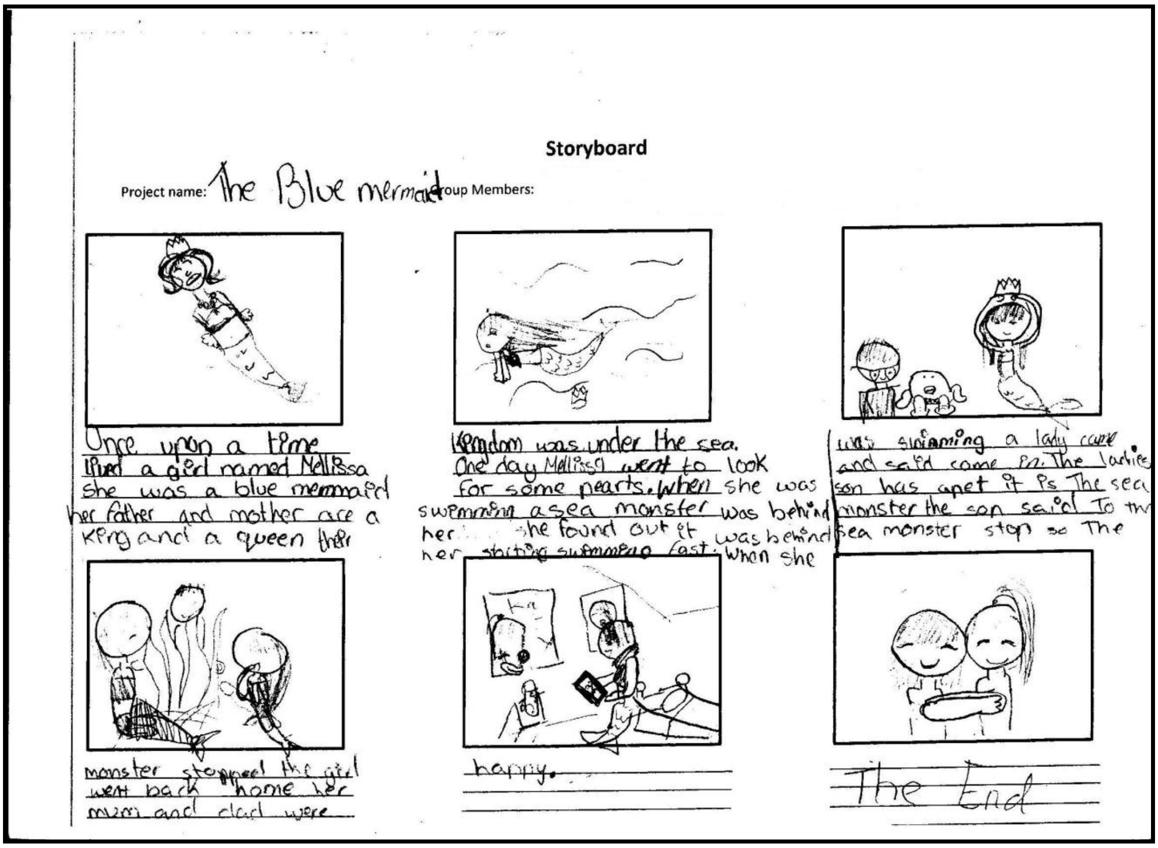




Appendix I: Examples of storyboard for 3/4 class







Storyboard

Project name: The Blue mermaid Group Members:

Once upon a time lived a girl named Mellissa she was a blue mermaid her father and mother are a King and a queen their

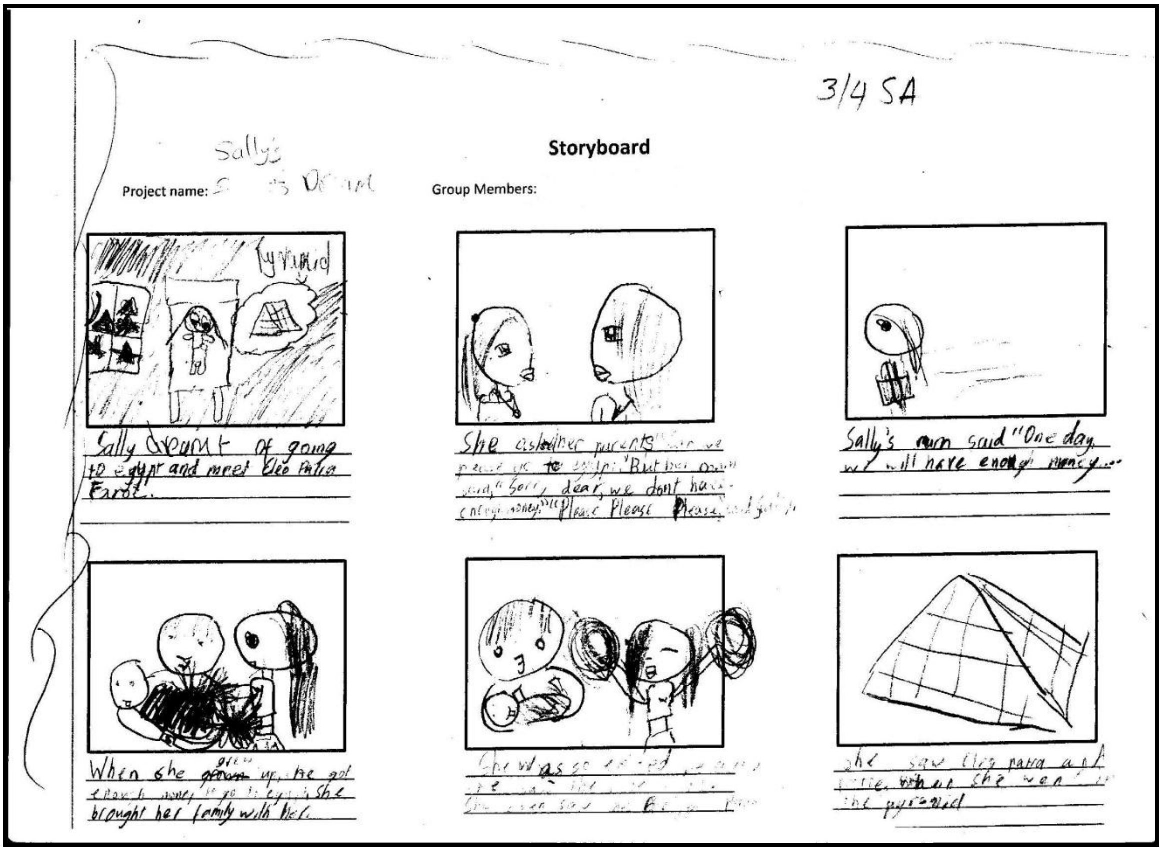
Kingdom was under the sea. One day Mellissa went to look for some pearls. When she was swimming a sea monster was behind her. [illegible] she found out it was behind her. Starting swimming fast. When she

was swimming a lady came and said come in. The ladies son has got it [illegible] The sea monster the son said To the sea monster stop so The

monster stopped the girl went back home her mum and dad were

happy.

The End



3/4 SA

Storyboard

Project name: Sally's Dream Group Members:

Sally dreamt of going to egypt and meet Cleo Patra Farol.

She asked her parents "Can we please go to egypt." But her mum said, "Sorry, dear, we dont have enough money." "Please Please Please" said Sally.

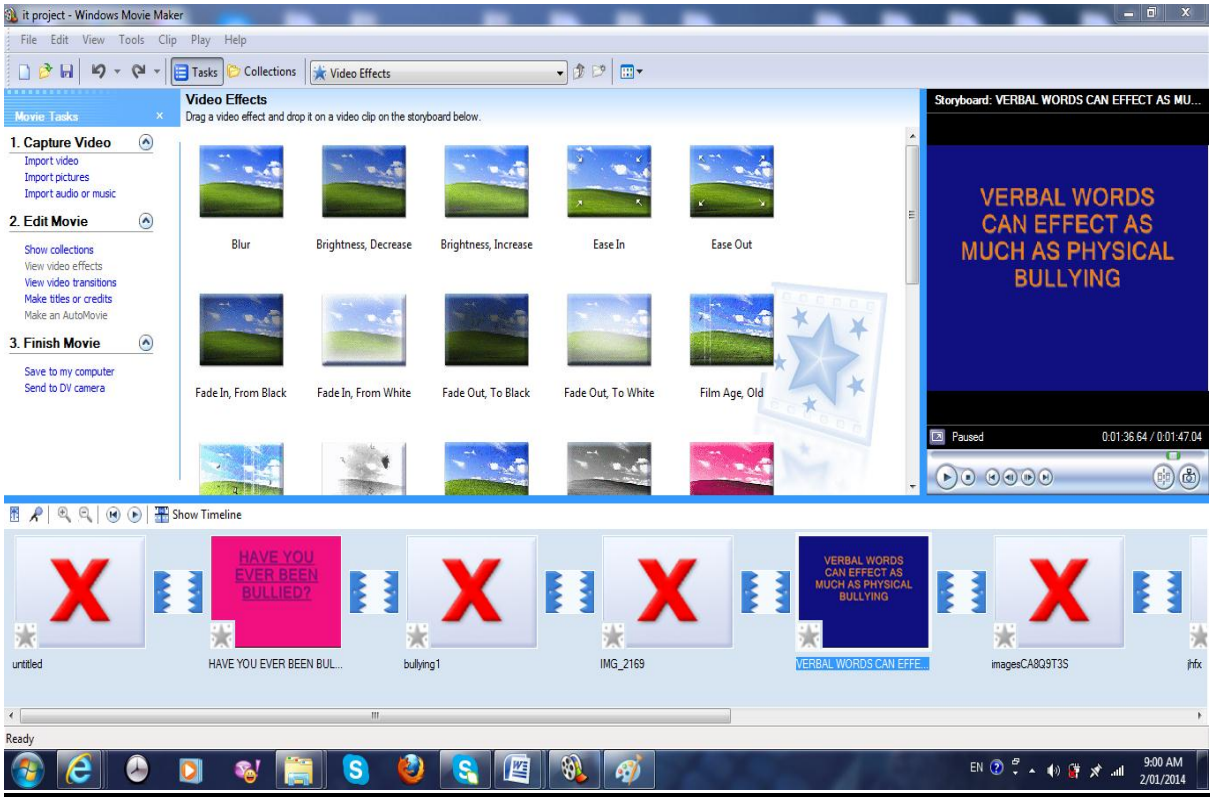
Sally's mum said "One day we will have enough money..."

When she grew up, she got enough money to go to egypt. She brought her family with her.

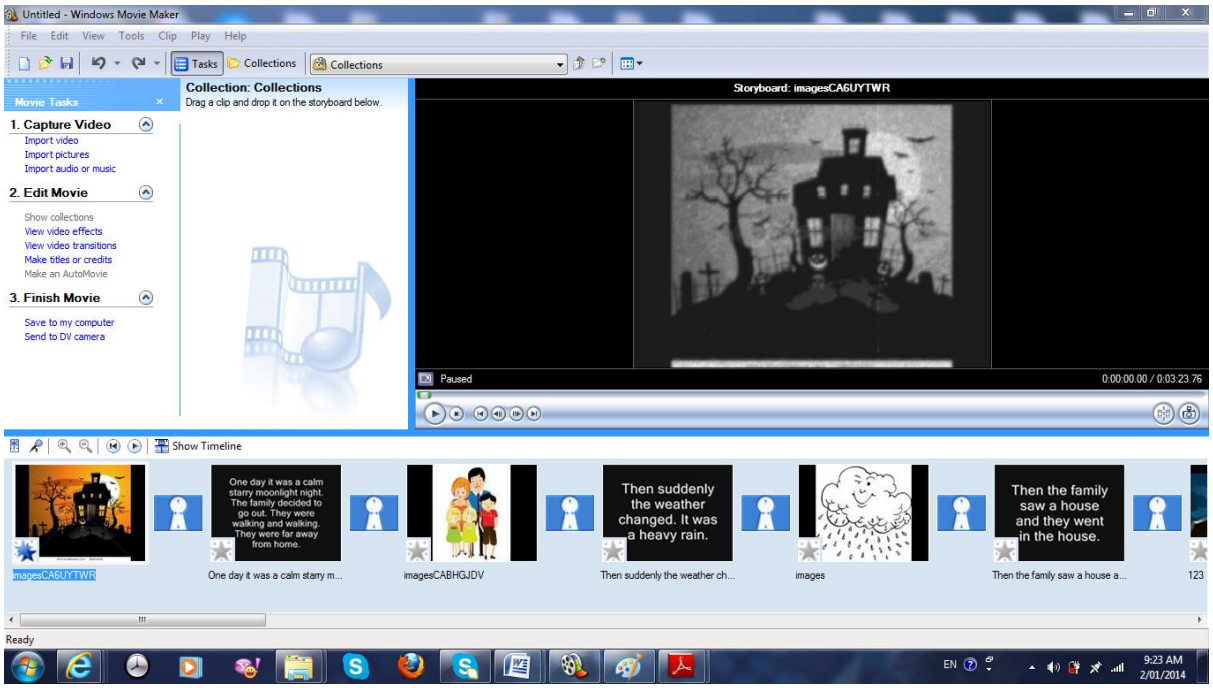
She was so excited [illegible]

She saw Cleo patra and [illegible] when she went in the pyramid

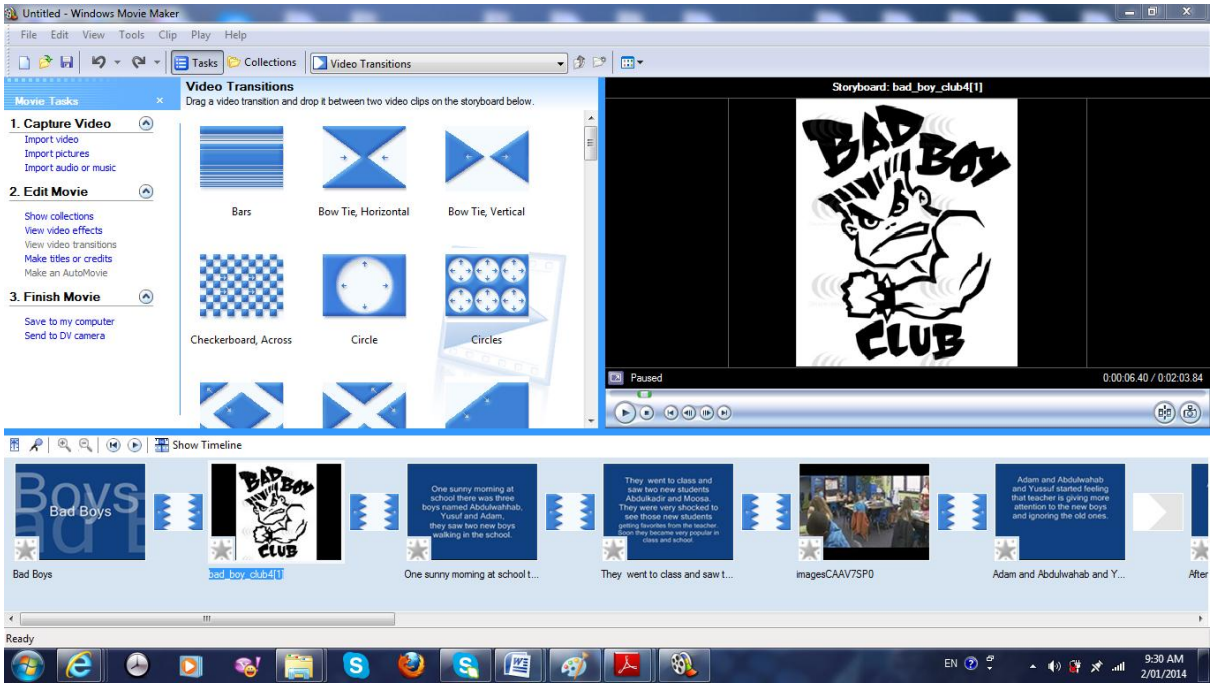
Appendix J: Examples from the students' digital stories



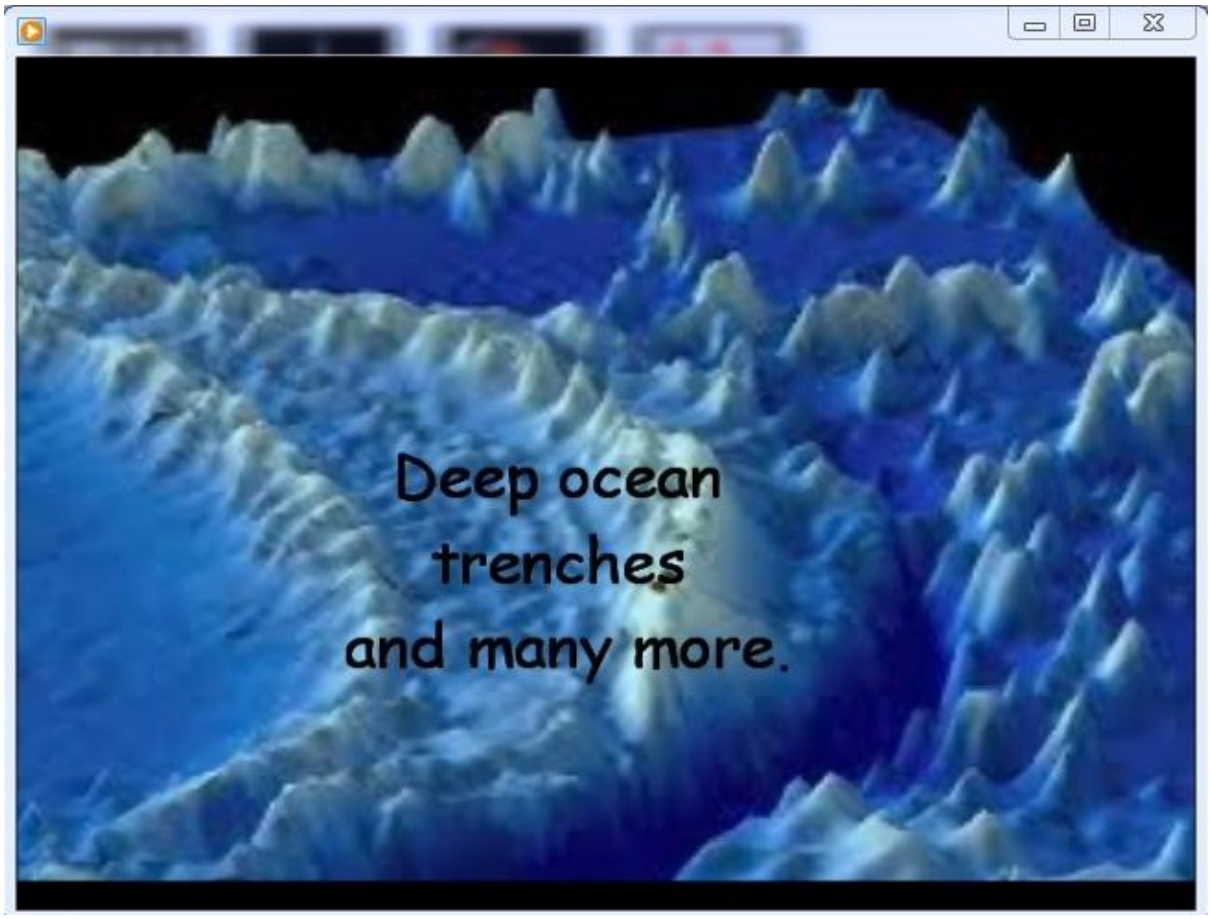
Screenshot 1: Add video effects



Screenshot 2: Show collection



Screenshot 3: Add video transition



Screenshot 4: Viewing the completed digital story

Appendix K: The e-Learning Digital Storytelling (eLDiSt) Framework

Digital Storytelling Aspect (DSA)	Definition of the (DSA)	Level-1	Level-2	Level-3	Level-4	Level-5
1: SA The Story Aspects						
SA-1 Plot	The set of events that make up the story.	Simple with no complexities in the story plot	Some options to turn the story direction	Options for the story direction will increase	Complex, the story can go different ways	Complex story plot- with twists
SA-2 Pacing and Narrative	The rate at which the events proceed	Simple, Linear story	Linear story	With sub-plots	Non-linear story with sub-plots	Multifarious story with multiple substitutes over the story
SA-3 Dramatic Question	Question which makes the main point of the story.	Fundamental questions	Basic with sub questions	Indirect with sub questions	Indirect increasing sub questions	Intricate or Secondary questions about the story
SA-4 Story Characters	The actors, participants, or players who populate the story.	Familiar (e.g.: characters from cartoons)	Simple (Fictional characters)	Moderately complex (Fictional characters)	Multifaceted characters	Complex (e.g.: Fiction- 3D pictures)
SA-5 Emotional Content	The range of emotions	Elementary images and sound	Simple images , sounds and graphics	Moving characters and animation	Dynamic characters and animations	Advanced animations and dynamic characters
2: LA Learning Aspects						
LA-1 Purpose	Aim(s) and Objective(s)	To send an educational message	To explain a specific lesson	Presenting a specific theme via story	Presenting a specific theme or lecture	Presenting a specific theme or lecture
LA-2 Language Usage	Complexity of the language.	Plain grammar and language	Simple grammar and language	Moderately complex language and grammar	Intricate grammar and language	Multilingual
3: DCA Digital Creation Aspects						
DA-1 Story Content	The elements used to create the story	Spoken words, images and music	Simple videos and audio	Adding moving pictures	Adding moving pictures, and animation	Adding advanced animations and moving objects
DA-2 Technological Competence	Complexity of technology	Very basic knowledge& skills	Fundamental knowledge & skills	Intermediate level of knowledge & skills	Upper Intermediate level of knowledge & skills	Advanced level of knowledge & skills
DA-3 Production	The process and tools used for creating the digital story	Simple editing programs (e.g. Microsoft Photo Story)	Simple editing programs (e.g. Movie Maker)	Advanced editing programs (e.g. iMovie)	Advanced editing programs (e.g. iMovie	Complex tools (e.g.: professional movie production program)
DA-4 Presentation	Media used to present the story	PC or simple home video	PC or simple home video	Slightly advanced web-based presentation media	Advanced web-based presentation media	Adding advanced web-based with smart devices
4: CA Combined Aspects						
CA-1 Economy of Content	Optimization of contents and quality	Use simple pictures , sounds, and short text	Stays simple but with the addition of adding videos	Adding more videos and possibly 3D images	Advanced quality video and 3D graphics	Very advanced audio visual content including videos and 3D graphics
CA-2 Evaluation	Tools to evaluate the story	Feedback from teacher	Feedback from teacher &classmates	Feedback from external audiences	Feedback from external audiences	Feedback from external audiences