

2016

## Digital storytelling as a means of supporting digital literacy learning in an upper-primary-school English language classroom

Natalia Churchill  
*Edith Cowan University*

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**Digital storytelling as a means of supporting digital literacy learning in an upper-primary-school English-language classroom**

This thesis is presented for the degree of  
**Doctor of Philosophy**

**Natalia Churchill**

Edith Cowan University

School of Education

2016

## **Abstract**

Digital literacy learning has become a requirement created by the wide development and application of new technologies for communication and representation. In the context of this study, ‘digital literacy’ is defined as a set of skills that enable an individual to use technologies to work with information. It builds on the traditional literacies of reading, writing, listening and speaking and includes elements of information literacy, media literacy and technology skills.

The purpose of this study was to investigate digital literacy learning in terms of the set of competencies - aspects of digital literacy - that a student in an upper-primary-school English-language classroom in an international school in Hong Kong needs to possess to participate meaningfully and actively in representing through digital multimodal texts such as digital stories. In this study, digital storytelling is defined as a contemporary strategy for the creation of digital multimedia content for expressing ideas, representing knowledge and otherwise communicating information through digital artefacts.

This study adopted a case study approach, mapping the development of digital literacy skills in three students. Data collection included, a whole class student questionnaire, interviews with the three case study students, participant observations, class discussions, students’ written reflections, peer evaluation, discussion of planning documents and digital artefacts by the researcher and three students as well as analysis of the digital artefacts by the researcher. In the course of the study, the three participants engaged in the planning and creation of three digital stories based on different genres: pourquoi story (narration), story review (response) and show & tell (personal story with a predefined genre). Analysis of the collected data provided insights into how digital storytelling supports digital literacy learning in an upper-primary-school English-

language classroom, what aspects of digital literacy develop through digital storytelling and what are the factors that inhibit the effective implementation of digital storytelling.

The key findings of the study suggest that digital storytelling is an effective strategy for digital literacy learning in a Primary 6 English-language classroom. Digital storytelling has supported the digital literacy learning of the three participating students and provided a context for the development of digital literacy. In addition, it has enhanced other aspects of teaching and learning that contribute to digital literacy development. To identify and analyse the aspects of digital literacy that the three students developed, an assessment rubric was constructed by the researcher. The application of this rubric produced evidence that suggested that all aspects of digital literacy were developed through the three digital storytelling projects.

Each of the three projects completed by the students enabled them to build on their skills while learning new digital literacy skills. The study also found that the implementation of digital storytelling in the classroom was mediated by a range of issues that were affected by both curricular and extracurricular constraints. The study produced a number of recommendations for teachers and curriculum designers in relation to integrating digital storytelling into the school curriculum.

## **Declaration of Originality**

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

On: 21 March 2016



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# **Chapter 1: Introduction**

A substantial body of evidence indicates that schools across the world are attempting to integrate information technology into mainstream lessons (Clements & Sarama, 2003; Barrett, 2006; Vincent, 2006; Barron & Darling-Hammond, 2008; Jewitt, 2008; Robinson, 2010; Yang & Wu, 2012; Sweeney-Burt, 2014).

This study investigates the way upper-primary-school students in the Singapore International School in Hong Kong engaged in digital storytelling with the goal of developing or increasing their digital literacy to the level necessary for representing information through multimodal texts. The study context was a school, which was located in Hong Kong, and was financed by the Ministry of Education of Singapore. In this study, ‘digital storytelling’ is examined as a contemporary strategy for the creation of digital multimedia content for expressing ideas, representing knowledge and communicating information. The final product of digital storytelling (that is, a digital story) has also been referred to in literature as a ‘photo story’, ‘slideshow-style video’, ‘conversational media’, ‘multimedia sonnet’ and even ‘radio-with-pictures’ (Lambert, 2007; Microsoft, 2007; Meadows, 2003a, 2003b; Salpeter, 2005). In digital storytelling, students are required to integrate modalities such as music, sound effects, text, narrations, transitions, graphics and images. Digital storytelling in the classroom engages students in working with technology and digital media to create multimodal texts. A wide spectrum of technology tools is used to plan, produce, present and review a digital story. This experience provides students with an opportunity to increase their skills in working with technology and, in turn, to increase their digital literacy.

## **1.1 Statement of the Problem**

Changes in language usage and consequently, the methodology of teaching English, are reflected in the Singapore Ministry of Education English-language syllabus.

The primary-school English-language syllabus that was developed and implemented by the Singapore Ministry of Education in 2001 emphasises meaning making—viewing and representing—through multimodal texts (Curriculum Planning and Development Division, 2001). This syllabus added a new skill, viewing, to the four basic language micro-skills of listening, reading, writing and speaking. Thus, traditional language literacy is being extended into a new literacy that is critical for communicating, creating and consuming contemporary print and digital texts. However, this new literacy differs from that required to work with static images and layouts in combination with text, as is found in printed material, as it includes the ability to work with modalities such as audio, animated sequences, transitions and video, which the related literature refers to as ‘multimodal texts’ (Kress, 2006).

Various other associated terms have been used in the literature to describe this extended idea of traditional literacy; examples are ‘new literacies’ (Bruce, 1998), ‘multiliteracies’ (Cope & Kalantziz, 2000), ‘new media and popular culture’ (Howard, 1998), ‘digital literacies’ (Merchant, 2007) and ‘new media and online literacies’ (Hagood, 2003). Overall, it is argued that students “should be taught how to construct, control, consume and manipulate the wide repertoire of text” and that to do this, “traditional reading practices and resources in the classroom should now include media text, hypertext, CD ROMs, visual texts, and other forms [that] may soon be invented” (Koh, 2002, p. 260).

This new literacy promoted by the revised Singaporean curriculum can also be associated with other constructs used to describe emerging literacies: techno-literacy, information literacy, visual literacy, media literacy and critical literacy. For example, digital literacy can also be linked to the development of information literacy, because it requires students to work with information in a variety of modes. ‘Information literacy’

is the ability to recognise when information is needed and to locate, evaluate, use and communicate it effectively (American Library Association [ALA], 1998; Armstrong, 2005; Plotnick, 1999). ‘Information literacy’ is also defined as a prerequisite for lifelong learning and an ability to participate effectively in the world outside the school (The Prague Declaration, 2003). Katz (1997) uses the term ‘digital citizens’. Although the idea of ‘digital citizens’ does not fully address changes in literacy practices, it draws attention to important divides that education must help us to bridge.

All curricula are subject to changes and a number of significant changes to the Singapore Ministry of Education curriculum occurred while this study was being undertaken. One very significant change was the development and introduction of a new “English Language Syllabus 2010. Primary & Secondary (Express/Normal [Academic])” (Curriculum Planning and Development Division, 2010). This syllabus emphasises the importance of the learner’s receptive and productive skills in such a way that listening and reading are supported by *viewing*, while speaking and writing are aligned with a new domain, *representing*. Viewing and representing are not considered separate skills; rather, they enhance traditional literacy and they are examined as follows:

- listening and viewing
- reading and viewing
- speaking and representing
- writing and representing.

According to the new syllabus, English-language curricula should be enriched through “the use of a variety of print and non-print resources that provides authentic contexts for incorporating the development of information, media and visual literacy skills in the teaching of listening, reading, viewing, speaking, writing, and representing”

(Curriculum Planning and Development Division, 2010). This study investigated how digital storytelling could be used in a Primary 6 English-language classroom to support digital literacy learning.

Practices reflecting viewing and representing are found in the language curricula of many countries. For a number of years most Australian states have implemented curricula that emphasise using and composing multimodal texts (Vincent, 2006). For instance, the New South Wales Board of Studies in Australia has issued an English-language syllabus for K–10 that includes new learning outcomes related to viewing multimodal texts. ‘Viewing’ is described as skills for “observing and comprehending a visual text, e.g., diagram, illustration, photograph, film, television documentary, multimedia” that might or might not include reading accompanying written text (Board of Studies Teaching and Educational Standards, 2015). The syllabus refers to these meta-skills as ‘language modes’ and introduces an additional mode, ‘representing’, which is given prominence in the secondary-school syllabus. In Victoria, the Victorian Essential Learning Standards (Victorian Curriculum and Assessment Authority [VCAA], 2007) for primary-school English also emphasise using and composing multimodal texts in electronic format.

Similar developments are occurring in other countries. For example, in Canada, viewing and representing are integral parts of the English Arts curriculum (Division of Program Development, 1998), while in England, the Primary National Strategy places a priority on new technologies for literacy teaching in schools (Department for Children, Schools and Families, 2006). These developments all demonstrate clearly that English-language curricula for primary schools around the world have been revised to allow new literacy practices involving technology to enter classrooms. For centuries, traditional storytelling has been used in schools to help the students develop their literacy skills by

improving reading, writing, listening and speaking. However, the emergence of new technologies created opportunities for the students to express themselves digitally, or create digital stories for a specific purpose (Oller, 2008).

## **1.2 Context for the Study**

### **1.2.1 About the school.**

The study reported in this document took place at a primary school in Hong Kong. The school was financed by the Singapore Ministry of Education and parents. It was an international school that opened in 1991 to accommodate the children of Singaporean expatriates working in Hong Kong. Over the years, the school gained popularity with the local community of Hong Kong parents because of its rigorous bilingual academic program (English and Mandarin Chinese) and unique approaches to teaching mathematics, which include a model drawing approach for problem solving when learning mathematical concepts. Such method of learning mathematics allows pupils to represent mathematical relationships in a word problem pictorially, which helps them visualize the problem, understand it better and plan the steps required for the solution. The primary school's curriculum was based on the guidelines from the Singapore Ministry of Education.

The community of teachers was multinational and multiracial, with teachers originating from Singapore (the majority), mainland China, Hong Kong, Australia, New Zealand, Canada, the US and the UK. Most of those holding managerial positions, including the principal, vice principals, heads of department and subject heads, were Singaporean. A large number of teachers were Masters Degree holders and were eager to continue their own professional development through regularly updating their teaching skills.



The student community mostly comprised Hong Kong and Singaporean Chinese, some of whom held citizenships of other countries such as the US, Canada, Australia and the UK. The school had approximately 100 preparatory-year (kindergarten) students, 750 primary-school students and 100 secondary-school students when the study was conducted. The secondary-school students were stationed at the primary-school campus temporarily, while waiting for the permanent school premises to be built.

### **1.2.2 About the class.**

The study class consisted of students aged 11 or 12 whose nationality was Hong Kong (12), Singaporean (8) and mainland Chinese (5), with 13 boys and 12 girls. The students were bilingual or trilingual: they could communicate (orally and in writing) in English and Mandarin Chinese, and some were effective Cantonese speakers.

The school building was modern and the school had a well-developed infrastructure and state-of-the-art facilities. There were three stationary computer laboratories and one mobile cart, each having sufficient computers for 30 students. Primary 1 and 2 classrooms had interactive whiteboards. Computer laboratories and the mobile cart were booked through an online booking system on a first-come-first-served basis; teachers needed to make bookings three weeks in advance, which required thorough teacher planning to ensure the required facility would be available for a lesson. The mobile cart was stored on the 5th floor and had to be rolled from the storeroom to the 6th floor, where the study was conducted, and back into the storeroom afterwards.

In this study, the students used PC computers in the stationary computer lab during the pre-study and for project one, and the school MacBooks from a mobile cart, which was rolled toward the students' classroom whenever the students worked on their digital stories for projects two and three.

The school had its own e-learning portal, 'MC Online', previously known as 'LEAD' ([http://www.lead.com.sg/LEAD/login/lms\\_login.aspx](http://www.lead.com.sg/LEAD/login/lms_login.aspx)). The portal contained a repository of curriculum-based digital content, based on the Singapore curriculum materials. It was used by teachers to supplement the curriculum, especially during 'E-learning Days'. However, during the time when the study was conducted, the portal only included pre-packaged resources, such as interactive MCQ questions and a message board, and was not useful for the purpose of the study.

Another learning platform, ThinkQuest, was used by the school (<http://www.thinkquest.org/en/>). It allowed the creation of technology-based activities and online collaboration in a protected environment. It was used by a small number of teachers who were enthusiastic about bringing information and communication technology (ICT) into their lessons. The two main functions of this portal were the ability to upload files (including videos) up to 1Gb in size and to typewrite texts. The researcher used ThinkQuest for one of the projects in this study, as detailed in a later chapter.

The school Intranet was well developed. Wi-fi was available in all corners of the school, except for the school canteen and rooftop. There were directories for individual teachers, departments, committees and students. The students had access only to the Pupils' Drive, which they began using in Primary 1. By Primary 6, all students were able to navigate it effectively. Professional learning was provided by teachers from the ICT committee. Department drives contained all the teaching resources, examination materials and curriculum documents. Only teachers had access to this drive. Documents and video files could be uploaded to and downloaded from the drive from any teacher's computer. Parents did not have access to either the drives or the online learning platforms.

### **1.2.3 About the researcher.**

The researcher for this study was the female teacher of English language in the class being studied. At the time of the study, the researcher had had eight years of experience teaching English, English as second language, English support, ICT and research skills. The researcher was born in Eastern Europe and grew up in various countries around the world due to her parents' work engagements (e.g., Myanmar, Peru, Singapore, India, Russia, Ukraine and Australia). She attended international and government schools and is fluent in English, Russian, Spanish and Croatian languages. Her qualifications include: a Bachelors Degree from Russia (double major: teacher of English and Spanish as Foreign languages; translator), Specialist Diploma in E-learning Instructional Design from Singapore, and a Masters Degree (Education) from Australia. The researcher was passionate about the use of technology in her classrooms. Being a teacher of both ICT and English, she often noticed that certain ICT projects could be integrated into the English-language curriculum. Across-the-curriculum activities using ICT were not undertaken in the study school at the time the study commenced and the use of technology for teaching was limited to teacher PowerPoint (PPT) demonstrations. The researcher pioneered the integration of ICT in her own teaching of a Primary 6 English-language class. The fact that the researcher was the classroom teacher in this study might have influenced the study in such way that her own digital literacy skills and competences did not impede the flow of the technology-enhanced lessons, and her confidence in using technology in the classroom became beneficial for the students under the study.

### **1.3 Purpose of the Study**

The purpose of the study was to identify and describe the digital literacy development of three Primary 6 students as they engaged in three digital-storytelling

activities over one semester. In addition, the researcher aimed to examine any factors that inhibited the development of digital literacy in the three students. Lastly, the researcher aimed to provide recommendations for teachers on planning lessons that include digital storytelling, to enable the development of students' digital literacy.

## **1.4 Importance of the Study**

English-language classrooms must provide students with opportunities to develop digital literacy: to work with ICT and develop the skills required for representing through digital media (Singapore Ministry of Education ICT Standards Key Stage 2, 2007; General Capabilities in the Australian Curriculum, 2012; Florida Technology Literacy Profile, 2009). In this study, digital literacy is viewed as a part of language learning but more importantly, as an essential skill that prepares students for effective performance across the curriculum and in aspects of modern life in which representing through multimodal texts is required (e.g., in work, learning and socialising).

Studies by Sweeney-Burt (2014), Banaszewski (2005) and Barron and Darling-Hammond (2008) indicate that digital storytelling may be an important strategy in digital literacy learning and teaching in a primary-school English-language classroom, for a number of reasons: it supports student engagement; provides a meaningful context for learning; offers structure for working with media; enhances students' creative expression in multimedia formats; provides opportunities to work with technology tools; helps consolidate aspects of digital literacy learning; and helps students develop research and critical-thinking and problem-solving skills.

In contrast, however, a 2015 OECD (Organisation for Economic Co-operation and Development) report found that schools around the world that use ICT for education had not seen a noticeable improvement in their students' performance in

reading, mathematics or science. In fact, in the countries in which technology is used in classroom the most (e.g., Spain, Sweden and Australia), the students' reading performance declined between 2000 and 2012 (OECD, 2015). The report also suggested that students sometimes have too much computer time in schools and miss out on other important aspects of learning, such as face-to-face group work, handwriting and solving of real-life problems. The report recommended a rethink about the way technology is used in the classroom.

These two opposing views demonstrate that there is no consensus regarding the effectiveness of the use of technology in teaching and learning; therefore, this current study was important in terms of finding out whether storytelling with the use of technology (digital storytelling) in a Primary 6 English-language classroom was beneficial for the students' development of digital literacy.

Although primary English-language curricula for schools in Singapore and in the rest of the developed world have been revised to incorporate digital literacy, a number of challenges continue to undermine the implementation of digital literacy in schools. Some of the challenges include: the limited focus on digital text (Chew, 2005; Kress, 2006; Merchant, 2007); the disintegrated view of multimodal text (Jewitt, 2008); the limited digital literacy of teachers (Pakley, 2003; Loudon & Rohl, 2006; Grunwald & Associates, 2010); the lack of student-centred practices in digital literacy learning in Singaporean English-language classes (Chew, 2005; Kwek, Albright & Kramer-Dahl, 2007); and the lack of appropriate multimodal assessment (Chew, 2005; Vincent, 2006; Keys, 2007; Van Driel, Bulte, & Verloop, 2007).

## **1.5 Research Design**

The following central research question (RQ) guided the study and informed the research design and data collection:

*RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom?*

Additionally, the following specific questions (SQs) were addressed:

*SQ1. What aspects of digital literacy develop through digital storytelling?*

*SQ2. What are the factors that inhibit the effective implementation of digital storytelling?*

To answer these questions, three digital-storytelling activities were designed and an evaluation rubric was developed to measure development (if any) of aspects of digital literacy as the students became engaged in the three projects.

The study's premise was that if digital literacy learning occurs through students' engagement with digital storytelling, it is necessary to identify the aspects of digital literacy developed by the students and any factors that may inhibit this development (detailed in Chapter 2: Literature Review).

The collected data were richly descriptive and included digital artefacts and planning documents created by the students, teacher observations, interviews with the students, students' written reflections, peer evaluation, and evaluations by and discussions between the researcher and associates (detailed in Chapter 3: Research Methodology).

The three study cases were analysed individually and the results for the pre-study and the three subsequent digital storytelling projects were reported in form of texts, tables and charts (presented in Chapter 4: Results).

A cross-case analysis of the three cases was conducted. The researcher compared the digital literacy developed by these three students to identify any similarities and differences between the three cases. According to Yin (2009) and Merriam (2004), cross-case analysis in a multiple case study may help to harness

individual cases under common themes (discussed in Chapter 5: Results Across the Three Cases in the Study).

Finally, the researcher provided study conclusions, recommendation and limitations, as well as called for further research in the field (discussed in Chapter 6: Conclusions and Recommendations).

The next chapter reviews the literature relevant to this study.

## **Chapter 2: Literature Review**

### **2.1 New Type of Literacy**

#### **2.1.1 Literacies in the twenty-first century.**

The Internet and emerging tools and technologies are transforming the way we work with information, communicate and learn. According to Lane (2012), “The expectations and learning and thinking styles of students exposed to these technologies sets expectations on academics to change the way they teach” (p. 68). The Internet is flooded with digital text that is consumed, produced and published not only by traditional ‘information authorities’ but also by ordinary Internet users. Individuals can now easily publish and distribute digital text to millions of others across the world via the Internet. This significantly increases one’s ability to be heard and seen. In addition, the speed at which new information is published and updated has significantly increased, while emerging mobile phone applications allow individuals to publish content remotely as and when they wish to do so. This means that ordinary people are now able to provide new information more rapidly than the major news houses (Carrington & Robinson, 2010). Information is also becoming more multimodal, which requires students to develop a new set of skills. The way the information is created and distributed, as well as consumed, is also changing (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2008).

The enormous growth in information available on the Internet, as well as the spectrum of engaging Web 2.0 applications (e.g., Facebook, Friendster and Myspace) result in increasing information needs and expectations from ordinary people. For example, individuals now expect information to be rich in modalities and to be delivered not just via computers, but also via a range of mobile devices such as iPods, smart mobile phones and tablet personal computers (Luckin, 2010). As a result of the



types of information that are now being consumed, as well as the increasing urge to create information themselves, these individuals are distinctly different from older generations and people who are not active technology users in terms of their ability to work with information (Luckin, 2010). Many of them are school students who, unlike most of their teachers, have been active technology users from a very early age (e.g., through electronic toys, digital games, mobile phones and the Internet) and digital ‘content creators’ (McLellan, 2006).

There is growing support in the literature for the need for educational institutions to accommodate technology developments in teaching and learning, to prepare students to function in the technology-literate world outside school (UNESCO, 2008).

Educational and other institutions across the globe need to be conscious of the rapid developments in ICT. Media houses, for example, are particularly threatened by these developments, as they no longer have a monopoly over news creation and distribution. The voices of ordinary people are now becoming as powerful as the voices of the major news houses. For Gillmor (2004), the ordinary people are the media today. They decide what to read, what to edit and what to publish.

Flexible businesses are able to accommodate these developments and turn some of the emerging practices into competitive advantages. As this occurs, business practices change and in turn, the skills that are required in new and existing employees change. This raises the question of whether educational institutions are preparing graduates who are relevant to the needs of industry. Sir Ken Robinson explained this notion in a multimedia presentation, ‘Changing Educational Paradigm’ (2010). According to Robinson, education reforms are often slow and lag behind other developments in the world. Teachers often teach by ‘telling’ the students what they want them to know, while students read texts and produce written essays or sit tests.

Thus, the spoken word and written text remain the predominant modes of teaching and assessment, while technology, when used, is mostly intended for students to learn from, rather than to learn with.

There is a predicament if schools continue to deal predominantly with traditional forms of information and put more emphasis on the development of traditional literacy skills rather than digital literacy skills. Although it is widely recognised that digital literacy skills are important, promoting activities in which students learn with technology and develop digital literacy remains peripheral to many classrooms around the world. For example, Churchill and Lim (2007) noted that it is now widely recognised that more needs to be done to ensure that educational reforms transform pedagogical practices and integrate technology in teaching and learning as “a means for improving learning outcomes and development of new competencies for a knowledge-based global economy (such as information literacy, digital fluency and lifelong learning skills)” (p. 182).

Pinkard (2008) claimed that although it is one thing to use digital tools in order to be a consumer of today’s media, it is another more important skill to know how to be a meaningful producer of digital media. Pinkard further suggested that we need to teach students to be “multimedia storytellers”. Other authors have agreed that digital literacy learning has become a requirement imposed by the wide development and application of new technologies for communication and representation (Gleva & Bogan, 2007; Huffker, 2006; Kress, 2006; Resnick, 2002). To understand how digital literacy should be taught and learnt, it is important to identify the scope and range of skills encompassed by the term ‘digital literacy’.

### **2.1.2 Digital literacy: Spectrum of understandings.**

The definition of digital literacy in the literature varies, but most researchers agree that digital literacy requires a number of skills, or sets of skills, that are interdisciplinary in nature. The first attempts to identify digital literacy belong to Paul Gilster (1997), who defined digital literacy as “the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers” (as cited in Pool, 1997, p. 6). Gilster saw essential differences between digital information media and conventional print media. In addition, he thought digital literacy competencies were not merely technical, but included the ability of a person to “master ideas”. The four digital literacy competencies defined by Gilster were: knowledge assembly, evaluating information content, searching the Internet and navigating hypertext.

Similarly, Warshauer and Matuchniak (2010) stated that to be digitally literate, an individual needs to develop the following set of skills:

- information, media and technology skills
- learning and innovation skills
- life and career skills.

Warshauer and Matuchniak (2010) proposed that developing the first set of skills (information, media and technology skills) required the individual to achieve competency in information literacy, media literacy and technology skills. An individual empowered with learning and innovation skills should be able to demonstrate creativity and innovation, as well as skills in critical thinking, problem solving, communication and collaboration. Warshauer and Matuchniak (2010) further postulated that an individual needs to be flexible, adaptable, self-directed, take initiatives and exercise social and cross-cultural skills.

The UNESCO (2008) Framework defined the indicators of information literacy as meaning a person can:

- recognise information needs (that is, awareness that information is required to solve problems)
- locate and evaluate the quality of information (e.g., in manuals, databases and published codes of practice the information is usually accurate, unlike much of that on the Internet)
- store and retrieve information
- make effective and ethical use of information
- apply information to create and communicate knowledge (representing the product of information literacy).

The UNESCO Framework (2008) did not consider digital literacy as a required part of information literacy, but acknowledged its importance for adults in the light of advances in ICT.

People can be information literate in the absence of ICT, but the volume and variable quality of digital information, and its role in knowledge societies, has highlighted the need for all people to achieve information literacy skills. For people to use information literacy within a knowledge society, both access to information and the capacity to use ICT are prerequisites. Information literacy is however a distinct capacity and an integral aspect of adult competencies (p. 7). In the Framework, ICT literacy is examined as a separate set of skills related to the use of technology: hardware and software.

When considering digital literacy in school settings, an international ICT literacy panel formed under the umbrella of the Educational Testing Service (ETS) nominated digital knowledge as an important competency of students in the twenty-first century.

However, the term ‘digital literacy’ is replaced by ‘ICT literacy’, defined as “using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society” (ETS, 2002). The members of the ETS panel called for ICT literacy skills to be integrated into curricula, addressing cognitive skills as well as technical skills to provide for the development or improvement of ICT literacy.

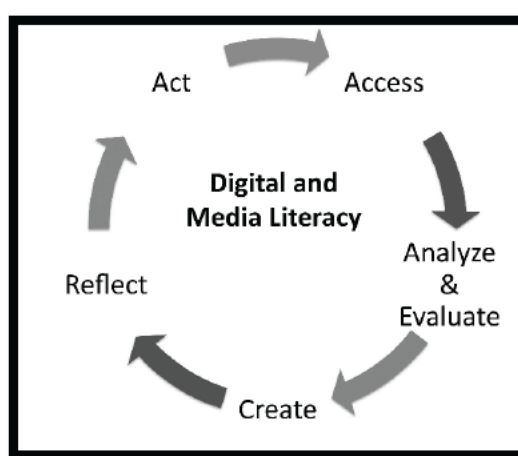
The rapid technological advances of the 2000s and the emergence of Web 2.0 (O’Reilly, 2005) have led to an increasing number of technology tools and resources both online and offline, which have allowed ordinary computer users to create and share digital information such as CDs and DVDs, computer software and applications, online Web-based learning, streaming video and audio, wikis and blogs. According to the proceedings for the International Conference on Media and Information Literacy for Knowledge Societies organised by UNESCO, consuming and creating digital media require an individual to develop competencies in media literacy, including digital literacy, and “aims to empower citizens by providing them with the competencies (knowledge and skills and attitude) necessary to engage with traditional media and new technologies” (UNESCO, 2012).

Hobbs (1998, 2007), stated that media literacy, which includes digital literacy, is the specific knowledge and skills that can help develop critical understanding and the use of media as well as the ability to access, evaluate, organise and communicate messages in a variety of forms. Redmond (2012, p. 106) supports this perspective by stating, “Media literacy education extends knowledge and skill competencies from reading and writing print texts to include analysis of texts in all forms”, including digital texts. Similarly, the National Association for Media Literacy Education (NAMLE, 2010) published a report written by Hobbs (2010) that resulted in a set of

recommendations on the digital and media literacy needs of the student. The report emphasises the importance of these literacies by claiming that it is important to:

... acquire multimedia communication skills that include the ability to compose messages using language, graphic design, images, and sound, and know how to use these skills to engage in ... life. These competencies must be developed in formal educational settings, especially in K–12 and higher education, as well as informal settings. The inclusion of digital and media literacy in formal education can be a bridge across digital divides and cultural enclaves, a way to energize learners and make connections across subject area.” (p. 6).

Hobbs (2010) further highlighted the five competencies that people need in order to communicate effectively and solve problems in their daily lives, as illustrated in Figure 1.1.



*Figure 1.1.* Essential competencies of digital and media literacy (Source: Hobbs, 2010).

The diagram above demonstrates that “the competencies work together in a spiral of empowerment” (Hobbs, 2010, p. 16). These competencies enable people to consume and produce messages. They need to be taught through formal schooling. Hobbs further claimed that “Teacher education programs recognize the importance of preparing future teachers to be skilled in digital and media literacy” (p. 16), quoting the

Common Core State Standards Initiative (2010): “To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, report on, and create a high volume and extensive range of print and non-print texts in media forms old and new” (as cited in Hobbs, 2010, p. 16).

An important component of digital literacy is technology tools literacy, as with the emergence of ICT, a person needs to be able to effectively use the technology tools that are available. The International Society for Technology in Education (ISTE, 2007) listed the following technology tools skills:

- understand and use technology systems
- select and use applications effectively and productively
- troubleshoot systems and applications
- transfer current knowledge to learning of new technologies.

Shapiro and Hughes (1996) defined technology literacy as “the ability to understand and use the practical and conceptual tools of current information technology relevant to education and the areas of work and professional life that the individual expects to inhabit”. Similarly, the Singapore Ministry of Education ICT Standards Key Stage 2 (2007), the General Capabilities in the Australian Curriculum (2012) and the Florida Technology Literacy Profile (2009) guidelines emphasise the importance of technology tools skills by providing a detailed list of student abilities for working with technology both in class and at home. According to these guidelines, digital tools enable students to solve problems and carry out tasks. Students need to develop an understanding of what a computer can do and an appreciation of the limitations under which computers operate. According to the Florida Technology Literacy Profile (2009), technology literacy is the ability to responsibly use appropriate technology to

communicate, solve problems and access, manage, integrate, evaluate and create information to improve learning in all subject areas and to acquire lifelong knowledge and skills in the twenty-first century.

Various literacy skills required to participate actively and effectively in the world where emerging technologies create rapid changes in education and everyday life, are called elsewhere the 21<sup>st</sup> century skills. They include critical-thinking skill sets, creativity, innovation, decision-making, problem-solving, ability to use technology to gather, analyze, and synthesize information, to work ethically and collaboratively. Many researchers use the term of the 21<sup>st</sup> century skills as an umbrella heading for many of the skills and literacies associated with the use of information and communication technologies (Barell, 2010; Lent, 2012; Trilling & Fadel, 2009).

### **2.1.3 Four key components of digital literacy.**

As discussed in the previous section, the literature suggests that a student needs to develop a set of skills that will allow him/her study, socialise and work using technology in the contemporary world (ISTE, 2007; Hobbs, 2007, 2010; UNESCO, 2008, 2012). Digital literacy, which comprises information literacy, media literacy and technology tools literacy, is not an alternative or replacement to traditional literacies; rather, it is an extension that contributes to overall literacy. In the context of this study, ‘digital literacy’ is defined as a set of skills that enable an individual to use technologies to work with information. Information in the context of this study is examined as digital information, which encompasses texts (e.g., articles published on websites), images (e.g., photographs and pictured on web sites or taken by students), videos (e.g., multimedia products, animations and broadcasts), and podcasts (e.g., recorded narrations published online or on students’ desktops). Digital literacy It builds on the traditional literacies of reading, writing, listening and speaking and includes elements of



information literacy, media literacy and technology skills (American Association of School Librarians [AASL], 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 1997, 2008; Jewitt, 2006; Kress, 2003; McClure, 1994; Martinec & Leeuwen, 2009; UNESCO, 2008; Webber & Johnston, 2000). In this study, digital literacy is examined in terms of the set of competencies that a student in an upper-primary-school English-language classroom needs to possess to participate meaningfully and actively in representing through digital multimodal texts. These competencies include, but are not limited to, the following abilities:

- reading, writing, speaking and listening (traditional literacy)
- identifying what information is needed and possessing the ability to locate, evaluate and use information (information literacy)
- questioning, analysing, interpreting, evaluating and creating media messages (media literacy)
- using tools to manage, consume and create information (technology tools literacy).

The first component, ‘traditional literacy’, is defined in official educational standards and assessments of the four language skills of reading, writing, listening and speaking (O’Brian & Scharber, 2008). The second component, ‘information literacy’, is a set of skills that helps an individual to recognise when information is needed and to locate, evaluate and use this information effectively (AASL, 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; McClure, 1994; UNESCO, 2008; Webber & Johnston, 2000). The third component, ‘media literacy’ is defined as a set of skills that helps an individual to be both a critical thinker and a creative producer of an increasingly wide range of messages using images, language

and sound (Jewitt, 2006; Kress, 2003; Martinec & Leeuwen, 2009). ‘Visual literacy’ is included in this component, being a set of skills that requires an individual “to access, analyse, evaluate and communicate information in any variety of forms that engage the cognitive processing of visual images” (Chauvin, 2003; Hobbs, 1997, 2008), including the ability to think, learn and express oneself in the form of images (Australian Communications and Media Authority, 2009; Braden & Hortin, 1982; Chauvin, 2003; Sinatra, 1986; UNESCO, 2012). The fourth component, ‘technology tool skills’ is defined as a set of skills that “enable[s] an individual to solve problems and carry out tasks” (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2012) with the use of “the practical and conceptual tools of current information technology relevant to education and the areas of work and professional life that the individual expects to inhabit” (Shapiro & Hughes, 1996).

Having identified definitions of these three key components of digital literacy the literature and used them to define digital literacy in the current study, the next section considers the digital literacy competencies needed to become digitally literate, as identified in the literature.

#### **2.1.4 Digital literacy competences and their aspects.**

As noted above, digital literacy is a fundamental skill that is required in a contemporary classroom and in life. The literature suggests that a student needs the skills to read multimodal texts and represent ideas with the use of multiple modalities (texts, images, sounds and voice recordings) to operate in contemporary educational settings and for lifelong learning. To support this, Kress and Van Leeuwen (1996) discussed the “overwhelming evidence of the importance of visual communication” and emphasised that effective communication is not limited to written text because of the development of other forms or modes of communication, from oral messages in early

times, to printed media, to radio and television and finally, to the dominance of the Internet media.

Jewitt (2008) argues that all modes of communication contribute to construction of meaning in some ways and “no one mode stands alone in the process of making meaning; rather, each plays a discrete role in the whole” (p. 247). Similarly, a blog by Yannielle (personal communication, 2012), titled ‘My Runaway Class’, emphasises the duty of educators to teach their students how to use the currently available technology more effectively, particularly for their educational endeavours. He states, “... a student who is very comfortable with digital technology is not necessarily digitally literate”. This means that to be digitally literate, students need to develop a set of digital competencies. In addition, Kress (2004) underlines a move from the dominance of the book (or print-based media in general) to the dominance of the medium of the screen (the computer screen in particular). Elsewhere, Kress (2006) argues that the new medium of screen makes it “easy to use a multiplicity of modes, and in particular the mode of image, still or moving images, as well as other modes, such as music and sound effects” (p. 5).

This raises the question: In what ways should literacy learning be extended to encompass skills required to communicate meanings through digital multimodal texts? Digital literacy is not an alternative or replacement to traditional literacies; rather, it is an extension that contributes to an overarching literacy required for working, learning and socialising in the contemporary world. In this study, digital storytelling is examined as a strategy to develop or promote digital literacy learning. Digital literacy builds on the traditional literacies and includes elements of information literacy, media literacy and technology skills.

Much of the literature on information literacy concurs that the general competencies include:

- recognising, locating, evaluating, storing and retrieving the information needed to perform a task
- being aware of issues to do with reliability of information
- organising information
- accessing information ethically and legally
- effectively transmitting the information to others or using it to solve problems (ISTE, 2007; UNESCO, 2008; Australia and New Zealand Information Literacy Framework, 2004; Webber & Johnston, 2000; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Ryan & Capra, 2001; McClure, 1994)

Media literacy competencies are characterised in the literature as the ability to:

- determine the nature and extent of the visual materials needed
- find, analyse, interpret and evaluate images and their sources
- understand legal and ethical issues surrounding the use of images
- understand how visual elements create new meanings
- communicate information with the use of multiple media (e.g., images, texts, layouts and transitions)
- review the skills (including ICT skills) needed to produce user-generated content (Australian Communications and Media Authority, 2009; Olher, 2008; ISTE, 2007; ALA, 2008; General Capabilities in the Australian Curriculum, 2012; Hobbs, 1998; 2005, 2006, 2007; Chauvin, 2003; Kress & Van Leeuwen, 1996; Sinatra, 1986; Braden & Hortin, 1982).

The challenge in identifying the technology tools required for the development of digital literacy is the tendency to make broad generalisations about the use of technology in teaching and learning. For example, in some countries, educational institutions prescribe the use of various technology applications without considering how they can be used in various subjects in a meaningful way. Nevertheless, researchers and various educational institutions around the world, such as General Capabilities in the Australian Curriculum, (2012), Australian Communications and Media Authority (2009), Singapore Ministry of Education (2008), ALA (2008), Olher (2008), Hobbs (1998, 2007), ISTE (2007), Kress & van Leeuwen (1996), use standards that call for individuals to develop technology skills by using technology in a meaningful way to:

- solve problems and carry out tasks
- develop an understanding of what the machine can do and appreciate its limitations
- work across multiple applications, both online and offline/

Researchers in Future Lab (2010) call these skills “functional skills” that “empower a student to operate each of the broad range of technologies that can be used in schools. They are not developed sequentially and can be developed simultaneously.” Similarly, Florida Technology Literacy Profile (2009) suggested that ICT literacy skills can be allocated into different categories, as follows:

- technology operations and concepts (applying strategies for identifying and solving routine hardware and software problems that occur during everyday use)
- constructing and demonstrating knowledge (using content-specific tools, software, and simulations; applying multimedia tools and peripherals to support personal productivity, group collaboration and learning throughout

the curriculum)

- communication and collaboration (in collaboration with peers and experts, researching and evaluating the accuracy, relevance, appropriateness, comprehensiveness and bias of electronic information sources concerning real-world problems)
- independent learning (designing, developing, publishing and presenting products using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom)
- digital citizenship (exhibiting legal and ethical behaviours when using information and technology and discussing the consequences of misuse).

The researcher in this study recognised the considerable effort of many individuals and international organisations in defining digital literacy. It is possible to say, based on the above-mentioned descriptors of the components of digital literacy (e.g., information literacy, media literacy and technology tools skills) that the skills may overlap. It was important for the researcher to identify and examine each of the sets of skills, which the researcher defined as ‘aspects of digital literacy’, to identify a framework for digital literacy teaching and learning. The framework used by the researcher was based on the standards developed by ISTE (2007), which provided the performance indicators and described the relevant competencies that the students needed for learning effectively and living productively in an increasingly global and digital society. The ISTE Standards, or their modified versions, have been used in many countries around the world. The six technology-aided performance indicators offered by ISTE are as follows:

- 1) *Creativity and innovation*: Students demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.

- 2) *Communication and collaboration*: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
- 3) *Research and information fluency*: Students apply digital tools to gather, evaluate and use information.
- 4) *Critical thinking, problem solving and decision making*: Students use critical-thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources.
- 5) *Digital citizenship*: Students understand human, cultural and societal issues related to technology and practise legal and ethical behaviour.
- 6) *Technology operations and concepts*: Students demonstrate a sound understanding of technology concepts, systems and operations.

Although communication and collaboration using technology is an important standard, this was not examined in the initial study because the conditions for the use of digital media environments at the time when the study was conducted were limited. Additionally, the researcher intended to engage the students in individual work, to maximise the learning opportunities, which were then used to evaluate the development of digital literacy by the individual students in the study. Although the students worked individually on their digital storytelling tasks, the researcher did not exclude the possibility of collaboration and communication between all of the students in the classroom.

The ISTE (2007) standards of student digital literacy competencies were used as a foundation in this study. After consulting the body of literature, a set of 10 aspects of digital literacy was developed because they would provide more information and more concrete evidence of the development of digital literacy in students, especially because

some of the standards overlapped as seen in Table 2.1. These 10 aspects were identified as key aspects for the development of digital literacy.

Each aspect of digital literacy is explained in the next section.

### **2.1.5 Aspects of digital literacy.**

#### ***2.1.5.1 Determine the nature of information and media needed.***

This aspect encompasses skim-reading through the content and deciding whether the information and images are useful for the task and identifying what this source offers that other sources of information do not (UNESCO, 2008; Australia and New Zealand Information Literacy Framework, 2004; Webber & Johnston, 2000; ALA, 1989). Deciding whether the resolution of images is adequate is very important because the clarity of images may affect the overall meaning of the multimedia representation created by the student (Lambert, 2002). Identifying the technology tools needed for the task is another required skill because this may inform the choice of media (Lambert, 2002; ISTE, 2007). This aspect is important because due to the rapid technological changes, “individuals are faced with diverse, abundant information choices—in their academic studies, in the workplace, and in their personal lives” (ALA, 1989). This aspect is also widely supported in the literature see (ISTE, 2007; UNESCO, 2008; Lambert, 2002; Webber & Johnston, 2000; Australia and New Zealand Information Literacy Framework, 2004).

#### ***2.1.5.2 Locate information.***

This aspect involves a student’s ability to know where and how to locate information, because if students can locate information quickly and easily it increases their ability to concentrate on the meaning of information (ISTE, 2007; UNESCO, 2008; Porter, 2004; Lambert, 2002). In addition, a student needs to understand that using a single source might not provide sufficient information or choice of images



(Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 2005, 2006, 2007). This aspect is important because given the amount, type and multiple formats (multimodal formats of information, students need to be able to use online research to locate the information that would best suit their purposes (ISTE, 2007; UNESCO, 2008; Porter, 2004; Lambert, 2002; Webber & Johnston, 2000; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 1998, 2005, 2006, 2007).

#### ***2.1.5.3 Evaluate reliability of information and media content.***

This aspect involves deciding whether information sources and media are reliable by being able to explain the significance of some criteria for evaluation of the information and media reliability; for example, the author and his expertise in the field, the domain, the target audience, the age appropriateness, the copyright date and what this source offers that other sources of information do not (ISTE, 2007; UNESCO, 2008; Webber & Johnston, 2000; Redmond, 2012; Australia and New Zealand Information Literacy Framework, 2004). It can be harder for young learners to evaluate the reliability of digital materials than some print materials because websites are sometimes not authored or dated (ISTE, 2007; UNESCO, 2008; Webber & Johnston, 2000; ALA, 1989, 2008; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Australian Communications and Media Authority, 2009; Hobbs, 1998, 2005, 2006, 2007; Redmond, 2012).

#### ***2.1.5.4 Analyse, interpret and use a range of information and media to communicate meanings through multimodal text (e.g., text, image, animation, sound, layout and narration).***

This aspect involves students' ability to make meaningful use of modes to construct meanings in a cohesive manner, to express themselves in a digital format

(ISTE, 2007; ALA, 2008; General Capabilities in the Australian Curriculum, 2012; Porter, 2004; Chauvin, 2003; Lambert, 2002; Sinatra, 1986; Braden & Hortin, 1982; Australian Communications and Media Authority, 2009; Olher, 2008; Kress, & van Leeuwen, 1996; Hobbs, 1998, 2007). This aspect is important because it “extends knowledge and skill competencies from reading and writing print texts to include analysis of texts in all forms” (Redmond, 2012, pp. 116–120). There appears to be agreement in the literature that there are a growing number of ICTs that the students need to master to ensure that the modes in a multimodal text complement each other dynamically (ISTE, 2007; ALA, 2008; General Capabilities in the Australian Curriculum, 2012; Porter, 2004; Chauvin, 2003; Lambert, 2002; Sinatra, 1986; Braden & Hortin, 1982; Australian Communications and Media Authority, 2009; Olher, 2008; Kress, & van Leeuwen, 1996; Hobbs, 1998, 2007).

#### ***2.1.5.5 Use digital technologies in a safe and socially responsible manner.***

Various authors agree that the use of digital technologies in a safe and socially responsible manner involves displaying socially responsible conduct when coming across inappropriate, harmful and obscene digital information (ISTE, 2007; UNESCO, 2008; Chauvin, 2003; Lambert, 2002; Australian Communications and Media Authority, 2009; Olher, 2008; Florida Technology Literacy Profile, 2009; Hobbs, 1998, 2007). According to these authors, this aspect is important because many schools around the world are using digital technologies such as computers and the Internet so the students can access digital resources quickly and easily. However, despite the measures that the schools take to protect the students from harmful online material (e.g., by using a Firewall network security system), there is still a range of information and media that the students may come across when conducting online search.

#### ***2.1.5.6 Manage digital information in technology space (hardware and software components troubleshooting).***

This aspect is about how students use digital technology such as computers and online resources (ISTE, 2007; Hobbs, 1998, 2007). It includes abilities such as copying chunks of texts, web addresses or notes for future use from an Internet page and pasting them into a word-processing document (Florida Technology Literacy Profile, 2009). It also includes the ability to save and retrieve files in/from a designated folder and/or USB and to share files with others (Australia and New Zealand Information Literacy Framework, 2004; ALA, 2008). This is one of the key skills required in technology-enriched environment in schools, work and everyday life, (ISTE, 2007; Hobbs, 1998, 2007; Olher, 2008; Florida Technology Literacy Profile, 2009; Australia and New Zealand Information Literacy Framework, 2004; ALA, 2008).

#### ***2.1.5.7 Ethically use information and media.***

This aspect involves a student's ability to use royalty-free information and media created by others (Creative Commons) by providing a source title, the link and date when information was retrieved (Australian Communications and Media Authority, 2009). It also involves the students' ability to create and use their own media by using a digital camera or by drawing and scanning their own pictures in a legally acceptable and ethical manner (Olher, 2008; Lambert, 2002). This aspect is important because copyright holds increasing importance in a technology-dominated world (ISTE, 2007; Webber & Johnston, 2000; ALA, 2008; Australian Communications and Media Authority, 2009; Florida Technology Literacy Profile, 2009; Olher, 2008; Hobbs, 1998, 2007; Lambert, 2002; Creative Commons).

***2.1.5.8 Apply information to design own representations to effectively communicate knowledge to others.***

This aspect is about how students apply information they have collected (e.g., text, image, animation, sound, layout and narration) to create their own multimedia presentations using the elements of a given genre (ISTE, 2007; UNESCO, 2008; Webber & Johnston, 2000). This aspect is important because the creator needs to consider the target audience and how they would make meaning of what was created by others (Olher, 2008; Hobbs, 1998, 2007; Webber & Johnston, 2000; Redmond, 2012; Australia and New Zealand Information Literacy Framework, 2004; ALA, 2008).

***2.1.5.9 Develop ability in problem solving and reflecting on own technology skills.***

This aspect involves a student's ability to critically evaluate the technology skills that he or she needs in order to complete the task (ISTE, 2007; Florida Technology Literacy Profile, 2009; Olher, 2008; Hobbs, 1998, 2007; Webber & Johnston, 2000; Redmond, 2012). These authors agree that the ability to solve problems independently is an important skill in light of the rapid technological progress over the past decades.

***2.1.5.10 Use a variety of technology tools to create digital information.***

This aspect means that a student is able to create an integrated multimedia product with authoring tools, using them to the best advantage (e.g., evaluating and editing their own work). This skill is important, in light of the vast variety of emerging technologies, as it allows a student to make informed decisions when choosing a technology tool (ISTE, 2007; ALA, 2008; Florida Technology Literacy Profile, 2009; Kress & van Leeuwen, 1996; Hobbs, 1998, 2007; Porter, 2004; Australia and New Zealand Information Literacy Framework, 2004; Jonassen, 2000).

Table 2.1 below summarises the six technology-aided performance indicators and the 10 aspects of digital literacy competencies identified by the literature. As there was a limited number of research studies on digital literacy in schools, this review drew on secondary and tertiary sources to ensure that a comprehensive exploration of practice and theory would be investigated in relation to the research questions.

Identified performance by ISTE (2007)		Aspects of digital literacy	Literature sources
Digital citizenship	Critical thinking, problem solving and decision making Communication and collaboration	1. Determine the nature of information and media needed	ISTE, 2007; UNESCO, 2008; Lambert, 2002; Webber & Johnston, 2000; Australia and New Zealand Information Literacy Framework, 2004
		2. Locate information	ISTE, 2007; UNESCO, 2008; Porter, 2004; Lambert, 2002; Webber & Johnston, 2000; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Hobbs, 1998, 2005, 2006, 2007, 2010
		3. Evaluate reliability of information and media content	ISTE, 2007; UNESCO, 2008; Webber & Johnston, 2000; ALA, 1989, 2008; New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Australian Communications and Media Authority, 2009; Hobbs, 1998, 2005, 2006, 2007, 2010; Redmond, 2012
		4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal text: text, image, animation, sound, layout, narration	ISTE, 2007; ALA, 2008; General Capabilities in the Australian Curriculum, 2004; Chauvin, 2003; Lambert, 2002; Sinatra, 1986; Braden & Horton, 1982; Australian Communications and Media Authority, 2009; Olher, 2008; Kress & van Leeuwen, 1996; Hobbs, 1998, 2007, 2010
		5. Use digital technologies in a safe and socially responsible manner	ISTE, 2007; UNESCO, 2008; Chauvin, 2003; Lambert, 2002; Australian Communications and Media Authority, 2009; Olher, 2008; Florida Technology Literacy Profile, 2009; Hobbs, 1998, 2007, 2010
		6. Manage digital information in technology space (hardware and software components, troubleshooting)	ISTE, 2007; Hobbs, 1998, 2007, 2010; Olher, 2008; Florida Technology Literacy Profile, 2009; Australia and New Zealand Information Literacy Framework, 2004; Olher, 2008
		7. Ethically use information and media (copyright)	ISTE, 2007; Webber & Johnston, 2000; ALA, 2008; Australian Communications and Media Authority, 2009; Florida Technology Literacy Profile, 2009; Olher, 2008; Hobbs, 1998, 2007, 2010; Lambert, 2002; Creative Commons
		8. Apply information to design own representations to effectively communicate knowledge to others	ISTE, 2007; UNESCO, 2008; Webber & Johnston, 2000; Redmond, 2012; New Zealand Information Literacy Framework, 2004; ALA, 2008; Hobbs, 1998, 2007, 2010
		9. Develop ability in problem solving and reflecting on own technology skills	ISTE, 2007; Florida Technology Literacy Profile, 2009; Olher, 2008; Hobbs, 1998, 2007, 2010; Webber & Johnston, 2000; Redmond, 2012
		10. Use a variety of technology tools to create digital information	ISTE, 2007; ALA, 2008; Florida Technology Literacy Profile, 2009; Kress & van Leeuwen, 1996; Hobbs, 1998, 2007, 2010; Porter, 2004; Australia and New Zealand Information Literacy Framework, 2004; Jonassen, 2000

### Aspects of Digital Literacy

Having identified 10 aspects of digital literacy that students develop as they become digitally literate, it is important to identify indicators to help map different levels of each aspect of development. The literature and the ISTE Standards (2007) in particular provides guidelines to which a teacher may refer to integrate technology into lesson planning and delivery. However, there is no instrument available to measure the development of students' digital literacy skills if the teacher uses a specific strategy for digital literacy learning (e.g., digital storytelling) in an English-language classroom.

A comprehensive collection of assessment instruments and rubrics compiled by Jon Mueller, Professor of Psychology at North Central College and author of *The authentic assessment toolbox* is available at <http://jonathan.mueller.faculty.noctrl.edu/infolitassessments.htm>. These assessment tools help to evaluate information literacy skills in one (albeit large) component of digital literacy, in the context of specific educational institutions, but they do not reflect digital literacy development indicators. There are various rubrics and checklists that assess ICT skills but they have been developed by individual institutions and target specific sets of skills. For example, Digital Literacy Assessment Standards lists a large number of competencies related to the use of specific computer applications and operation systems (e.g., Excel, Mac OS, etc.). Although they undoubtedly provide some guidelines as to how some digital literacy competencies can be assessed, there is no uniform answer to this issue.

The following sections explore digital literacy learning in the classroom and in particular, the existing challenges to digital literacy learning (see Section 2.2) and digital storytelling as a strategy for digital literacy learning (see Section

2.3). The literature in the following section further informed the development of an assessment rubric for this research.

## **2.2 Challenges for Digital Literacy Learning in the Classroom**

### **Context**

To realise digital literacy learning, transformations are required, not just in subject syllabuses but also in actual classroom practices. Any implementation of a curriculum in the classroom is mediated by a range of issues that may cause classroom practices to significantly deviate from the goals of the curriculum. This problem is obvious in Singapore's classrooms. For example, as stated by Kwek et al. (2007), when the English-language syllabus is implemented in Singapore's classrooms (Singapore Ministry of Education governed schools similar to the school where this study was conducted), it applies "a narrow range of textual forms and organisational 'rules' that students are asked to reproduce" (p. 74). The literature discusses the following challenges that teachers could have to overcome to implement digital literacy learning in their classrooms:

- limited focus on digital text
- disintegrated view of multimodal text
- limited digital literacy of teachers
- lack of student-centred practices in digital literacy learning
- lack of an appropriate multimodal assessment.

These challenges, derived from the literature, are discussed in more detail in the next section.

#### **2.2.1 Limited focus on digital text.**

The term 'digital story' as a product of digital storytelling has a strong association with print-based rather than technology-based material. This may



encourage teachers to favour the use of print-based materials as a means of developing reading and writing skills, while ignoring the other modes encompassed in digital literacies. For example, Merchant (2007) suggests that “what may be called digital literacy can be quite different in character from print literacy” (p. 118), while Kress (2006) underlines the importance of the literacies of the screen. For Merchant (2007), digital literacy includes communication of meanings through digital artefacts created and delivered via computers and other technologies. The focus on literacies of the screen allows teachers to have a clearer focus on new literacies involving digital multimodal texts. Unfortunately, the current English-language syllabus for Singapore’s primary schools does not distinguish explicitly between literacies for print and screen, and existing resources provided limited focus on digital text (Chew, 2005).

### **2.2.2 Disintegrated view of multimodal text.**

Further challenges lie in the teaching approaches that consider modes of representation as separated entities. For example, one common classroom practice is to give students a text and ask them to draw a picture based on it (or the other way around). In other words, the students are asked to change the modality of information and in doing so, to focus on one mode at a time rather than on multimodal texts (Jewitt, 2008). Although such activities can be beneficial for literacy learning, they do not fully address the complexity and requirements of a multimodal text, in which different modes contribute to overall meanings in unique ways. Jewitt further notes that all modes contribute to the construction of meaning in some ways and “no one mode stands alone in the process of making meanings; rather, each plays a discrete role in the whole” (p. 247). Students are required to develop skills to make meaning and to construct meaning through

digital texts, and throughout this process to effectively learn how to apply the language skills of reading, listening and viewing, as well as writing, speaking and representing in an integrated literary way. Jewitt further suggests a pedagogical model that encourages and fosters integration in the classroom. Jewitt discusses the application of the multiliteracies theory (Cope & Kalantzis, 2000) and the five factors that are “not necessarily linear” (Jewitt, 2008, p. 248). The model represents learners’ immersion in an *acquisition-rich environment*, which is followed by a *situated practice* that includes learners’ prior knowledge and experiences. Jewitt further discusses the “key pedagogic strategy through which students are taught meta-languages of design” (p. 248), called the *overt instruction*, which involves explicit teaching of the processes and meanings. *Critical framing* is the factor that allows the learners to understand the purpose of texts as they are in real-life contexts. Jewitt’s fifth pedagogical factor is *transformed practice*, which means the transfer of learners’ knowledge into new contexts (p. 249). This pedagogical model may help provide opportunities for teachers and students to engage in viewing and representing digital multimodal texts.

### **2.2.3 Limited digital literacy of teachers.**

Many teachers may not be adequately digitally literate, which presents difficulties in appreciating the importance of the new literacy as well as appropriately setting activities for students to increase their digital literacy learning. At the same time, despite the prolonged presence of computers in schools in the developed world, many teachers continue to demonstrate personal discomfort with, and lack of skills for, integrating technology into their teaching. For Oakley (2003), teachers are “expected to use ICT in meaningful ways in the

classroom, but they are often given little information on how to do so to reach specific pedagogical outcomes”.

Louden and Rohl (2006) explored pre-service teachers’ readiness for literacy teaching in Australian schools and found that sometimes, beginning teachers had little confidence to teach digital literacy and called for more practical ideas and concrete strategies. Although formal education is important, it is recommended that teachers constantly seek new knowledge and upgrade their technology skills in line with the latest developments in the fields of education and ICT (Australian Government Department of Education, Science and Training, 2003). This is observed elsewhere in the literature. For example, according to an American study conducted by Grunwald and Associates (2010), most teachers themselves “do not believe that their pre-service programs prepared them well in either technology or 21st-century skills. Teachers place more value on advanced training programs ... [However,] on-the-job technology training for teachers may focus on how to operate new equipment, but not on how to incorporate it effectively into instruction” (p. 7) Therefore, limited digital literacy of teachers may become an obstacle during technology-enhanced lessons.

The importance of teacher’s digital literacy, the attitude towards integrating technology into lessons and the ability to solve problems related to technology are significant factors that influence the development of digital literacy by students (Australian Government Department of Education, Science and Training, 2003; by Grunwald and Associates, 2010; Loudon and Rohl, 2006; Oakley, 2003). It is possible to suggest that the more digitally literate the teacher is, the higher are the chances of him or her providing students with opportunities

to use technology when completing school tasks, which in turn may support the development of digital literacies by students.

#### **2.2.4 Lack of student-centred practices in digital literacy learning in Singaporean English-language classes.**

Digital literacy learning requires student-centred pedagogical practices (see Section 2.3.2.2); learning outcomes cannot be achieved simply by instruction and memorisation. The current English-language syllabus for Singapore's primary schools emphasises language use, creativity, group work and other forms of student-centred engagement in classrooms as suitable strategies for achieving learning outcomes (Chew, 2005). Chew further claims that students should be engaged to work on relevant tasks that require them to make meaning and communicate through digital text and investigate language use through technology.

The rise of standardised international tests that tend to focus on low-level, traditional literacy skills has become increasingly an international issue in the past decade. For example Au (2007) synthesised 49 studies conducted across the USA and discovered changes in curriculum content which included the increase of teacher-centered instruction as teachers had been inclined to narrow their instruction to focus on selected topics tested in the standardised examinations.

The literature is critical of the pedagogical practices in Singaporean English-language classrooms. For example, according to Kwek et al. (2007), English-language teaching in Singapore is dominated by direct instruction, whole-class lectures, teacher interpretation of texts for students, "answer checking aimed at teacher-student transmission of knowledge" (p. 73), single interpretation of text, "faithful reproduction by students of a limited set of text types" (p. 74), and

without any opportunities for “debate and discussions around texts” (p. 73), exploration of texts, or trans-disciplinary and inter-textual uses of English language. According to Tan (2001) and Chew (2005), such traditional teaching approaches are widely practised, even by experienced senior teachers. Developing digital literacy skills would appear to be an ideal opportunity to develop student-centred pedagogy reflected in the Singapore curriculum.

### **2.2.5 Lack of an appropriate multimodal assessment.**

It would seem that the lack of an appropriate multimodal assessment strategy and the examination culture of Singapore’s classrooms may have strong mediating influences on digital literacy learning. Many teachers are comfortable with teacher-directed approaches, while the lack of appropriate multimodal assessment further predisposes teachers to continue with traditional practices (Keys, 2007; Van Driel, Bulte, & Verloop, 2007).

The existing English-language syllabus in Singapore is not accompanied by an appropriate assessment strategy for projects undertaken with the use of multimedia. Although teachers do use rubrics for multimodal assessment (see Section 2.1.4), the results often do not affect the final grades, especially in exams-driven educational institutions. For Vincent (2006), the current assessment strategies are monomodal and despite efforts to increase multimodality in primary-school classrooms in Singapore, the assessment in most English-language classrooms emphasises ‘words’ above everything else. According to Vincent, if teachers had an adequate means of assessing multimodal texts, this might help them develop multimodal texts as a normal means of text production. Vincent suggests that tests and examinations are not adequate assessment techniques and proposes portfolios as a better alternative.

Teaching in Singapore's schools is strongly directed towards enabling students to pass national examinations. Chew (2005) argues that despite the prescriptions of the English-language syllabus, the emphases of classroom teaching remains strongly determined by examination-focused concerns. According to Cheah (1998), "an examination culture exists and has tremendous impact on teaching and learning in our classrooms" as it "puts pressure on schools and teachers to prepare their students for the examinations, and students look to their teachers for guidance" (p. 196). Cheah further suggests that this examination culture leaves little space for innovative and student-centred pedagogical practices to enter the classroom because of concern that students will not be appropriately prepared for examination success.

Based on his study of Singapore's higher education students, Chang (1995) writes that most students "are only keen to pass examinations, using the rote learning method" (p. 3). Kramer-Dahl (1997) notes that even pre-service teachers in Singapore's teacher-training institution favour pedagogical practices tied to passing examinations. Although these references are somewhat outdated and Singapore's education system has undergone a series of important reforms since then, more recent publications continue to suggest that these challenges remain (e.g., Chew, 2005; Kwek et al., 2007). Chew and Kwek both call for technology that could be used effectively by the teachers to help their students develop digital literacy skills, reiterating that while the emphasis remains on traditional teaching pedagogy as a means of ensuring students pass traditional tests and examinations, the place of digital literacy development through student-centred learning remains challenging for many teachers.

Although the development of digital literacy learning in classrooms remains difficult, as discussed in this section, a number of studies have explored strategies for digital literacy learning and in particular, digital storytelling. Could digital storytelling become a strategy for digital literacy learning in the classroom? The next section examines this issue.

## **2.3 Digital Storytelling as a Strategy for Digital Literacy**

### **Learning**

#### **2.3.1 Multimodal representations in the classroom.**

Teaching digital literacy in schools has become increasingly important and “... pupils need to be taught now which tools are effective and how to use them responsibly” (e-Safetysupport, 2013). Representing with multimedia in a classroom needs to be taught with the use of suitable technology tools and by providing relevant content. Digital storytelling may become a useful technology tool to help students increase or develop digital literacy skills. Therefore, it is important to identify what makes a representation multimodal.

Over the past decade, the traditional language skills of reading, writing, listening and speaking have been extended to include representing. This additional category in literacy learning is a response to contemporary developments in representation and communication. For Kress (2004), one key aspect of these developments is a move from the dominance of writing as “the culturally most valuable form of representation” (p. 5) towards the new dominance of images. Kress and Van Leeuwen (1996) claimed that “newspaper, magazines, public relations materials, advertisements and many kinds of books today involve a complex interplay of written text, images and other graphic elements, and what is

more, these elements combine together into visual designs, by means of layout” (p. 15).

Barratt-Pugh (2000) emphasised that images help to convey meaning. An image does not replace text, but rather complements it, which results in a blending of modes in multimodal representation or multimodal text. Each mode affords specific potential and limitations for communication (Kress 2004) and images and texts enter into a powerful intersemiotic relationship with each other. For example, expanding on the work of Barthes (1977), Martinec and Salway (2005) suggested three possibilities for the text–image relationship: text supporting image, image supporting text and the two being equal (that is, the whole image is related to the whole text).

Jewitt (2008) wrote that all modes contribute to the construction of meanings in some way and “no one mode stands alone in the process of making meanings; rather, each plays a discrete role in the whole” (p. 247). In their *Grammar of visual design*, Kress and Van Leeuwen (1996) write about the “overwhelming evidence of the importance of visual communication” and emphasise that effective communication is no longer limited by written texts because of this evolution in the forms of communication: from oral messages in early ages, to printed media, to radio and television, and finally, to the dominance of the Internet as a medium.

Contemporary text and communication are increasingly multimodal. Kress (2004) underlined the move from the dominance of the book (or print-based media in general) to the dominance of the medium of the screen (computer screens in particular). Elsewhere, Kress (2006) writes that the new medium of the screen makes it “easy to use a multiplicity of modes, and in particular the mode of



image—still or moving—as well as other modes, such as music and sound effects for instance” (p. 5). Unlike language-based written texts that have been well researched and have well-established semiotic rules, no corresponding rules exist for multimodal texts (although Kress and Van Leeuwen, 1996, made an attempt to develop what they called the ‘Grammar of Visual Design’). Callow (2003) noted the limited research on what skills students need when they are involved in making meanings from multimodal texts, while for Jewitt (2008), “pedagogical models for print literacy are based on the acquisition and mastery of sets of established practices, conventions and rules” (p. 252), whereas models for digital literacy are incomplete. Therefore, this thesis attempts to understand the digital literacy skills that develop through digital storytelling. Digital storytelling may provide multimodality and interactivity, the two main properties of the process of creating a digital story, which may lead to the development of digital literacy.

*Multimodality:* Digital text contains language-based text (e.g., explanations and discussions, headings and sub-headings, subtitles and labels) and images (e.g., photographs, drawings and illustrations, icons and symbols, aesthetic elements, maps, concept/mind maps, diagrams such as flow charts, schemas and statistical graphs). It may also contain other modalities such as audio (narration, music and sound effects), animation (two- and three-dimensional), video, colour leads, transitions and interactive elements. All of these different modes afford something specific for representations (Kress, 2004) and each communicates certain aspects of the overall display. Together, they blend and the boundaries between them blur and mesh in a new multimodal configuration (Jewitt, 2008). This new multimodal configuration can be represented as a multimedia representation in the form of a digital story, among others (e.g., web pages,

podcasts, etc.). For Jewitt (2008), students need to learn how to recognise what is salient in a multimodal text, how to read across the modal elements, how to move from the representation of a phenomenon in one mode to another mode, and how to navigate through the multiple paths of a text. Therefore, a student working with technology needs to have the ability to blend traditional literacy with media literacy, information literacy and technology tools literacy. In other words, a student needs to be digitally literate.

*Interactivity:* In the context of this study, interactivity involves the reader or viewer and the author of the text in an interactive exchange around the multimodal texts. Digital literacy learning through the creation of a digital story provides students with an opportunity to explore how to go beyond the content of the multimodal text and engage others in extended meaning making (Ohler, 2006).

These two properties of multimedia representations (multimodality and interactivity) are key elements of digital storytelling, which could become a strategy for digital literacy learning in a classroom. Classrooms could provide students with the opportunity to work on digital storytelling and develop skills required for representing through digital multimodal texts that should not be understood exclusively as a part of language learning. This leads to the question: What is digital storytelling?

### **2.3.2 Digital storytelling and its affordances in the classroom.**

Digital storytelling is a contemporary strategy for the creation of digital multimedia content for expressing ideas, representing knowledge and otherwise communicating information through digital artefacts. The digital story (the final product of digital storytelling) has also been referred to as a photo story (Microsoft, 2007), slide-show-style video (Salpeter, 2005), conversational media

(Lambert, 2007), multimedia sonnet (Meadows, 2003a) and even radio-with-pictures (Meadows, 2003b). In the production of digital stories, students integrate modalities such as music, sound effects, text, transitions, graphics, recorded narrations and images. Although not common, it is also possible that videos and animations can be included in digital story productions. However, it is recommended that video be introduced only after students have become more familiar with effective storytelling (Banaszewski, 2005).

Until recently, creating a digital story was not necessarily easy. The tools required technical skills and powerful computers, and delivering content online was a troublesome process. However, the development of computers with greater processing power, touch tablet devices with a wide range of user-friendly applications and easy-to-use, effective and inexpensive digital cameras and camera-enabled mobile phones and computers with inbuilt cameras has allowed anyone to become a digital photographer. These advances in technology have empowered ordinary Internet users to not only consume but also to create multimodal digital content. For example, user-friendly and often free tools such as Microsoft Photo Story, Windows Movie Maker or iMovie allow user-friendly environments for the effective production of digital stories. At the same time, the Internet applications under the umbrella term ‘Web 2.0’ have opened many possibilities for online content publishing. In particular, it is important to mention blogs (e.g., Blogger), social repositories (e.g., YouTube), online social networks (e.g., Facebook) and similar Internet-based services that allow millions of ordinary Internet users to become publishers and distributors of video and other kinds of digital content. There are also a wide range of free applications for

mobile touch tablet devices that make the creation of digital texts simple and accessible for students.

Digital storytelling can be conceptualised as ‘constructionism’, or ‘learning by making’ (Harel & Papert, 1996). Constructionism builds upon the theories of constructivism, which hold that students actively construct knowledge out of their experiences, but adds that such construction of knowledge occurs when students are engaged in building personally meaningful objects (Kafai & Resnick, 1996). Knowledge construction in this context occurs when students are consciously engaged in constructing an external artefact that they can reflect upon and present to others. Han and Bhattacharya (2001) suggested that ‘learning by design’ is a form of constructionist learning. In this type of learning, students design an artefact for a pre-selected target audience. A digital story can be understood as such an artefact. According to Han and Bhattacharya (2001), in learning by design, students are more engaged in learning as they “become more accountable for their learning through designing, sharing, piloting, evaluating, modifying their work and reflecting on the process”.

Similarly, Hoban (2013) advised to use digital storytelling to create “digital explanations” when teaching and learning the nature of science and the history of science. He compared digital explanations to slide shows and recommended the use of digital storytelling as beneficial to student engagement and understanding of the material. Through the creation of digital explanations students use speech and still images that enhance each other when students try to convey meanings.

In this study, digital storytelling is defined as a contemporary strategy for the creation of digital multimedia content for expressing ideas, representing

knowledge and otherwise communicating information through digital artefacts (Lambert, 2007; Microsoft, 2007; Meadows, 2003a, 2003b; Salpeter, 2005). As the final product of digital storytelling, a digital story can be constructed in many different ways, is multimodal, and can be interactive and non-linear. Reading such stories includes interrogating modalities: particular ways in which the information is to be encoded for presentation to human beings. It means that “Through the use and creation of multimodal texts, students have opportunities to use linguistic, visual and audio modes in order to experience, conceptualize, analyze and apply meaning” (Wilder, 2010).

Digital storytelling, when appropriately applied in the classroom, may effectively meet the challenges of digital literacy learning and can provide a strategy for teachers to effectively move beyond print-based texts and engage students in working with digital multimodal texts. Barratt-Pugh (2000) suggests that children’s writing skills may be enhanced through technical support and the use of technology. Similarly, digital storytelling requires students to bring together various modes, such as typewritten words, images, narrations and sounds, in their own multimodal representations.

Barret (2006) claimed that the effect of digital storytelling on student learning includes increased motivation, engagement, development of technology skills and reflection. The author further suggested that digital storytelling might benefit all learners in all schools. The affordances of digital storytelling have been examined in the literature and include increased student engagement and student-centredness, catering to the different learning styles of the students, enhances creativity and research skills, increased focus on digital multimodal text and provision for a multimodal assessment strategy. Sections 2.3.2.1-2.3.2.7 consider

the way digital storytelling supports digital literacy learning through examining these affordances.

### **2.3.2.1 Student engagement.**

The current English-language syllabus for Singaporean primary schools promotes student-centred engagement in classrooms as suitable strategies for achieving learning outcomes. This is in line with contemporary pedagogical approaches that suggest that teachers need to plan student-centred activities in which learning is more *situated*, *active* and *engaging* (e.g., Brown, Collins, & Duguid, 1989; Dwyer, Ringstaff, & Sandholtz, 1985, 1998; Grabinger, 1996).

Transformation to student-centred practices requires technology to be placed in the hands of learners as a tool to *learn with* rather than as a tool to *learn from* (Hokanson & Hooper, 2000; Jonassen & Reeves, 1996). Digital storytelling in the classroom engages students to work with technology and use a wide spectrum of technology tools to plan, produce, present and review a digital story. This experience provides students with an opportunity to increase their skills in working with technology in a meaningful context and in turn, to increase their digital literacy. In this context, technology is seen as an intellectual partner (Salomon, Perkins, & Globerson, 1991) and a psychological tool that supports learners “cognitive operations that they might not have been capable of otherwise” (Lim, 2006, p. 3).

Technology used in this way can be a tool for students to create digital artefacts that represent their knowledge and ideas, and this can be linked to relevant assessment of students’ learning: for example, digital portfolio or e-portfolio assessment (Mason & Pegler, 2005). This important transformation, from teachers being in control of technology and technology as instructional tools,

to learners as *active technology users*, is an important strategy for student-centred learning that might lead not only to advancement in learning of curriculum content, but also to the preparation of students for the world outside the school environment.

### **2.3.2.2 *Student-centredness.***

Digital storytelling can be used in ways that supports student-centredness in the classroom, leading to an increased level of student engagement, motivation and initiative and willingness to collaborate and interact with others. A number of researchers suggest that digital storytelling is a motivating and engaging activity for classroom application (Banaszewski, 2005; Salpeter, 2005). With digital storytelling, students become active creators, rather than passive consumers, of digital media content (Ohler, 2006).

Digital storytelling in a classroom can be conceptualised as a problem-solving activity. Problem solving is one of the key components of a constructivist learning environment (Jonassen, 1999) and active learning (Grabinger, 1996). Problem solving is also often linked to the development of lifelong learning skills. According to Jonassen (2000), *ill*-structured problem solving should be promoted in classrooms as a strategy that leads to improved learning outcomes for students: in contrast to well-structured problem solving, ill-structured problem solving has a somewhat unclear goal and this allows students to learn by experimenting with resources. Jonassen introduces different kinds of problems that can be designed for learning, such as troubleshooting, case studies, design and dilemma problems.

Digital storytelling can be understood as a design type of problem-solving project: students know the goal—create a digital story for a specific purpose—and they search for images and other media that best suit their purpose and edit those

if necessary, upon evaluating their own emerging designs. Such activities are purposely not well defined, as a teacher would not tell the students exactly what media to investigate. For Jonassen (2000), design-type problems have unclear goals, no predetermined solution paths, require integration of multiple knowledge domains and require commitment and self-regulation by students. Hence, Jonassen recommends that students develop their own system for evaluating their emerging designs. This leads to increased independence and self-regulation in problem solving and learning.

Likewise, for Roth (1996), the key benefits of design activities are that students learn to manage the complexity of ill-structured problems: while engaging in digital storytelling, students not only design a story, but also engage in the processes of planning and delivering their project outcomes. For Roth, these processes are mediated by emerging designs created by the students themselves, which allows them to construct and test their knowledge. He further suggests that learning in design is not exclusively represented in the final products, but in the process of designing. The planning process, in particular, forces students to make careful decisions and to reflect and engage in research as it is done in real-life, authentic problem-solving projects, such as digital storytelling projects (Banaszewski, 2005; Bull & Kajder, 2004; Lambert, 2007; Meadows, 2003a; Renwick, 2006; Robin, 2005). The literature suggests that digital storytelling offers great potential for teaching and learning. Digital literacy is not something that is required solely for learning the English language; it is a new literacy required for learning and communication in all other subjects.



### ***2.3.2.3 Support of learning styles.***

Digital storytelling supports students with different learning styles (Early Learning Information [ELI], 2007; OTE, 2001; Robin, 2005), promotes interdisciplinary learning and can be applied across the curriculum (McLellan, 2006). In addition, digital storytelling allows one to try out ideas, see how they work and change them if necessary; thus, it supports the development of reflective awareness (Ohler, 2004; Tendero, 2006). When planned carefully as a classroom activity, it can include peer critique as a contemporary method of assessment of student learning because according to the literature, “critique is a form of assessment through which young people jointly judge their own work and that of their peers” (Sep, 2006). This can be especially important for second-language students or students with learning difficulties, who may benefit from repetitive revising of their own work and who may become reflective on the informal feedback provided by their peers.

Students can choose different types of multimedia to dominate their projects in ways that best cater to their individual learning styles (University of Huston). A study conducted by Yang and Wu (2012) demonstrated that a group of students of various learning abilities and learning styles who worked on a project involving digital storytelling performed better in terms of academic achievement, critical thinking and learning motivation than another group who worked on the same project but did not use digital storytelling as a tool for learning. The researchers concluded that the use of digital storytelling creates an effective learning environment.

#### **2.3.2.4 *Enhanced creativity and research skills.***

Creativity, innovation and entrepreneurship are seen as increasingly central 21<sup>st</sup> century skills and increasingly central to education. This skills are emphasised in Singapore. For example, the Singaporean Prime Minister Lee Hsien Loong in his foreword speech to the *Oceans of Innovation* report stated that in the rapidly changing world where technology changes the way people live, it is important to help students develop the ability of “coping with uncertainty, adapting to evolving conditions and learning how to learn” because they would need to learn how to “think for themselves” and to “develop their creativity” in order to face the challenges of tomorrow (Barber, Donnelly & Rizvi, 2012, p. 3).

Digital storytelling leverages the multiple talents of students, such as media production, project development, art and storytelling, which might otherwise remain inactive under traditional classroom practices (Ohler, 2007). This could be one of the reasons why students begin to reflect on their own imagination, creativity and thinking. Through the development of a digital story, students “work not only as readers and writers but also as directors, artists, programmers, screenwriters and designers” (Kajder, 2004, p. 65).

Similarly, other authors report that digital storytelling enhances students’ research skills, critical thinking, media literacy, collaborative skills, technical skills, visual literacy skills, critical literacy and other life skills for the twenty-first century (Banaszewski, 2005; Howell & Howell, 2003; McLellan, 2006; Ohler, 2006; Robin, 2005; Salpeter, 2005).

#### **2.3.2.5 *Increased focus on digital multimodal text.***

Digital storytelling helps students to write by using different media (Kajder, 2004; Renwick, 2006). Similarly, Ohler (2006) noted that digital

storytelling provides “powerful media literacy opportunities because the students are involved in the creation and analysis of the media in which they are immersed” (p. 47). In addition, Verdugo and Belmonte (2007) suggested that digital storytelling can improve children’s listening skills in both their first and foreign languages by involving them in actively decoding and understanding the story at their own pace. Thus, structuring and segmenting digital storytelling may help students to develop a focus on multimodal text.

Currently, multimodal text is a standard feature of information communicated through digital media. Multimodality combines such modes as text, audio, images and video into a single representation. When working on digital stories, students are engaged in the process of creation of a digital multimodal text with the use of technology tools.

#### ***2.3.2.6 Supports multimodal assessment strategy.***

Digital storytelling can serve as an effective multimodal assessment strategy that can enable teachers to assess and understand students’ skills for meaning making (viewing and representing) through digital multimodal texts. Thus, digital stories produced by students can be considered artefacts that demonstrate the developments in students’ knowledge and skills. Further, digital storytelling is easy to implement, as it requires minimal technical skills. This allows teachers to concentrate on the pedagogical aspects of implementation rather than be overwhelmed by technical difficulties. Warlick (2005) argued that teachers need to be provided with an opportunity to develop their own digital literacy.

### ***2.3.2.7 Digital storytelling and digital literacy learning.***

According to the literature (see Sections 2.3.2.1–2.3.2.6), digital storytelling supports the following aspects of learning and assessment: student engagement, student-centeredness, learning styles of students, creativity, research skills, focus on digital multimodal text and multimodal assessment strategy. However, very little research has studied the way digital storytelling supports digital literacy learning. This current study aimed to examine the way digital storytelling supported digital literacy learning in a Primary 6 English-language classroom. To do this, an instrument for evaluation of aspects of digital literacy is required, and it is important to understand what influenced the planning of evaluation of digital storytelling by the researcher.

## **2.4 Evaluation of Aspects of Digital Literacy Developed Through Digital Storytelling**

In this study, digital storytelling is examined as a strategy for digital literacy learning, with the competencies being the expected learning outcomes: a set of skills, knowledge and abilities that a student should develop after engagement with digital storytelling. To observe and evaluate these, it is necessary to identify particular aspects of the competencies and the way digital storytelling can act as a strategy to achieve them. Several digital literacy standards and frameworks have been developed in the past in an attempt to integrate digital literacy learning in educational institutions around the world.

The most comprehensive set of digital literacy skills was developed by the ISTE (formerly known as NETs) (2007), which developed a platform that allows planning for technology integration in the classroom and evaluating the skills and knowledge students need to learn effectively and live productively in an

increasingly global and digital world (see Section 2.1.4). Although the platform provides guidelines to which a teacher can refer to integrate technology into lesson planning and delivery, there is no available instrument to measure the development of students' literacy skills if the teacher uses digital storytelling in an English-language classroom.

An attempt to evaluate students' digital literacy is seen in the digital literacy model developed by Canada's Centre for Digital and Media Literacy (Media Smarts, 2009), as shown in Figure 2.1. The model is based on models from the report of the Digital Britain Media Literacy Working Group (2009), *DigEuLit—A European framework for digital literacy* (Martin, 2005) and *Confronting the challenges of participatory culture: Media education for the 21st century* (Jenkins et al., 2006).

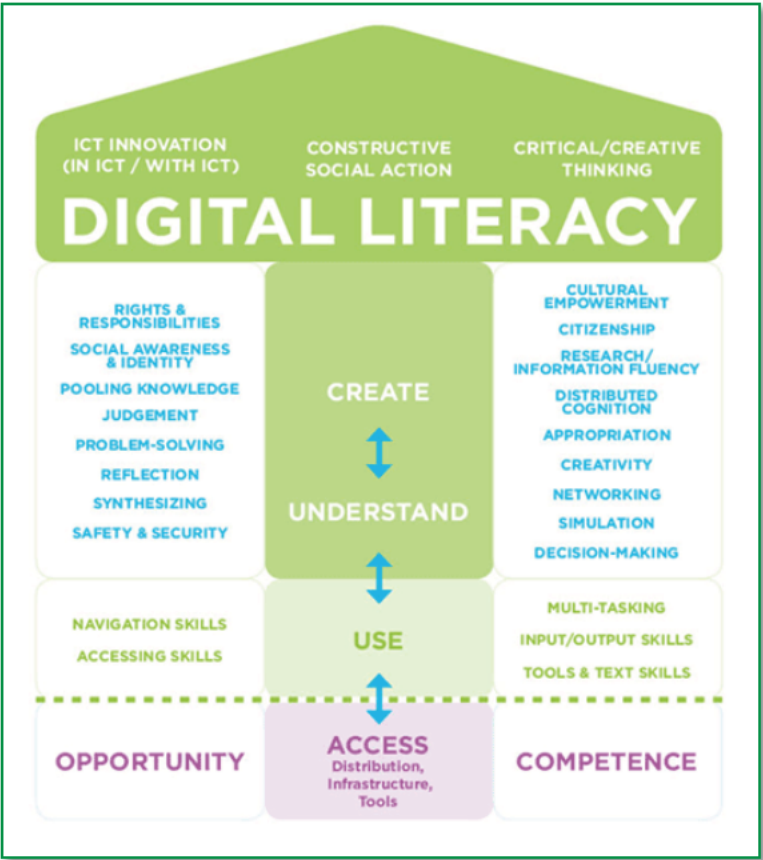


Figure 2.1. A digital literacy model.

The interconnected components in this model come under the umbrella of digital literacy. Although the model does not provide universal answers for evaluating digital literacy in the classroom, the notion of a “logical progression from the more fundamental skills towards the higher, more transformative levels” is important, as digital literacy development is “not necessarily a sequential process” and it “much depends on the needs of individual users” (Canada’s Centre for Digital and Media Literacy, 2009). Creating digital stories is a complex process that involves manipulating various media and contents. It may not necessarily be a sequential process due to the possibility of creating non-linear digital stories, which means that a creator starts with a single piece of media and integrates other pieces of media in any order that he/she chooses. The creation of a digital story may depend on the level of digital literacy that the individual student possesses at the time.

To identify a student’s existing digital literacy and any development in their digital literacy, the researcher developed a set of codes for an evaluation tool (a rubric) that allowed the evaluation of the students’ level of digital literacy before, during and after the completion of the study. This is set out in Table 2.2.

t	Use (1)	Understand (2)	Create (3)
etermine the nature of information and media used	<p>Recognises that information and media are required</p> <p>Skims through information and selects media without being able to justify choice (e.g., select an image because it appears nice to them)</p>	<p>Recognises that information and media are required</p> <p>Skims through the content and decides whether the information and images are useful for the task and what this source offers that other sources of information do not</p> <p>Decides whether image resolution is acceptable</p>	<p>Skims through the content and decides whether the information and images are useful for the task and what this source offers that other sources of information do not</p> <p>Decides whether image resolution is acceptable</p> <p>Identifies technology tools needed</p>
ate information	<p>Navigates and accesses information; however, unable to reflect and determine why this information is needed</p> <p>Uses Wikipedia as a single source</p>	<p>Navigates and accesses information and reflects on why this information is needed; however, unable to demonstrate social awareness of how that information affects others</p> <p>Uses a single source</p>	<p>Navigates, accesses information, and reflects on why this information is needed and how that information affects others and how their own responsibility is in relation to information</p> <p>Uses multiple sources</p>
evaluate reliability of information and media used	<p>Attempts to identify 1 or 2 of the following criteria for evaluation: author and his expertise in the field, domain, target audience, age appropriateness, copyright date, what this source offers that other sources of information do not; however, unable to explain their significance</p>	<p>Identifies 3 or 4 of the following criteria for evaluation: author and his expertise in the field, domain, target audience, age appropriateness, copyright date, what this source offers that other sources of information do not</p> <p>Attempts to explain their significance</p>	<p>Identifies 3 or 4 of the following criteria for evaluation: author and his expertise in the field, domain, target audience, age appropriateness, copyright date, what this source offers that other sources of information do not</p> <p>Able to explain their significance</p>
analyse, interpret and evaluate the range of information and media to communicate meanings within multimodal text	<p>Uses modes to construct meanings, but demonstrates poor cohesion</p> <p>The modes do not complement each other</p>	<p>Uses modes to construct meanings and demonstrates average cohesion</p> <p>The modes somewhat complement each other</p>	<p>Makes meaningful use of modes to construct meanings in a cohesive manner</p> <p>The modes complement each other</p>
t	<p>The linguistic content is minimally comprehensible due to spelling/punctuation/grammar error(s)</p>	<p>The linguistic content is comprehensible even though there are a few spelling/punctuation/grammar error(s)</p>	<p>The linguistic content is comprehensible and structured in a logical manner, with few spelling/punctuation/grammar error(s)</p>
ge	<p>Selects and uses images but unable to justify the choice</p>	<p>Selects images and in some instances able to justify the choice</p>	<p>Carefully selects and uses images and is able to justify the choice</p>
mation	<p>Makes use of the default animated components but unable to justify the choice, or does not use any</p>	<p>Makes use of the default animated components but is not always able to justify the choice</p>	<p>Makes use of the default animated components and/or special effects or creates original dynamic sequencing of the content to justify the choice</p>

<b>t</b>	<b>Use (1)</b>	<b>Understand (2)</b>	<b>Create (3)</b>
nd	Makes use of the default auditory components, such as music/sound effects, but cannot explain their purpose or does not use any; auditory components used do not complement the content	Makes use of the default auditory components, such as music/sound effects, but is not always able to explain their purpose or does not use any; auditory components used do not complement the content	Makes use of default auditory components such as music/sound effects and cannot explain their purpose, or creates own music that does not complement the content
out	There is no specific layout to structure design components Text/images alignment and/or margins are not carefully planned	There is no specific layout to structure design components Attempts to plan text/images alignment and/or margins	Creates a specific layout to structure design components Makes use of text/images alignment and margins
ration	Makes use of recording to create narrations The voice is not projected clearly or the volume is inconsistent from slide to slide	Makes use of recording to create narrations The voice is sometimes projected clearly or the volume is sometimes inconsistent from slide to slide	Makes use of recording to create narrations The voice is projected clearly; the volume is consistent from slide to slide
digital technologies in a safe and socially responsible manner	Unaware of socially responsible conduct when using inappropriate, harmful or obscene digital information	Attempts to discuss inappropriate, harmful or obscene digital information with peers	Displays socially responsible conduct when using inappropriate, harmful or obscene digital information
manage digital information in digital space using appropriate hardware and software applications (e.g., word processing, presentation, photography, videography, etc.)	Copies from an Internet page and pastes into a word-processing document chunks of texts, web address or own notes for future use Unable to save and/or retrieve files in/from a designated folder on the local server (e.g., school Pupils Drive) and/or USB and/or Documents folder Unable to share files with others	Copies from an Internet page and pastes into a word-processing document chunks of texts, web address or own notes for future use Attempts to save and/or retrieve files in/from a designated folder on the local server (e.g., school Pupils Drive) and/or USB and/or Documents folder Attempts to share files with others	Copies from an Internet page and pastes into a word-processing document chunks of texts, web address or own notes for future use Able to save and retrieve files in/from a designated folder on the local server (e.g., school Pupils Drive) and/or USB and/or Documents folder Able to share files with others
critically use information and media sources (e.g., Wikipedia)	Able to acknowledge information and media sources created by others by providing a source title (e.g., Wikipedia) or the link	Able to acknowledge information and media sources created by others by providing a source title (e.g., Wikipedia), the link and date when information was retrieved	Able to use royalty-free information and media sources created by others (e.g., Creative Commons) by providing a source title (e.g., Wikipedia), the link and date when information was retrieved, and/or able to use royalty-free information (e.g., Creative Commons) to create own media



t	Use (1)	Understand (2)	Create (3)
<p>oly information to own entations to vely communicate edge to others</p>	<p>Able to use few elements of genres to create own piece of information of the same genre</p> <p>Aware of the target audience but cannot apply all skills to convey meanings clearly (e.g., clear, non-blurred images voice projection and clear pronunciation for narration background music/sounds that do not interfere with the narration background music/sounds that enhance the presentation dynamic fonts and colours of texts)</p>	<p>Able to use most elements of genres to create own piece of information of the same genre</p> <p>Aware of the target audience and can apply some skills to convey meanings clearly (e.g., clear, non-blurred images, voice projection and clear pronunciation for narration background, music/sounds that do not interfere with the narration background, music/sounds that enhance the presentation, dynamic fonts and colours of texts)</p>	<p>Able to use all elements of genres piece of information of the same g</p> <p>Recognises the target audience by skills to convey meanings clearly non-blurred images, voice project pronunciation for narration backg music/sounds that do not interfere narration background, music/soun enhance the presentation, dynamic colours of texts)</p>
<p>elop ability in m solving skills flecting on own logy skills</p>	<p>Able to acknowledge that there are technology-related difficulties; unable to identify needed skills and solve problems</p>	<p>Able to acknowledge that there are technology-related difficulties; demonstrates understanding of needed skills but cannot solve problems independently</p>	<p>Able to critically evaluate needed related skills; develops needed tec skills through independent proble</p>
<p>ie a variety of logy tools to digital information</p>	<p>Able to create integrated multimedia product from a template</p>	<p>Able to create integrated multimedia product with authoring tools, but unable to critically evaluate it and edit accordingly</p>	<p>Able to create integrated multimed with authoring tools, using them t advantage (e.g., evaluating and ed work)</p>
			<p><b>Total : ____/30</b></p>

## e 2.2. Aspects of Digital Literacy Evaluation Rubric

The 'Use' skills and competencies ranged from simply using basic technology to accessing and using knowledge resources such as search engines and online databases (Media Smarts, 2007). 'Understand' evaluated the skills that help us to comprehend, contextualise and critically evaluate digital media, to allow an informed decision about what we do and encounter online. This deepens the information management skills to find, evaluate and effectively use information to communicate, collaborate and solve problems (Media Smarts, 2007). 'Create' was "the ability to produce content and effectively communicate through a variety of digital media tools" (Media Smarts, 2007). Creating with multimedia (digital storytelling) is a set of advanced skills that go beyond "knowing how to use a word processor or write an email: it includes being able to adapt what we produce for various contexts and audiences; to create and communicate using rich media such as images, video and sound" (Media Smarts, 2007).

Ohler's 2007 publication *Digital storytelling in the classroom: New media pathways to literacy, learning, and creativity* is widely recognised as serving as an instruction manual for teachers to implement digital storytelling in the classroom effectively. Ohler provides multiple examples of the use of digital storytelling in classroom settings, guiding the reader through the processes of planning, creating and evaluating digital storytelling projects. However, he noted, "I'm always reluctant to propose a specific evaluation rubric for others to use" (Ohler, 2007, p. 64). The author further emphasises that assessing "media grammar and student use of media" is especially challenging, stating, "One person's photo collage is another person's waste of time" (p. 66). For him, "Media choices need to be accessible, effective, and, above all, support the story rather than detract from it"

(p. 66). Consequently, it is possible to suggest that evaluation rubrics suit different teaching and learning purposes and there is no universal rubric to assess a digital story.

The purpose of this current study was to examine, based on the existing developments in digital literacy and digital storytelling teaching and learning, what aspects of digital literacy are developed through the engagement of students in the process of multimedia production (digital storytelling) and if there are any factors that can inhibit this development. The rubric developed by the researcher served as a tool for evaluating aspects of digital literacy that were developed through the students' engagement with digital storytelling.

## **2.5 Studies of Digital Storytelling in the Classroom**

Some studies on digital storytelling in the classroom have been conducted previously by researchers in various parts of the world. Karakoyuna and Kuzub (2013) examined digital storytelling in terms of twenty-first-century skills. Their research, conducted in a private elementary school, examined the development of learning and innovation skills, information skills, media and technology skills, and life and career skills. Their data analysis included the use of descriptive statistical methods. Their findings showed that elementary school sixth-grade students believed that digital storytelling activities supported their twenty-first-century skills, particularly their technology skills.

Barrett (2005) proposed digital storytelling research design. Her hypothesis was that the findings of a study of the use of digital storytelling in the classroom might show the effect that digital storytelling has on student learning, motivation, engagement, development of technology skills and reflection. The

author further suggested that digital storytelling may benefit learners of all ages in all schools.

Kulla-Abbott (2006), who conducted a qualitative case study in a lower secondary-school setting, aimed to study the way digital storytelling affected students' learning and what literacy skills developed through the students' engagement in the process of creating a digital story. Her findings revealed that the students' participation in digital storytelling led to particular aspects of literacy learning: writing, reading, listening and speaking. Her findings also informed "improvements in instruction of writing, story telling and related technologies, as well as the curricula utilizing them" (p. 3). She emphasised the importance of teacher training to equip teachers with the required technology-related skills. The study focused mainly on the effect of digital storytelling on writing and Kulla-Abbott called for further studies examining the development of technology skills as a result of digital storytelling.

An experimental study by Yang and Wu (2012) examined 10th-grade students in two English as a Foreign Language classes that were taught the same content by the use of different approaches: one with digital storytelling and the other with lecture-type, information-technology-integrated instruction. They evaluated English-language achievement and critical-thinking scores, as well as motivation for learning. The findings showed that the group that learnt with digital storytelling performed better in terms of academic achievement, critical thinking and motivation for learning. The study concluded that the use of digital storytelling in the English as a Foreign Language classroom created an effective learning environment.

Nguyen (2011) examined the ways that three graduate students used digital storytelling to create digital stories in two linked courses: one focusing on hands-on multimedia technology and the other focusing on using popular culture in the classroom. The findings revealed that digital storytelling is “a powerful tool for cognitive and literacy development in the digital age” and that the creation of a digital story is a complex process, requiring different skills and literacies to produce a meaningful digital story.

The above studies provided insights into students’ engagement with digital storytelling and the benefits of digital storytelling for their learning. Cumulatively, they emphasized students’ beliefs about their digital literacy skills, drew conclusions that digital storytelling may benefit learners of all ages in all schools, discussed that the students’ participation in digital storytelling can lead to particular aspects of literacy learning, claimed that students using digital storytelling performed better in terms of academic achievement, critical thinking and motivation for learning, and suggested that through the process of creation of a digital story students develop different skills and literacies to produce a meaningful digital story. However, the mentioned studies did not aim to identify what aspects of digital literacy learning were developed through the process of digital storytelling and what could inhibit their development – the two focus areas of this thesis.

## **2.6 Conceptual Framework**

Based on the literature, the researcher developed a conceptual framework (see Figure 2.2) that anchored precious knowledge of the topic under examination. The conceptual framework, which may also be called research paradigm, demonstrates the researcher’s understanding on how the research problem would

be examined and discussed, and it is based on theories and findings of other research studies and academic standards in the fields of digital literacy and digital storytelling. This conceptual framework embodies a particular direction, which will guide the research and will assist in describing correlation between specific variables (aspects of digital literacy) identified in the study and the output of the study.

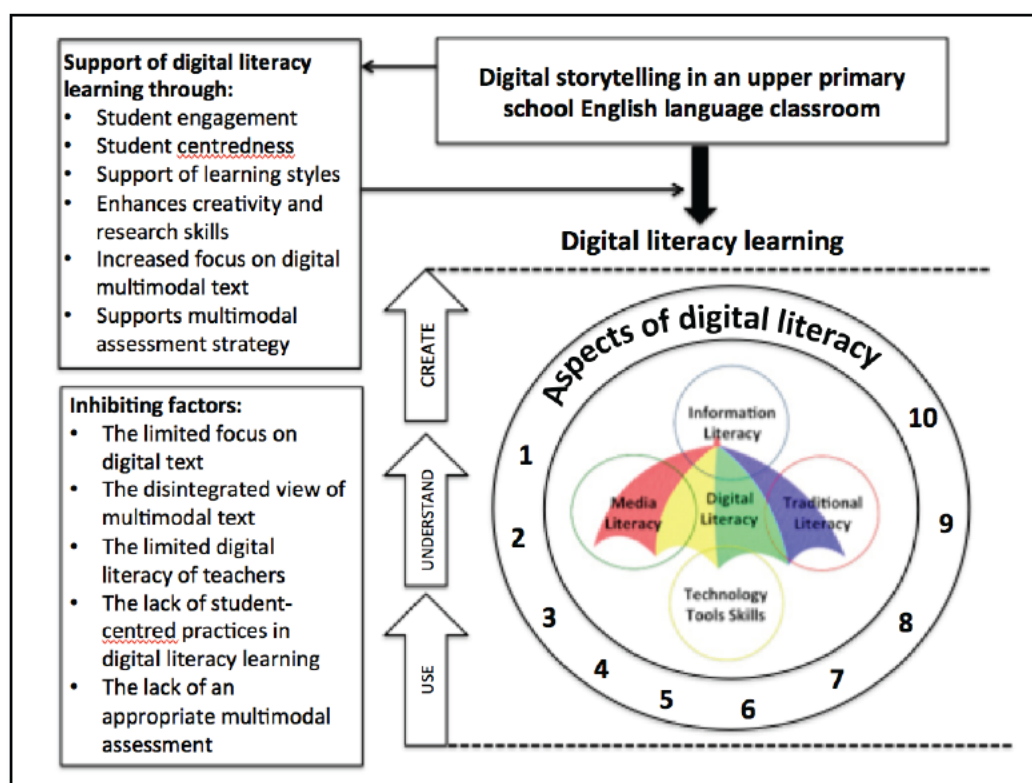


Figure 2.2. Conceptual framework.

This figure shows a synthesis of constructs, or what Maxwell (2005) called “the actual ideas and beliefs ... about phenomena”, (p. 33). The aim of this study was to examine how upper-primary-school students engaged in digital storytelling, with the goal of developing or increasing their digital literacy to the level necessary for representing through multimodal texts. The factors that can inhibit effective implementation of digital storytelling in the classroom were also examined. ‘Digital storytelling’ in this study was examined as a contemporary

strategy for the creation of digital multimedia content through which to express ideas, represent knowledge and otherwise communicate information through digital artefacts (digital stories). Through this, the students could develop or increase the 10 digital literacy skills that were identified earlier as aspects of digital literacy. Digital literacy in this study is defined as a set of skills that enables an individual to use technologies to work with information. It builds on the traditional literacies of reading, writing, listening and speaking and includes elements of information literacy, media literacy and technology skills (AASL, 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 1997, 2008; Jewitt, 2006; Kress, 2003; McClure, 1994; Martinec & Leeuwen, 2009; UNESCO, 2008; Webber & Johnston, 2000). Traditional literacy, information literacy, media literacy and technology tools skills are examined under the umbrella of digital literacy. Digital storytelling therefore, becomes a strategy for the digital literacy learning.

## **2.7 Definition of Terms**

- Digital storytelling is a contemporary strategy for the creation of digital multimedia content for expressing ideas, representing knowledge and otherwise communicating information through digital artefacts (Lambert, 2007; Microsoft, 2007; Meadows, 2003a, 2003b; Salpeter, 2005).
- A digital story is the final product of digital storytelling, also referred to in the literature as a ‘photo story’, ‘slideshow-style video’, ‘conversational media’, ‘multimedia sonnet’ and ‘radio-with-pictures’ (Lambert, 2007; Microsoft, 2007; Meadows, 2003a, 2003b; Salpeter, 2005).
- Digital literacy is a set of skills that enables an individual to use technologies to work with information. It builds on the traditional literacies

(see the next point) of reading, writing, listening and speaking, and includes elements of information literacy, media literacy and technology skills (AASL, 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 1997, 2008; Jewitt, 2006; Kress, 2003; McClure, 1994; Martinec & Leeuwen, 2009; UNESCO, 2008; Webber & Johnston, 2000).

- Traditional literacy is the literacy outlined in official educational standards and assessments of the four language skills of reading, writing, listening and speaking (O'Brian & Scharber, 2008).
- Information literacy is a set of skills that requires an individual to be able to recognise when information is needed and be able to locate, evaluate and use this information effectively (AASL, 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; McClure, 1994; UNESCO, 2008; Webber & Johnston, 2000).
- Media literacy is a set of skills that requires an individual to be both a critical thinker and a creative producer of an increasingly wide range of messages using images, language and sound (Jewitt, 2006; Kress, 2003; Martinec & Leeuwen, 2009). Visual literacy comes under the umbrella of media literacy and represents a set of skills that requires an individual “to access, analyze, evaluate and communicate information in any variety of form that engages the cognitive processing of visual images” (Chauvin, 2003; Hobbs, 1997, 2008), including the ability to think, learn and express oneself in the form of images (Australian Communications and Media Authority, 2009; Braden & Hortin, 1982; Chauvin, 2003; Sinatra, 1986; UNESCO, 2012).



- Technology tool skills are a set of skills that “enable[s] an individual to solve problems and carry out tasks” (ACARA, 2012) with the use of “the practical and conceptual tools of current information technology relevant to education and the areas of work and professional life that the individual expects to inhabit” (Shapiro & Hughs, 1996; ISTE, 2007).

These literacies and skill sets may have overlapping elements, or ‘aspects of digital literacy’. Based on the existing aspects defined by the literature, three study stages were designed to answer the research questions, preceded by a pre-study questionnaire and evaluation of the study participants’ levels of the 10 aspects of digital literacy. The development of their digital literacy and/or any factors that inhibited this development were documented and analysed.

## **2.8 Chapter Summary**

This chapter discussed that the Internet and emerging technologies are transforming the way we work with information, communicate and learn, which result in increasing information needs and expectations from ordinary people, who now expect information to be rich in modalities and to be delivered not just via computers, but also via a range of mobile devices such as iPods, smart mobile phones and tablet personal computers. Consequently, there is growing support in the literature for the need for educational institutions to accommodate technology developments in teaching and learning as to prepare students to function in the technology-literate world outside school and to be a meaningful producer of digital media. The chapter identified the scope and range of skills encompassed by the term ‘digital literacy’, its components or aspects of digital literacy and the challenges for digital literacy learning. The chapter also discussed that digital storytelling is an important strategy for digital literacy learning in schools and it is

vital to assess the levels of digital literacy of individual students before, during and after their engagement in digital storytelling activities. Based on the literature, the researcher developed a conceptual framework (see Figure 2.2) to present existing knowledge of the topic and the way the study will be conducted. The next chapter discusses the methodology of this study.

## **Chapter 3: Research Methodology**

### **3.1 Context for the Study**

In the previous chapter, the literature was reviewed and the key issues related to the discussed study were identified: digital literacy, digital literacy learning and digital storytelling as a tool for digital literacy learning. Due to technological advances, new ways of communication using digital information have emerged and are being used in schools. New modes of meaning making and communicating combine multiple media (multimedia): static and moving images, sounds, texts and videos. Although schools across the globe have recognised the need for new ways of teaching and learning that include elements of digital literacy learning, there have been limited studies on the aspects of digital literacy skills required for a student to engage in effective creation of representations with the use of digital media. Blackall (2005) states:

It is commonly held that having an ability to read and write impacts considerably on a person's potential to communicate and learn. But how, and in what ways does a person's ability to read and write digitally impact on that potential? Being able to access the Internet; find, manage and edit digital information; join in communications; and otherwise engage with an

online information and communications network, are arguably aspects of what could be called ‘digital literacy’.

This study aimed to examine how digital storytelling supports digital literacy learning in an upper-primary-school English-language classroom. In particular, the study aimed to identify the aspects of digital literacy that can be developed through digital storytelling and factors that can inhibit effective implementation of digital storytelling. Potentially, this study could contribute to the theoretical debate in relation to digital literacy learning and learning with technology, and develop recommendations for further research. However, the study was not intended for generalising beyond its context.

The collected data were richly descriptive and included digital artefacts and planning documents created by the students, teacher observations, interviews with the students, students’ written reflections, evaluations by and discussions between the researcher and associates. The researcher also created assessment rubrics to evaluate the development (if any) of aspects of digital literacy as the students became engaged in three projects.

This chapter discusses and justifies the process and instruments of data collection to ensure that the data collected contributes meaningfully to the understanding of the field under study.

## **3.2 Research Design**

### **3.2.1 Research questions.**

The following central research question guided the study and informed the research design and data collection:

*RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom?*

The following specific SQs were also addressed:

*SQ1. What aspects of digital literacy develop through digital storytelling?*

*SQ2. What are the factors that inhibit the effective implementation of digital storytelling?*

To answer these questions, three digital storytelling activities were designed and a rubric was developed to assess the development of aspects of the three students' digital literacy. The researcher then compared the digital literacy developed by the three students to identify any similarities and differences between the three cases. Based on the existing aspects defined by the literature, two study stages were designed, to answer the research questions: a pre-study, which aimed to evaluate the levels of the study participants' 10 aspects of digital literacy, and the main study, which aimed to examine the development of digital literacy learning in the participants as they engaged in the three digital storytelling activities. The development of their digital literacy and/or any factors that inhibited this development were documented and analysed.

### **3.2.2 Qualitative case study: Rationale.**

As noted earlier, the aim of this study was to understand the development of aspects of digital literacy developed by the students (as well as factors that may inhibit their development) through the engagement of students in the process of planning and creating digital stories. Through the processes of planning, producing and presenting a digital story, the students were engaged in continuous consumption and representation of meanings. The researcher, who was also the teacher in the classroom under study, was physically present in the classroom to observe the students' interactions with technology and each other in their natural setting. According to Woods (2006), "The qualitative researcher seeks to discover

the meanings that participants attach to their behaviour, how they interpret situations, and what their perspectives are on particular issues”. Being an “insider-researcher” allowed the researcher for this study to have a greater understanding of the class and school culture and to have “an established intimacy which promotes both the telling and the judging of truth” (Unluer, 2012). However, there can be challenges associated with the researcher being an insider: he/she may become subjective and biased due to familiarity with the topic through prior experience. To overcome these challenges, the researcher for this project engaged multiple reviewers in the data analysis process. The researcher and the multiple reviewers discussed any discrepancies in the results and determined which level of digital literacy each student had, on the basis of that review, at different stages of the study.

The researcher tried to understand the way the students applied technology to create digital stories in their English-language classroom and to answer the questions regarding the aspects of digital literacy that can be developed through digital storytelling, as well as the factors that can inhibit effective implementation of digital storytelling. The study was pursued through the classroom application of digital storytelling and involvement with students and adopted a methodology in the form of a case study (Merriam, 1988).

Data from the case studies were converged and studied in a cross-case analysis. The focus of qualitative studies in general is “to detail many specifics that give the context its unique flavour” (Lincoln & Guba, 1985, p. 201) rather than to “deliberately [divorce] a phenomenon from the context, so that attention can be focused on a few variables” (Yin, 1989, p. 23). Three cases were employed

to strengthen the understanding of possible variation by examining a range of similar cases.

### **3.2.3 Participant selection.**

Three upper-primary-school English-language class children (aged 11 or 12) were the cases for this study. They used digital storytelling over a prolonged period during one school semester, from January to July 2009. Three participants engaged in identical digital storytelling activities were a suitable ‘bounded system’ for the study (Merriam, 1988; Creswell, 1998; Yin, 1989). Three cases are suitable for qualitative research, as the aim of such a study is not to generalise beyond the specific context but to provide a rich description of the experience (Flyvbjerg, 2006; Stake, 2000). The focus of qualitative studies in general is “to detail many specifics that give the context its unique flavour” (Lincoln & Guba, 1985, p. 201).

The students in the study were from three different countries: Singapore, mainland China and Hong Kong Special Administrative Region of China. Student diversity was important, as the students from these three countries had diverse English-language abilities and could be divided into the following categories:

- native speaker of English language for whom English was their mother tongue (Singapore)
- student who learnt English as a second language at kindergarten and primary school in early childhood but had no exposure to English language at home (Hong Kong)
- student who joined the school in lower primary (three or four years before this study was conducted), coming from a non-English medium of instruction in a mainland Chinese school (in China).

Their different levels of English language were evident from their performance in the English-language end-of-year examinations (Semester Assessment Two) at the end of Grade 5. The researcher selected the three participants for the multiple case study based on an analysis of the pre-study data (questionnaire, PPT and Microsoft Word). They were chosen to maximise the diversity of the sample, based on their language ability (low, medium and high, as seen from their examination results) and their level of digital literacy prior to the study.

#### **3.2.4 Trustworthiness in qualitative research.**

In a qualitative study, a researcher is a primary instrument of data collection and analysis, which might be understood as a limitation in this kind of qualitative study. To overcome possible bias when analysing the data, the researcher used methodological triangulation (Merriam, 1988) as an important strategy to observe the internal validity of the study. This involved multiple reviewers and multiple sources of data to confirm the emerging findings. The validity of the study was strengthened by:

- a) engaging the participating students in informal interviews and discussions of their individual projects, to identify what challenges they had and how they dealt with those challenges, as well as to understand what guided their decision making
- b) member-checking was used as a technique establish to the validity of students' statements in order to encourage the participants to clarify earlier statements; it was done informally during the course of observations
- c) engaging multiple reviewers (critical friends) in the analysis process.

Costa and Kallick (1993) defined a critical friend as:

... a trusted person who asks provocative questions, provides data to be examined through another lens, and offers critiques of a person's work as a friend. A critical friend takes the time to fully understand the context of the work presented and the outcomes that the person or group is working toward. The friend is an advocate for the success of that work.

For this study, the researcher identified two experienced educators who were enthusiastic about integrating technology in their teaching as suitable people to play the role of the critical friends.

### **3.3 Data Collection and Data Analysis Instruments**

#### **3.3.1 Overview.**

This study adopted qualitative multiple case study methods that included: student questionnaires, interviews with students, participant observations, class discussions, students' written reflections, peer evaluation, discussion of planning documents and digital artefacts by the researcher, students and multiple reviewers, as well as analysis of the digital artefacts by the researcher and multiple reviewers.

Table 3.1 provides an overview of all the methods used; each method is then explained individually.



e 3.1. *Outline of Methods Implemented in the Study*

Stages Method	Pre-study assessment (Microsoft Word and PPT)	Project One: <i>Pourquoi</i> Story (narrative genre)	Project Two: Story Review (response genre)	Project Three: <i>Shout Your Story</i> Tell (personal story predefined genre)
Pre-study assessment Section )	15-minute session during class contact time before 8.30am  Administered by researcher before students' engagement in the study	Not applicable	Not applicable	15-minute session during class contact time before 8.30am  Administered by researcher after students' engagement in the study and before final interviews with students
Use of digital technology Section )	Conducted prior to the students' engagement with the first project	Conducted after the completion of Project One	Conducted after the completion of Project Two	Conducted after the completion of Project Three
Interviews with students Section )	Unplanned informal interviews took place in any teachable moment, such as when the researcher observed a student, or the researcher asked questions  Took place in the classroom and in the computer laboratory	Unplanned informal interviews took place in any teachable moment, such as when the researcher observed a student, or the researcher asked questions	Unplanned informal interviews took place in any teachable moment, such as when the researcher observed a student, or the researcher asked questions	One 30-minute planned interview with each student  All three interviews conducted over the telephone  Unplanned informal interviews took place in any teachable moment, when the researcher observed a student, or the researcher asked questions

Stages Period	Pre-study assessment (Microsoft Word and PPT)	Project One: <i>Pourquoi</i> Story (narrative genre)	Project Two: Story Review (response genre)	Project Three: Show Tell (personal story predefined genre)
Participant variation Section )	8 English-language lessons, 30 minutes each	30 English-language lessons, 30 minutes each  Conducted in the classroom and in the computer laboratory	24 English-language lessons, 30 minutes each  Conducted in the classroom (one-on-one laptops)	12 English-language lessons, 30 minutes each  Conducted in the classroom (one-on-one laptops)
Discussions Section )	Not applicable	10-minute sessions conducted at the end of each block (12 blocks)	10-minute sessions conducted at the end of each block (10 blocks)	10-minute sessions conducted at the end of each block (5 blocks)
Students' written contributions Section )	Not applicable	One lesson of 30 minutes conducted upon completion of the project	One lesson of 30 minutes conducted upon completion of the project	Not applicable
Evaluation Section )	Not applicable	One lesson of 30 minutes conducted upon completion of Project One	One lesson of 30 minutes conducted upon completion of Project Two	One lesson of 30 minutes conducted upon completion of Project Three
Learning experiences and assessment artefacts Analysis Section )				

### **3.3.2 Procedure and stages of the study.**

The participating students were engaged in three digital storytelling activities over one semester. The researcher, who was also the class teacher, designed a set of digital storytelling activities based on recommendations from the literature and implemented these in the class.

For the purpose of the study, the students were informed that instead of the usual pen-and-paper writing, for Project One they would be engaged in an activity in which they would be able to use personal computers (PC) in the stationary computer laboratory. The students were familiar with this laboratory because they used its computers during lessons. According to Ohler (2008), “Ideally, you need one computer and microphone per storyteller”. For all three projects (*Pourquoi* Story, Story Review and Show-and-Tell), the students worked on individual computers and had microphones and headphones.

Laptop computers from the school Apple MacBook Learning Laboratory, also known at the school as ‘the mobile computer lab’, were used for Projects Two and Three. The mobile computer lab was purchased by the school at the beginning of Semester Two, when the students were already engaged in Project One. The students were not familiar with the mobile lab prior to the study. However, there were three stationary computer laboratories at the school: two equipped with PCs and one with iMac desktops. The subject ICT was introduced only one year before this study was conducted. ICT lessons at the fourth, fifth and sixth-grade levels were conducted only for one semester out of the two in the whole academic year (two 30-minute periods per week for 20 weeks).

Students had limited exposure to the computer laboratories outside ICT lessons due to various factors:

- The large number of students (approximately 900) and classes (approximately 32) made it very difficult to book a laboratory.

- Bringing the students to the computer laboratory meant losing a few minutes from each lesson for movement around the school, settling down in the laboratory and tidying up the room at the end of the lesson.
- Although there were enough desktop computers in each laboratory, if the students were to record their voices, the background could be too noisy.
- There were no headphones and cameras in the computer laboratories and the researcher had to ask technicians to provide the equipment before every lesson.

The mobile lab provided flexibility, mobility and convenient access to technology.

The purchase of the mobile lab by the school helped in many ways:

- It allowed curriculum time to be maximised.
- The teachers had one more laboratory available for use in their lessons, which eased the booking process.
- The researcher in this study was one of the few teachers in the school who felt confident with this mobile technology and therefore she could book the mobile lab without worrying that it would be pre-booked by other colleagues.
- Headphones with inbuilt microphones were purchased especially for use with the mobile lab.
- The mobile lab allowed mobility: when students needed to narrate, they could sit outside the classroom in the teacher's view, make recordings and avoid any noise created by their classmates' discussions.

As noted earlier, this study included pre-study activities designed by the researcher to identify the students' levels of digital literacy prior to their engagement with the three projects. The overview of the study procedure is presented in Figure 3.1 and discussed in the following section.

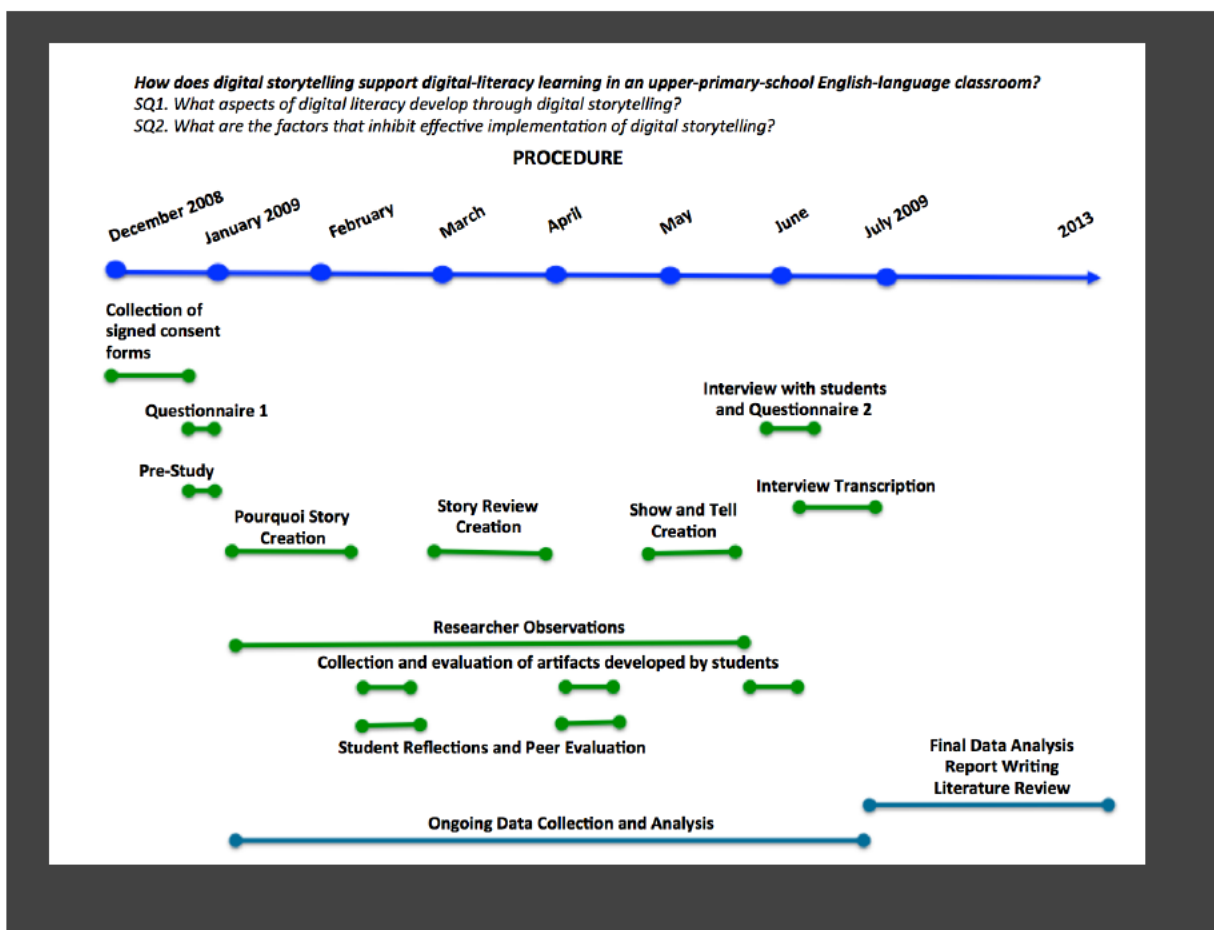


Figure 3.1. Study procedure overview.

The literature recommends using digital storytelling for different purposes. Lambert (2010) lists, among others, character stories, memorial stories, adventure stories, accomplishment stories and personal stories. Similarly, Wang and Zhan (2010) discuss the use of digital stories in education: “Students can create a story to share their experiences, report their findings, reflect on their understanding, and the like”. In this current study, three types of stories and genres were identified, based on:

- the literature about digital storytelling activities suitable for teaching English at schools (Ohler, 2008; Lambert, 2007; Miller, 2008)
- the curriculum requirements of the school in the study
- the aims of each of the three projects in terms of the digital literacy skills they would enhance.

### **3.3.3 Stage 1: Pre-study data collection and analysis.**

#### **3.3.3.1 Questionnaire.**

Prior to beginning the study, the researcher administered a questionnaire (see Annex A) based on the Likert scale. This aimed to identify the frequency of the students' engagement with technology prior to the study; to detect the level of their digital literacy, as perceived by the students themselves; and to identify suitable cases with the most variability in English-language proficiency (that is, to select students with levels of language ability and technology skills varying from low to high).

The questionnaire consisted of two parts, related to technology skills and English-language skills. According to Ohler (2008), "Traditional storytelling is highly regarded as a powerful tool for helping students develop literacy skills. Digital storytelling merely extends this into the digital domain. In the process, it usually integrates a number of traditional and emerging literacies into the storytelling process". One of the emerging literacies is digital literacy. As the context of this current study was an English-language classroom, it was necessary to ascertain whether English-language proficiency affected in any way the development of digital literacy skills. The two domains, English-language skills and technology skills, were examined. The questionnaire was designed with the following categories, each containing a number of specific questions:

- *Hardware*—operating a computer and ability to use headphones and microphones
- *Software*—level of familiarisation with software programs and/or applications such as Microsoft Word, PPT, Photo Story 3, iMovie; ability to save files in designated directories and to use search engines (e.g., Google)
- *Texts*—ability to select, use and change font colour, size, style, to position the text on the screen and to ensure the effectiveness of the text

- *Images*—ability to use ClipArt, to search for images on the Internet, to acknowledge copyright when downloading images from the Internet, to download and save images, to insert an image in Microsoft Word and PPT, to identify an image resolution, to crop an image, to combine images and to add effects to an image
- *Music*—ability to find music on the Internet, to import music to PPT, to select music that would enhance the content, to identify the size of a music file, to acknowledge copyright when downloading music from the Internet and to adjust music volume in PPT
- *Narration*—ability to record voice in PPT, to adjust the volume of narration in PPT, to speak for each PPT slide and to create scripts to support their narration in PPT
- *Information*—ability to find information for homework on the Internet, to identify reliable websites, to use Wikipedia for information, to use copyright-free images ([www.flickr.com/creativecommons](http://www.flickr.com/creativecommons)), and to differentiate between a search engine, a directory and a website
- *English-language*—to identify existing English-language-related study habits and attitudes; however, the main source of information about the students' English-language ability was the exam results

The researcher distributed a hard copy of the questionnaire to each student in the class and they completed them within the allocated time. The researcher collected the questionnaires and analysed the data. The results informed the researcher which students would be suitable to become the cases (participants) in the study.

The researcher conducted other pre-study activities to identify the levels of digital literacy of the three students being studied. The assumption was that the students would

enter the study with levels of digital literacy that would vary for different students and for different aspects of digital literacy. The researcher aimed to evaluate developments in their digital literacy throughout the study, to answer the research question of the thesis. The other pre-study activities included: a PPT presentation by the students ('Biography of a famous person'), a Microsoft Word document ('Comparison of two extraordinary people') and observations of the students' engagement with technology interwoven with discussions with them to evaluate their level of digital literacy, using aspects of the digital literacy rubric described in Section 3.3.2. Two reviewers (critical friends) were engaged to evaluate the students' digital artefacts. They and the researcher filled in the rubrics, which were later examined by the researcher. The researcher discussed any discrepancies in the three evaluators' rubrics and determined each student's level of digital literacy on the basis of that review.

#### **3.3.3.2 PowerPoint '*Biography of a famous person*'.**

During English-language lessons, the students studied biographies of different famous people, examining parts of a biography as a genre. The students were instructed to conduct research on any famous person of their choice and present their findings in the form of a PPT presentation they created individually. The requirements for the tasks were:

- a) Identify a famous person that you would like to research.
- b) Create a PPT presentation (a mini-biography of the famous person) consisting of 10 to 12 slides.
- c) For each slide, include images that can enhance the content. (The researcher intentionally did not specify the content of the pictures, as she intended to observe what images the students would use.)
- d) Save your work as 'Name\_Class\_Biography' into your own folder in the Pupils Drive.



### **3.3.3.3 Microsoft Word document ‘Comparison of two extraordinary people’.**

For this assignment, the students were required to fill in a table after searching for the necessary information on the Internet. Although this activity did not include storytelling, it was important to identify the students’ ability to identify, locate and analyse information. Technology skills, such as saving and retrieving files, were also to be analysed. To share the document, the researcher created it in Microsoft Word and saved it as a ‘read-only’ document called ‘COPY FROM HERE’ in the Pupils Drive. The teacher instructed the students to open the document, select the text and table, copy it, open a new Microsoft Word document and paste the copied information into it. Then they were to save the document under their own name in their own folder in the Pupils Drive.

### **3.3.3.4 Participant observations.**

The researcher conducted participant observations to observe, record and interpret the participants’ practices while engaging with technology in an English-language classroom.

### **3.3.3.5 Aspects of digital literacy rubric.**

The rubric (see Section 2.4, Table 2.2) was developed prior to the study and was used throughout the study to analyse the development of digital literacy skills in the students.

## **3.3.4 Stage 2: The three digital storytelling projects**

### **3.3.4.1 Project One: *Pourquoi* Story (narrative genre).**

For one of the requirements of the sixth-grade English-language curriculum, students must read and outline the key elements of *pourquoi* stories (stories created by different cultures around the world to explain how things had been created or why something is the way it is; for example, why a rabbit has a short tail, or why there are rainbows). The students were later to write their own stories.

The researcher identified narrative genre as suitable for the first project. During their previous five years of primary education, the students had been exposed to the narrative genre when, as a requirement of the English-language curriculum, they wrote compositions (essays). Thus, the students were not absolute novices in creating stories.

The researcher asked the students whether they wanted to start a traditional writing task or use school mobile lab instead. The idea of using the computers was welcomed by the students, who expressed a desire to start using them the very same day. Although the students did not really have a choice, the teacher-researcher used this tactic to arouse students' curiosity and boost their interest in the upcoming project, knowing that before embarking on a new topic or project, it was essential to develop the students' interest in it.

The first project was conducted at the stationary computer laboratory (computer laboratory 1). The researcher selected five sets of images of nature, animals and people from [www.flickr.com/creativecommons](http://www.flickr.com/creativecommons). The images were allocated to five different folders (10 in each folder) in the school Pupils Drive (a digital storage space for the students, accessible to only students and teachers at the school). The students were asked to examine the photographs in each folder and individually brainstorm what story they could possibly create, using all 10 given photographs. They were required to select only one folder and use only the 10 photographs in the folder to develop their stories. They were not allowed to omit or add photographs. The students did not create storyboards, but they were introduced to the inbuilt function in Photo Story 3 of text windows used for typing the scripts that corresponded to each of the images.

The researcher deliberately provided all images to the students, to allow them to focus on the digital storytelling tasks rather than spending time searching for the images. The researcher also intended to identify any digital literacy skills the students might exhibit when solving problems related to the seemingly limited choice of stories.

Project One allowed the students to become familiar with the idea of digital storytelling and engage more deeply in thinking about the way images can help develop a storyline supported by a variety of other media forms: narrations, sound effects, transitions and texts. The researcher introduced Photo Story 3 as a tool for learning and creating a digital story. The researcher provided minimal help (e.g., did not explicitly teach the students how to develop planning documents or how to create dynamic media); the researcher intended to give her students an opportunity to be independent yet goal-oriented learners.

This first project was identified as best suited to engage the students in inquiry-based learning, a learner-centred approach focusing on questioning, critical thinking and problem solving—one of the aspects of digital literacy learning identified by the researcher (see the Literature Review chapter) was “Develop ability in problem solving and reflecting on own technology skills”. As the students started exploring Photo Story 3, they became actively involved in formulating the elements of a *pourquoi* story and thought critically about the use of the pictures provided by the researcher and how they could be rearranged to communicate information to the viewers.

Table 3.2. *Project One: Pourquoi Story (Narrative Genre) Procedure*

Day	Number of periods	Activities outline
1	3	Introduction/modelling by teacher/deconstruction of a digital story
2	2	Choose one of five folders provided/open Photo Story 3 and create a project/explore the software/upload images/save the project
3	3	Upload more images from the selected folder (if failed to do it earlier)/organise sequences/edit images if necessary/add effects
4	2	Plan and typewrite texts/change fonts, styles and colours/explore how to write the scripts that will go along with narration
5	2	Continue from the previous lesson/proofread the scripts
6	2	Connect headphones and microphone to your computer/record narrations
7	3	Continue from the previous lesson/edit narrations/listen and edit if necessary/explore music inbuilt in Photo Story 3
8	2	Add music and/or sound effects inbuilt in Photo Story 3
9	2	Apply transitions/preview the project/export movie into a designated folder/give a meaningful title (e.g., YourName_ProjectTitle)
10	3	Peer evaluation/edit the project if necessary/export the final draft
11	3	Class viewing of selected projects (pre-selected by the teacher according to high, medium and low quality)/class discussion
12	3	Reflect on the project/write your story using pen and paper
TOTAL: 30 periods or 15 hours		

### **3.3.4.2 Project Two: Story Review (response genre).**

As the students had had prior experience working with Photo Story 3 on the first project, the researcher wanted them to focus on more complex tasks that potentially would allow for existing digital literacy skills to improve and for new skills to develop. The researcher also intended to examine whether planning the digital stories with the use of storyboards would affect the development of the digital skills.

As part of the sixth-grade English-language syllabus, Story Review (response genre) was identified by the researcher as an appropriate genre where one of the school core values, respect, could be integrated. Pastoral care and moral education at the school where the study was conducted plays an important role in the students' development. The school has identified six core values: respect, responsibility, resilience, integrity, care and

honesty. It is compulsory for sixth-grade teachers to integrate character education materials in their lessons. School character education booklets consist of a set of stories that teach moral values and sense of belonging to a country. Each sixth-grade English-language teacher needs to integrate any two stories from the booklet into their teaching.

The story of William Tell, a 14th-century Swiss hero, portrays respect for parents and country. In traditional interpretations, William Tell is presented as the personification of hundreds and thousands of Swiss people who resisted the Austrian domination of Switzerland. The teacher set a task: review the story of William Tell and explain how a school core value, respect, is exhibited in the story. The students were asked to create story maps and storyboards of the story. The students were made familiar with storyboarding as a tool that helped them to plan the media resources required for the story review. For the storyboarding activity, they provided simple sketches of the photographs that they planned to find on the Internet. The sketches served the purpose of visualisation and provided students with an opportunity to plan ahead and narrow the search of photographs on [www.flickr.com/creativecommons](http://www.flickr.com/creativecommons). The students collected their own media and in some cases, drew images for use in their digital stories. The researcher emphasised the importance of copyright in the information age. See Annex G and Annex H for the sample storyboard and story map.

The first digital storytelling project was designed to give students experience and understanding of digital storytelling and using Photo Story 3 for Windows to create their narratives. For the second task, the students needed to review a story. Storyboarding gave the students a framework to think about how to divide their story review into a sequence of screens and what media to include in each of the screens.

Through the study, the Internet was frequently used for locating and downloading media (images) and copyright issues were discussed. Scaffolding was provided to the

students when the teacher introduced storyboards as a tool that would allow them to plan and formulate their own ideas.

Table 3.3. *Project Two: Story Review (Response Genre) Procedure*

Day	Number of periods	Activities outline
1	3	Introduction/read the story/identify main characters/create a story map/conduct research on the topic
2	2	View sample storyboards/discuss the purpose of creating storyboards/create storyboards, simultaneously planning the media that you will use
3	2	Introduction to <a href="http://www.flickr.com/creativecommons/">www.flickr.com/creativecommons/</a> collect media
4	3	Start creating your story, referring to the planning documents (story map and storyboards): images, texts, narrations, music, sequences and transitions, special effects
5	3	Continue from the previous lesson
6	2	Continue from the previous session
7	2	Preview your project for self-evaluation/export movie into the designated folder
8	2	Peer evaluation/edit the project if necessary/export the final draft
9	3	Class viewing of selected projects (pre-selected by the teacher according to high, medium and low quality)/class discussion
10	2	Reflect on the project/write your story using pen and paper
TOTAL: 24 periods or 12 hours		

#### **3.3.4.3 Project Three: Show-and-Tell (personal story with a predefined genre).**

As the student were engaged in the creation of digital stories in the first and second projects, the researcher wanted them to consolidate the skills that they already had and to apply them when planning and creating the stories for the third project, in which they were free to choose a topic for a show-and-tell digital story. The students were tasked to create a show-and-tell for presentation. The researcher decided to allow the students to select their own topics. Since some students were not sure what stories they could create, the researcher provided some ideas to generate students' interest. They were independent in developing their narrative and selecting media for their story in the approach to the story development. They could decide whether or not to create a story map and storyboards. They were given

the freedom to use their own photographs or search the Internet. They were to go home and brainstorm ideas, and to generate a topic in a few days' time. The researcher provided the students with various ideas regarding software applications that they could use, such as Photo Story 3, Windows MovieMaker or PPT. After brainstorming, a few students asked the researcher if they could use iMovie to create their digital show-and-tell stories. The researcher welcomed the use of this Apple application.

The researcher decided to use a school-wide online platform to communicate with the students in relation to the project. The students and the researcher used ThinkQuest, “an online learning platform that helps students develop important 21st century skills, including communication, critical thinking, and technology skills” ([www.thinkquest.org](http://www.thinkquest.org)).

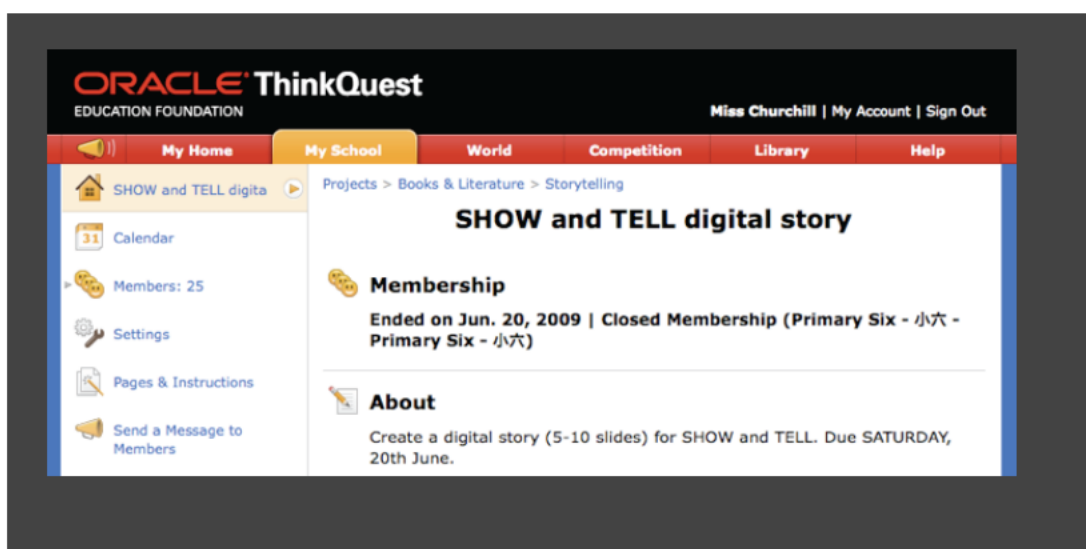


Figure 3.2. ThinkQuest.

The researcher predefined the use of the school online learning platform as a suitable communication and channel for the students and as a repository for the completed projects. At that time, online collaboration was non-existent in the school under study. The researcher intended to observe whether the aspect of digital literacy “Use a variety of technology tools to create digital information” would be observed when the students were engaged in a task involving new technology.

The third project was the last activity under study. Show-and-Tell (personal stories without a predefined genre) was identified by the researcher as best suited for the consolidation of the skills learnt through the engagement in the previous two project and allowing the students to be free in deciding on the topic and method of creating their digital story. The researcher hoped to observe how all 10 aspects of digital literacy would be demonstrated through the participants' engagement with their digital stories. The entire process led to an output (personal digital story) that was generated through the use of digital technologies. No scaffolding was provided by the researcher.

Table 3.4. *Project Three: Show-and-Tell (Personal Story with a Predefined Genre)*

*Procedure*

Day	Number of periods	Activities outline
1	2	Introduction to the e-Learning platform ThinkQuest/discussion of topics for the digital story
2	2	Plan the story (optional creation of story map and storyboards)/collect media
3	2	Choose an application to create your digital story from Photo Story 3/ iMovie/PPT with narrations/Windows MovieMaker Start work on the project
4	2	Continue from the previous lesson
5	2	Continue from the previous lesson
6	2	Self-evaluation and editing of the project
7	Homework	Submit the final version of the movie through one of the following means: send an email with attachment, upload to ThinkQuest, save on your USB and deliver through your parents at the parent-teacher meeting
TOTAL: 12 classroom periods or 6 hours		

To summarise, the three digital storytelling projects aimed to identify the development of digital literacy skills and any factors that could affect their development. Each of the three projects encouraged students to use different digital literacy skills (aspects of digital literacy) as seen in Table 3.5.



Table 3.5.

Aspect of digital literacy	Project One <i>Pourquoi</i> Story	Project Two Story Review	Project Three Show-and-Tell
1. Determine the nature of information and media needed			
2. Locate information			
3. Evaluate reliability of information and media content			
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal text (text, image, animation, sound, layout, narration)			
5. Use digital technologies in a safe and socially responsible manner			
6. Manage digital information in technology space (hardware and software components troubleshooting)			
7. Ethically use information and media (©)			
8. Apply information to design own representations to effectively communicate knowledge to others			
9. Develop ability in problem solving and reflecting on own technology skills			
10. Use a variety of technology tools to create digital information			

Each project built on the previous one and called for a higher level of digital literacy skills. The three projects supported the development of students' digital literacy skills.

### **3.3.5 Instruments of data collection and analysis.**

#### **3.3.5.1 Observations.**

The researcher conducted observations that she recorded in the form of field notes of specific actions (e.g., students' questions related to their projects, any comments, troubleshooting of hardware and software problems, etc.). The observation field notes were later transcribed (see the sample in Annex B). According to Bloom (1953, p. 161), "The basic idea underlying the method of stimulated recall is that the subject may be able to relive an original situation with vividness and accuracy if he is presented with a large

number of the cues or stimuli which occurred during the original situation”. The notes were read to students for a stimulated-recall discussion, to clarify what had informed students’ decisions when working on their projects (e.g., when they selected images, organised the storylines, recorded narrations, solved technology-related problems, etc.). Observations helped the researcher to understand changes in practices as indicators of the development of some aspects of digital literacy.

#### ***3.3.5.2 Class discussions.***

The researcher initiated 10-minute class discussions about the projects at the end of each block of lessons. This allowed her to observe the questions the three participating students asked and to assess whether those questions informed any of the aspects of digital literacy. Open-ended questions by the teacher and the students’ answers provided information about their understanding of the various aspects of digital literacy (e.g., “How might changing the sequences of the images affect the storyline?”; “How might a narration done in a soft voice affect the viewer?”; and “Why is image resolution important?”).

#### ***3.3.5.3 Students’ reflections.***

The researcher recognised that individual students’ reflections would enhance her insight into their perceptions and understanding of the skills required to learn with technologies, as well as boosting their critical thinking and providing evidence that would support her understanding of the phenomena. As noted in CSU (2012), “Reflection is a process of examining and interpreting experience to gain new understanding”. The researcher provided an outline for reflections through a set of questions related to Projects One and Two. Individual reflections differed from the class discussions because they allowed students to answer questions in a non-threatening environment, whereas speaking in front of the class could be intimidating for some students. The Results and Discussion

chapters of this document include direct quotes from the students' reflections and a rich discussion of their significance.

Reflections on the Project One digital storytelling project (see an example in Annex C) provided the researcher with insight into the aspects of digital literacy developed by the students and if there were any factors that affected the development of their digital literacy skills. As noted earlier, the students were required to present their final digital stories by uploading them to the designated folders in the Pupils Drive. They were required to review view, evaluate and provide comments (if necessary) on two stories created by their classmates. The researcher instructed student-reviewers on which two digital stories they were to review and ensured that the three participants in the study reviewed each other's digital stories. The students' reflections informed the researcher about the decision-making process of the participating students and their ability to transfer knowledge and apply skills learnt during the projects to evaluate the effectiveness of their own and others' digital stories.

#### ***3.3.5.4 Students' peer evaluation.***

The students evaluated their peers' digital stories (see an example in Annex E). As noted in Colorado State University (2012), "Teachers frequently use student peer review to increase the amount of feedback students receive on their writing and speaking assignments". The peer evaluation served two purposes. First, a student-creator of a digital story could listen to a classmate's evaluation and reflect on some shortfalls of his or her project. Then the reviewed students could edit their own work based on the feedback. Additionally, the peer evaluations provided an insight into some aspects of the student-evaluators' digital literacy, particularly whether they could identify any shortfalls or areas for improvement for their peers. In the context of this study, shortfalls were defined as any instance of students lacking any of the 10 aspects of digital literacy.

### ***3.3.5.5 Planning documents and digital artefacts.***

The planning documents provided ideas about the students' initial plans to represent their stories in digital ways and information about aspects of their digital literacy at that stage. Attention was also given to exploring the way technology mediated the development of their planning documents. Comparison of the planning documents and the final digital stories provided insights into development in the students' digital literacy and evidence of factors that had inhibited such development, based on the actual process of production using digital tools.

### ***3.3.5.6 Semi-structured interviews.***

Semi-structured interviews were conducted after the completion of the third project, Show-and-Tell, to collect data about the three students' experiences with digital storytelling and the way these supported their digital literacy development. The participants were asked to view their digital show-and-tell stories and explain how they had developed them, difficulties they had encountered and the way their plans changed as they engaged in the process.

The interviews were audio recorded, transcribed and then validated by the participants. They were reminded of the way they had made decisions when working on their digital stories and asked to clarify their decision-making. Due to timetabling constraints, the researcher decided that it was not necessary to conduct and record interviews after the completion of the first and the second projects. Reflections with pre-designed, specific open-ended questions on Projects One and Two elicited sufficient information on the aspects of digital literacy that had been developed by the students. Examples of these reflection questions were: "How did you search for information?"; "What images did you look for?"; and "Were there any difficulties saving the images or your movie?" (see an example in Annex I).

A summary of the data collection instruments used to inform each of the aspects of digital literacy development are presented in Table 3.6.

Table 3.6. *Instruments of Data Collection*

Aspects of digital literacy	Instruments of data collection					
	Observations	Class discussion	Student reflections	Student peer evaluation	Planning documents and digital artefacts	Semi-structured interviews
1. Determine the nature of information and media needed	X		X		X	X
2. Locate information	X	X	X		X	X
3. Evaluate reliability of information and media content	X	X				
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal text (text, image, animation, sound, layout, narration)			X		X	X
5. Use digital technologies in a safe and socially responsible manner	X	X	X	X	X	X
6. Manage digital information in technology space (hardware and software components troubleshooting)	X		X			X
7. Ethically use information and media (copyright)	X	X	X	X	X	

Aspects of digital literacy	Instruments of data collection					
	Observations	Class discussion	Student reflections	Student peer evaluation	Planning documents and digital artefacts	Semi-structured interviews
8. Apply information to design own representations to effectively communicate knowledge to others					X	X
9. Develop ability in problem solving and reflecting on own technology skills	X		X			X
10. Use a variety of technology tools to create digital information	X				X	X

### ***3.3.5.7 Aspects of digital literacy evaluation rubric.***

The data analysis involved coding and classifying the responses to the questionnaire and triangulating different pieces of evidence to arrive at emerging categories that could lead to assertions. Each data set was analysed to inform the aspects of digital literacy development and any factors that hampered their development. As noted by Merriam (1988), multiple pieces of evidence are essential for methodological triangulation as a means of establishing the internal validity of the study.

For this study, the researcher identified two colleagues (one from the school in which the study was conducted and one a college lecturer) who were experienced teachers of English and were enthusiastic about integrating technology in their teaching as suitable people to play the role of the critical friends. They reviewed and evaluated each of the three students' pre-study projects and the three digital stories by the three participants using the rubric provided by the researcher. The results were compared and discussed with the

researcher. If the reviewers' results differed from each other or from the researcher's results, the three reviewers and the researcher would check again, to come to a consensus.

The main evaluation tool used by the researcher to measure the development of the aspects of digital literacy was the evaluation rubric (see Section 2.4). The researcher letter-coded each data sources and looked for the codes of all data sources across the three projects. This analysis of the codes was undertaken for all aspects and all data sources and allowed the researcher to extract findings (instances of aspects of digital literacy) and to identify themes developing for the three participants in the study.

The researcher examined the three levels of each aspect of digital literacy (Use, Understand and Create, as outlined in Section 2.4) and monitored the development of the 10 aspects of digital literacy throughout the study by using the rubric. To present the findings and to show any changes in the participants' development in the aspects of digital literacy, the researcher input the collected data for each participant in a clustered column chart. The following three categories were included in each chart:

- 1) 10 aspects of digital literacy
- 2) three levels of digital literacy development (that is, Use, Understand and Create)
- 3) three projects and the pre-study.

These charts are presented and described in the Results chapter. The researcher then analysed the findings to identify any aspects of digital literacy that had developed and factors that had influenced or impeded this development.

### ***3.3.5.8 Cross-case analysis.***

The researcher analysed the three cases under study and conducted a cross-case analysis of them. According to Yin (2009) and Merriam (2004), cross-case analysis in a multiple case study can help to harness individual cases under common themes. A qualitative researcher may be challenged about the small "sample size" in a qualitative

research (Northcote; 2012, p.101). However, it is important to note that more powerful generalisations and descriptions may be developed by the researcher studying a few cases, which may potentially strengthen the study. The cross-case analysis allowed the researcher to contrast and compare the three participants to see if there were any similarities in the way they developed digital literacy skills, any differences in the way they completed the tasks, and if anything had affected the development of their digital literacy skills.

### **3.4 Ethical Clearance and Data Storage**

As the participating students were under the age of consent, ethical issues for this study were resolved by using a consent form. The researcher first received approval from the school principal, then sent an information letter and consent forms to the parents of the participants. The researcher obtained signed consent from the parents or guardians of all the students in the study. All student data was de-identified and student confidentiality was maintained through assigning pseudonyms such as Ian, Jane and Andrew. The researcher also obtained ethical clearance from Edith Cowan University.

All data were stored in a secure location and the identities of the participating students were protected. The participants were informed that they had the right to withdraw from the study if they decided to do so. They would still need to complete digital storytelling tasks, but any data collected based on their work would not be used in this study or any publications evolving from this study.

### **3.5 Summary**

This chapter has presented the research design methodology. The study focused on the evaluation of the digital literacy of sixth-grade students who engaged in digital storytelling activities during their English-language lessons. The study was qualitative by nature and falls under the umbrella of a multiple case study. Various research instruments were developed by the researcher for the data collection: a questionnaire, a rubric for



aspects of digital literacy, interviews, observations, group and class discussions, student reflections and peer evaluation, planning documents and digital artefacts analysis. The researcher involved multiple reviewers who helped evaluate the digital artefacts developed by the students. This allowed strengthening of the validity of data. The results of the study are discussed in the next chapter.

## **Chapter 4: Results**

### **4.1 Overview of the Data Coding**

This chapter reports the results of the analysis for each case study student for the pre-study project and the subsequent three digital storytelling projects. The results and data sources for each student are presented in a table at the beginning of each case. The data sources referred to in each case are taken from the table and indicated by the following codes:

Q—Questionnaire

O—Observation notes

R—Reflections by students

D—Discussion transcripts

E—Evaluation by peers

A—Artefacts (digital artefacts and planning documents)

I—Interviews (semi-structured).

The projects were coded as P1 (Project One), P2 (Project 2) and P3 (Project 3). The cases were coded as J (Jane), A (Andrew) and I (Ian). The symbol X is used to indicate the number of a coded note. The symbol NA is used to indicate that a source criterion is not applicable.

For example, a coded note B-O:P1:J:1 is used to illustrate the observation note (O) number 1 (1) for Jane (J) in project one (P1), which is recorded in Annex B (B). See section 4.3.3.1 and Annex B.

Selected examples of each data source are provided in appendices A–I. These data sources were coded as shown in Table 4.1.

Table 4.1. *Coded Data Sources*

Annex	Data collection instrument	Project number	Case name	Note number (if available)
A	Q	NA	NA	NA
Coded note A-QT				
B	O	P1	J	X
Coded note B-O:P1:J:X				
C	R	P1	A	X
Coded note C-R:P1:A:X				
D	D	P2	I	X
Coded note D-D:P2:I:X D-D:P1:A:X				
E	E	P3	I	X
E	E	P1	A	X
Coded note E-E:P3:I:X E-E:P1:A:X				
F	A	P1	A	X
Coded note F-A:P1:A:X				
G	A (story map)	P2	J	NA
Coded note G-A (story map):P2:J				
H	A (storyboard)	P2	J	NA
Coded note H-A:P2:J				
I	I	P3	J	X
I	I	P3	A	X
Coded note I-I:P3:J:X I-I:P3:A:X				

Each data source best illustrates the claims of the study.

## 4.2 Case One: Technical Master (Ian)

### 4.2.1 About Ian.

Ian was an 11-year-old boy from an English-speaking family in Singapore. He was a high-achieving student, having scored 90, 82, 95 and 91 per cent respectively in the core subjects of English, Putonghua, Math and Science. Ian completed tests in the Gifted Education Programme conducted by the school and based on his English and Math results in the fourth grade, he was found to be gifted. This meant he had an option of studying in

Singapore at a school for gifted children. However, due to his parents' commitments in Hong Kong, the family decided to decline this opportunity and he stayed at the school during the course of the study. Ian was a serious, self-disciplined and diligent student. He preferred reading to playing at recess and lunch breaks: "Books are my best friends" (see Ian's interview).

For his ability to use technology effectively and to identify and explore the functionality of various technology tools, the researcher identified Ian as a 'Technical Master'. To evaluate his development of digital literacy and their aspects, the researcher collected data through the various data collection instruments described earlier. An overview of these findings is presented in Table 4.2, followed by detailed description of the findings for Ian.

Table 4.2. *Analysis of the Aspects of Digital Literacy—Ian*

Aspect of Digital literacy	Stage of the study	Level of digital literacy	Evidence						
			Questionnaire	Observation notes	Discussion transcripts	Reflections by students	Evaluation by peers	Planning documents and artefacts	Semi-structured interview transcripts
			(Q)	(O)	(D)	(R)	(E)	(A)	(I)
1. Determine the nature of information and media needed.	Pre-study	UE	✓	✓	✓	NA	NA	✓	NA
	After P1	UD	NA	✓	X	✓	NA	X	✓
	After P2	CE	NA	✓	✓	X	NA	X	✓
	After P3	CE	NA	✓	X	NA	NA	✓	✓
2. Locate information.	Pre-study	UE	✓	✓	✓	NA	NA	X	X
	After P1	UD	NA	X	X	✓	NA	✓	✓
	After P2	CE	NA	✓	✓	X	NA	✓	✓
	After P3	UD	NA	✓	NA	NA	NA	X	✓
3. Evaluate reliability of information and media content	Pre-study	NE	X	X	X	NA	NA	X	X
	After P1	UD	NA	X	X	✓	NA	✓	✓
	After P2	CE	NA	✓	X	✓	NA	X	✓
	After P3	NE	NA	X	X	NA	NA	X	✓
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration)	Pre-study	UD	NA	✓	✓	NA	X	✓	X
	After P1	UD	NA	X	X	✓	X	✓	✓
	After P2	CE	NA	✓	✓	✓	X	✓	✓
	After P3	CE	NA	✓	✓	NA	✓	✓	✓
5. Use digital technologies in a safe and socially responsible manner	Pre-study	NE	NA	X	NA	NA	NA	X	NA
	After P1	NE	NA	X	X	X (✓)	NA	X	X
	After P2	UD	NA	✓	X	X	NA	X	X
	After P3	NE	NA	X	X	NA	NA	X	X
6. Manage digital information in a technology space (hardware and software components; troubleshooting)	Pre-study	UD	X	✓	✓	NA	NA	X	✓
	After P1	UD	NA	✓	✓	✓	NA	X	✓
	After P2	CE	NA	✓	✓	✓	NA	✓	✓
	After P3	CE	NA	X	X	NA	NA	✓	✓
7. Ethically use information and media (copyright)	Pre-study	UE	✓	✓	✓	NA	NA	✓	✓
	After P1	UE	NA	✓	X	✓	NA	X	X
	After P2	CE	NA	✓	✓	✓	NA	X	✓
	After P3	CE	NA	✓	✓	X	NA	✓	✓
8. Apply information to design own representations to effectively communicate knowledge to others	Pre-study	UD	NA	X	X	NA	X	✓	✓
	After P1	UD	NA	✓	✓	X	✓	✓	X
	After P2	CE	NA	✓	X	X	X	✓	✓
	After P3	UD	NA	X	✓	NA	X	✓	✓
9. Develop ability in problem solving and reflecting on own technology skills	Pre-study	UD	✓	✓	✓	X	NA	X	X
	After P1	CE	NA	✓	X	✓	NA	✓	✓
	After P2	CE	NA	✓	✓	X	NA	✓	✓
	After P3	CE	NA	✓	X	NA	NA	✓	✓
10. Use a variety of technology tools to create digital information tools to create digital information	Pre-study	UD	✓	✓	X	NA	NA	✓	✓
	After P1	CE	NA	✓	NA	✓	NA	X	X
	After P2	CE	NA	✓	✓	X	NA	✓	✓
	After P3	CE	NA	✓	X	NA	NA	✓	✓

**Key**

Symbol	Explanation
UE	Use (see Aspects of Digital Literacy Evaluation rubric)
UD	Understand (see Aspects of Digital Literacy Evaluation rubric)
CE	Create (see Aspects of Digital Literacy Evaluation rubric)
NE	Not evident: there were no instances of aspects of digital literacy
<b>Evidence of aspect</b>	
NA	Not applicable
✓	Instance of an aspect of digital literacy
X	No instances of aspects of digital literacy evident

#### 4.2.2 Ian's digital literacy pre-study.

## NEIL ARMSTRONG

Student's name and class appear here

### About Neil Armstrong

- Born 5 August 1930
- Full Name: Neil Alden Armstrong



Armstrong in spacesuit (Left)



Armstrong in 1999 (Right)

### Birth

- 5<sup>th</sup> of August, 1930
- Wapakoneta, Ohio
- Parents were Scottish and German
- 2 siblings



### Childhood

- Moved around Ohio constantly
- Last move in 1944
- Was a Boy Scout



### Schooling

- Studied aerospace engineering
- Purdue University



### When he grew up...

- He fought in the Korean War
- Was a Test Pilot



### Armstrong's Space missions

- Gemini 8 (16 Mar 1966)
- Gemini 11 (12 Sep 1966)
- Apollo 11 (16 Jul 1969)



### Apollo 11


- Landed on 20 July 1969 (20:17 UTC\*)
- First step on 21 July 1969 (2:56 UTC)
- Neil Armstrong, Buzz Aldrin and Michael Collins



\*Coordinated Universal Time



Figure 4.1. Ian's PowerPoint presentation.

Comparison	Braille	Gallaudet
<b>Photo</b>		
<b>Birth</b>	He was born on 4 Jan 1809	He was born on 10 Dec 1787
<b>Childhood</b>	He became blind when he stabbed his eye with an awl from his father's shop.	When he was young, he was always ill and was shorter than others of his age.
<b>Disability</b>	He became blind in 1812.	He was ill a lot.
<b>Schooling</b>	He went to the Royal Institute for the Blind.	He studied at the Yale University.
<b>The dream</b>	He wanted to make a system for the blind to read.	He wanted to teach a girl, Alice Cogswell.
<b>Death</b>	He died on 6 Jan 1852	He died on 10 Sep 1851
<b>Contribution to society</b>	He created a system for the blind to read.	He managed to teach the deaf.
<b>Similarities</b> (use these words: alike, comparable, similar, both are, share common points)	<ul style="list-style-type: none"> <li>• They both helped people to read</li> <li>• They both had disabilities</li> </ul>	

<b>Differences</b> (use these words: dissimilar, while, whereas, contrasting points, one the one hand...on the other hand)	<ul style="list-style-type: none"> <li>• Thomas was not blind</li> <li>• Thomas didn't only teach people to read</li> <li>• Louis taught blind people; Thomas taught deaf ones.</li> </ul>
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Source: Wikipedia

Figure 4.2. Ian's Microsoft Word document.

#### **4.2.2.1 Evidence of Aspect 1 pre-study (Ian).**

(Aspect 1: Determine the nature of information and media needed)

Evidence from the coded analysis of the pre-study observations and interviews revealed four instances of Ian being able to determine the nature of the information and media that he needed. For example, he skimmed through online content and could find images and texts when he worked on his PPT presentation and Microsoft Word document. He succeeded in completing both and included all the required information (Q; A).

Ian said that he could create his own template but did not want to spend time on it. He followed the teacher's instructions to use a variety of pictures to search for the images, but he explained that he thought that Google was a source and did not realise until he was prompted by the teacher that it was a search engine (D). He was able to search for images using key words, which suggests that he knew what images he was looking for. This illustrated that he could recognise the need for the information and media, but he could not always justify the choice (O). Aspect 1 of Ian's digital literacy during the pre-study was assessed as being at the level of 'Use'.

#### **4.2.2.2 Evidence of Aspect 2 pre-study (Ian).**

(Aspect 2: Locate information)

There were four instances that demonstrated Aspect 2 in Ian's pre-study stage. For example, he accessed Wikipedia and used the information for his PPT presentation and



Microsoft Word document. This suggests that he could navigate and access information. However, his interview revealed that he thought Google was the repository of images and he could locate both the information and images “in Google” (O).

Ian’s evaluation of his own ICT skills in Questionnaire One showed that he was confident in using technology in his studies. He relied heavily on Wikipedia and knew how to locate information online. He indicated that he was confident at speaking, listening, reading and writing. He had never heard of Photo Story 2, but he had heard of iMovie, although he had not had a chance to use it because he did not have a PC at home. Ian indicated that he knew how to change the sizes, colours and styles of fonts. When the teacher opened a Microsoft Word document and asked him to change the size and colour of a paragraph, Ian could perform this task easily. He said he liked to experiment with fonts and he believed that fonts should be consistent throughout a document (Q).

Ian’s slides contained all of the information required by the teacher (I6). There was an appropriate number of words (the slides were neither too cluttered with text nor too empty) and the information was concise, sensible and interesting. He used Wikipedia for his research on Neil Armstrong, stating that Wikipedia had the largest amount of information about famous people. He provided the name of the website and a link to it on the last slide. He also gave credit to the teacher. There were no references to the websites that he used to obtain his images (I; D).

Further, he used Wikipedia as a single source of information, which suggests that he was not aware that there are other websites that contain other facts and images that he might find useful. Even though he selected appropriate images and included relevant facts in his works, he was unable to explain why he needed the information (D). Aspect 2 of Ian’s digital literacy during the pre-study was assessed as being at the level of ‘Use’.

#### ***4.2.2.3 Evidence of Aspect 3 pre-study (Ian).***

(Aspect 3: Evaluate reliability of information and media content)

Ian used Wikipedia as a single source of information and he did not indicate understanding of the importance of the reliability of sources. On the contrary, he believed that Wikipedia was an appropriate website as it was “created by ordinary people”. He did not know how to distinguish between reliable and non-reliable websites and he could not list any of the criteria for evaluating the reliability of websites, such as the author, domain, target audience, age appropriateness and copyright date. This suggests that he probably did not realise that online information could be misinformation if he was to search an unreliable website. There were no instances of Aspect 3 for Ian during the pre-study; thus Aspect 3 of digital literacy was not evident or ‘NE’ for Ian.

#### ***4.2.2.4 Evidence of Aspect 4 pre-study (Ian).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were 10 instances of this aspect in Ian’s pre-study. He provided images for all slides except 1 and 10. He said that he deliberately did not put Neil Armstrong’s photograph on the title slide because it did not have any content apart from the title and his name (see the discussion transcripts). As noted earlier, his slides contained all of the information required by the teacher. There were no references to the websites that he had used to obtain his images (O; A).

He did not apply any sounds to his project, in spite of the teacher’s instructions. He explained that he did not see the necessity to do so because his topic was “a serious one”. His oral presentation was well rehearsed, as demonstrated through the confident delivery of the information. He rarely looked at the slides or read from them (D).

Ian followed the instructions and succeeded in completing the task. He arranged the information in the table accurately and selected the same font as the one used by the teacher in the left-hand column, explaining, “I think the same font makes my document look more important and neat. It has a professional look. I don’t like when some of my friends use different fonts throughout their documents. This is so hard to read” (D; A). He used clip art in his PPT presentation and Googled for images, which he inserted in his PPT presentation and Microsoft Word document. This suggests that he could use the images, but he did not pay attention to their quality and effectiveness. He indicated in his interview that he could resize the images but he was not aware of the way image resolution affects the presentation. Nevertheless, he helped his classmate find and insert images, which indicates that he could understand what images his classmate needed. This also indicates that searching for images may potentially be done in collaboration. This information could be useful for teachers who plan group work with the use of technology.

He chose not to record his narration as he explained that it was not necessary, as he was going to present his PPT in front of the class. During the class discussion he mentioned that he rehearsed presenting several times and that he did not like recording narrations as he did not want to make mistakes in his recorded speech. This may indicate that if he had not realised that he could record his narrations as many times as he wanted until he was satisfied with the result.

He changed the bullets to enhance the layout of his PPT presentation, which may be an indicator of his understanding of the importance of dynamic layouts. He did not make use of animation and explained that he did not know how to do it. This may mean that although he was aware animations, he did not know how to apply them effectively. The linguistic content of his work was comprehensive but there were two errors in punctuation. Ian explained during the class discussion that he liked to experiment with

fonts and he believed that fonts should be consistent throughout a document, which demonstrates some awareness of the font dynamics.

Ian's evaluation of his own ICT skills in Questionnaire One demonstrated that he was confident in using technology in his studies. He relied heavily on Wikipedia and knew how to locate information online. He indicated that he was confident at speaking, listening, reading and writing. He had never heard of Photo Story 2, but he had heard of iMovie, although he did not have a chance to use it because he had a PC at home. Ian indicated that he knew how to change the sizes, colours and styles of fonts. When the teacher opened a Microsoft Word document and asked him to change the size and colour of a paragraph, Ian could easily perform this task. He said that he liked to experiment with fonts and he believed that fonts should be consistent throughout a document (Q; O).

He also inserted images from PPT's clip art. He resized the images when he thought that a slide "looked too empty" (O; D). This may indicate that he understood that the white space in his presentation might not appeal to the target audience. Similarly, although he chose to work with a PPT template, he resized the fonts and changed the bullets until he was satisfied with the layout. He said, "I like this template. It is not too dark, yet the white font stands out on the grey background" (D). Aspect 2 of Ian's digital literacy during the pre-study was assessed as being at the level of 'Understand'.

#### ***4.2.2.5 Evidence of Aspect 5 pre-study (Ian).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

Although there was no evidence of Aspect 5 during the pre-study task, it is worth noting that Ian used Wikipedia as the only source of information. The pages that he used did not contain any inappropriate images or information. Therefore, it was not possible to identify his level in this aspect of digital literacy during the pre-study and it was assessed as NE.

#### **4.2.2.6 Evidence of Aspect 6 pre-study (Ian).**

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were five instances of Aspect 6 in Ian's pre-study task. When the Internet connection was lost during a lesson, Ian was able to reconnect to the Internet independently and also helped the students sitting next to him. In the interview he explained, "Wi-Fi is not great at my place so I have done this a hundred of times already" (I). This suggests that he was able to save and retrieve digital data independently. This was also supported by researcher observation, when Ian saved the latest drafts of his work on a USB drive, but on one occasion he deleted the old draft and did not drag and drop the latest one from the desktop into his USB (O). This shows that although he attempted to save the latest drafts of his own work, he did not always succeed. Further evidence was the researcher's observation that Ian coped with all the tasks and required minimum teacher guidance and his PPT presentation was completed within the given timeframe (O).

Thus, even though there were technical difficulties such as Internet connectivity, Ian often overcame them independently, which suggests that this aspect of digital literacy was at the level of 'Understand'.

#### **4.2.2.7 Evidence of Aspect 7 pre-study (Ian).**

(Aspect 7: Ethically use information and media (copyright))

Five pieces of evidence of this aspect of digital literacy suggested that Ian was not aware of copyright. First, he thought that Google was a source and did not realise that it was a search engine. He provided the name of the website source of an image, and a link to it, on his last PPT slide but he could not explain why he did this. His research on Neil Armstrong he was acknowledged with the name of the Wikipedia website. He also gave

credit to the teacher. There were no references to the websites that Ian used to obtain his images see (O; A).

Ian had heard of copyright and believed that Wikipedia was the best source because it was created by ordinary people. He said it would not be possible to mention all of their names when giving credits at the end of the presentation. Ian believed that it was logical to refer to Wikipedia when conducting research because it had all of the information that a person could imagine (I; Q). He said that he could create his own template but did not want to spend time on it. This aspect of digital literacy was assessed as being at the level of 'Use'.

#### ***4.2.2.8 Evidence of Aspect 8 pre-study (Ian).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

Although the main pieces of evidence for this aspect were the digital artefacts he created (A), it is possible to conclude that he was able to use most elements of genre to create his own piece of information of the same genre. For example, he followed closely most of the guideline for the PPT presentation and Microsoft Word document, but he did not employ the use of sound effects and narration, explaining that he did not think it was necessary and he did not want to make mistakes in the recording (I). He did not show awareness of the possibility to re-record the narrations as many times as required for his PPT presentation. This aspect was assessed as being at the level of 'Understand'.

#### ***4.2.2.9 Evidence of Aspect 9 pre-study (Ian).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were five instances of this aspect for Ian. As mentioned earlier, his evaluation of his own ICT skills (Q) demonstrated that he was confident in using

technology in his studies and knew how to locate information online. He had not heard of Photo Story 2, but he had heard of iMovie. He knew how to change the sizes, colours and styles of fonts. He said he preferred to use one of the good templates in the application (D). This indicates that he understood what technology skills he needed and used templates to best suit his context.

The source for the information and images was Wikipedia. The teacher noticed that Andrew and Ian had used the same images for Braille and Gallaudet from the Wikipedia. When he drew Ian's attention to this, Ian explained, "Well, Andrew had some difficulties looking for images so I decided to help him" (D). This may indicate that he could solve problems independently by helping a classmate who experienced difficulty with his work.

Ian was able to acknowledge technology-related issues, such as Internet connectivity problems. However, his inability to identify the skills required to re-record his own narration in his PPT presentation (O), as well as the points listed above, demonstrate that this aspect of digital literacy was not fully developed for Ian and was assessed as being at the level of 'Understand'.

#### ***4.2.2.10 Evidence of Aspect 10 pre-study (Ian).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

There were four instances of this aspect for Ian. He was able to create integrated multimedia products, a PPT presentation and a Microsoft Word document, as seen from the examination of these digital artefacts and the researcher's observations. This was also noted by the 'critical friends' who were asked to evaluate Ian's digital artefacts. They provided positive feedback about his technology skills and ability to integrate various media (A).

However, Ian was unable to critically evaluate his work, as shown when he mentioned that he was satisfied with the quality of his PPT presentation. Further, he did not attempt to edit his work after being prompted by the researcher (O), which may indicate that he did not know how to do it or what technology tools to use.

He indicated (Q) that he had experience using Microsoft Word and PPT. He did not mention any other technology tools that he was aware of or had used before. This aspect of digital literacy for Ian was at the level of ‘Understand’.

#### **4.2.3 Ian’s digital literacy in Project One: *Pourquoi* Story.**

Ian’s *pourquoi* story is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### **4.2.3.1 Evidence of Aspect 1 in Project One (Ian).**

(Aspect 1: Determine the nature of information and media needed)

Evidence from the coded analysis of teacher observations, student reflections and interviews revealed three instances of Ian navigating through the Internet searching for the required information: *pourquoi* stories. He read a number of stories before determining what storyline he could plan for his own project. He said, “I read and watched quite a few *pourquoi* stories online”. This illustrates his ability to recognise the information and media that were required. He did not need to download online images as they were provided by the teacher, but he did search a variety of websites before making his decision regarding the storyline (O). This was also evident in his written reflection on the project, as he indicated the importance of knowing about “what already exists online”. This aspect of digital literacy was assessed as being at the level of ‘Understand’.

##### **4.2.3.2 Evidence of Aspect 2 in Project One (Ian).**

(Aspect 2: Locate information)



There were three instances of Aspect 2 in Ian's second project. After determining what information he needed, he located the required information and identified the images provided by the teacher that he needed for his project. He noted in his interview that although he read a variety of *pourquoi* stories, he used only one source (that is, only one website) to read the stories. This illustrates that even though Ian could locate the information, he had little awareness that a variety of websites would provide more information. Nevertheless, he watched a number of YouTube videos, which demonstrates his ability to locate various types of digitised information available online (R; A; I). This aspect of digital literacy was assessed at the level of 'Understand'.

#### ***4.2.3.3 Evidence of Aspect 3 in Project One (Ian).***

(Aspect 3: Evaluate reliability of information and media content)

The coded data revealed three instances of Ian's ability to evaluate the reliability of information and media content. For example, in his written reflections Ian wrote:

I knew that my teacher provided the images, so I was sure that she used a reliable source. For example, she used the images from Flickr and there were captions showing the name of the author. I actually found some of the images in Flickr just to see them. Also, Flickr is free in some cases, and I think there can be no inappropriate images there. I am planning to use Flickr in the future.

This was also evident in his final digital story (R; A; I). This illustrates that this aspect of digital literacy had developed for Ian, compared with the first project, and was at the level of 'Understand'.

#### ***4.2.3.4 Evidence of Aspect 4 in Project One (Ian).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

“I could literally choose any folder with images” (I).

Ian deleted all motions and transitions throughout the story. He said, “Since this is similar to PowerPoint, I’d rather have it static. When you view a PPT or read a book, the slides and pages do not jump around in front of your eyes” (I). When he viewed his classmates’ projects, he admitted that zooming in or out would have enhanced his presentation so he could emphasise some important details in each slide.

Ian selected background music from the template in Photo Story 2. He explained his choice: “I thought of country music, as my story is taking place in a countryside, not a big city. I like the opportunity to choose from different genres of music” (I). Ian’s music hampered his narration a little. He said that he adjusted the volume of music and did not understand why it hampered his voice projection in the final version of his story.

There were nine instances of this aspect. For example, in his interview Ian said that he “moved the images in the timeline to get the idea” for writing. He tried to ensure that “colours are consistent throughout the PowerPoint presentation” and “deleted all motions and transitions throughout the story. Teacher observation transcripts revealed that Ian kept changing font colours. The analysis of the digital artefacts revealed that he selected background music to enhance his narration but did not realise that the music would hamper his narration in the final version of the project (A; R).

Ian followed the teacher’s instruction to add a title to their story to emphasise the key ideas relevant to the individual slides. He typed the text for every slide and changed the font colour to yellow. The position of the text on the screen was such that it partially covered the pictures. The yellow font was not very prominent for slides with a light background. He said:

I like when the colours are consistent throughout the PowerPoint presentation.

Similarly, I did not want to have a variety of colours in my digital story. Even

though the text, especially for the last slide, was too light, at least it was all right for the rest of the story (I).

He could justify the choices of colours and images. Although he used different modes to construct meanings, the project demonstrated average cohesion and the modes supplemented each other, but not dynamically. Thus, this aspect of digital literacy was assessed as being at the level of ‘Understand’.

#### ***4.2.3.5 Evidence of Aspect 5 in Project One (Ian).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

There was no evidence of this aspect of digital literacy in Project One for Ian. Nevertheless, there was an indicator that he might have given thought to the appropriateness of images when he discussed Flickr and wrote in his reflections, “I think there can be no inappropriate images there” (R). However, since this was not definite evidence, the researcher evaluated this aspect as NE.

#### ***4.2.3.6 Evidence of Aspect 6 in Project One (Ian).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were four instances of this aspect evident when Ian systematically saved drafts of his project in a USB drive. For example, the teacher observed that Ian copied the entire folder and Photo Story 2 onto his USB drive. He opened his saved project from his USB drive and started creating his story. He tried to drag and drop the images into the timeline. When the teacher asked why he did that, Ian explained that when the drag-and-drop option did not work, he used the ‘Import Images’ function instead (D).

Ian changed the sequence of the images in the timeline until he came up with a storyline for his *pourquoi* story (O). This suggests that he had developed confidence in saving and retrieving files and he was proactive, as he planned to do so without the

teacher's instructions. His interview transcript supported the evidence that he had developed awareness because he understood that when he deleted images in Photo Story2, all texts attached to the script would be deleted too (I). In his written reflection at the end of the project he indicated, "I realised that the images would be deleted together with the texts, so I started copying and pasting the texts into a MW [Microsoft Word] document, which I created before deleting the images" (R). This aspect of digital literacy was assessed as being at the level of 'Understand'.

#### **4.2.3.7 Evidence of Aspect 7 in Project One (Ian).**

(Aspect 7: Ethically use information and media (copyright))

The evidence from the teacher observation notes and student reflections on the project suggested that Ian was aware of copyright, as he discussed the use of copyright-free images available in Flickr (R). However, he appeared to not understand that he should have included Flickr in the credit slide of his project (O). This aspect remained at the level of 'Use' for Ian in the first project.

#### **4.2.3.8 Evidence of Aspect 8 in Project One (Ian).**

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were four instances of Aspect 8. The analysis of the digital artefact (a completed and rendered *pourquoi* story) showed that Ian could express himself in the genre of *pourquoi* stories and include all its characteristics in his project. He received positive evaluation from his peers, which indicates his awareness of the target audience. However, as two students evaluated his story as "dull and boring" because of the lack of transitions, it could be said that he applied some (but not all) skills to convey the meanings clearly. During the class discussion, Ian said that he did not "see a problem with

this” (A; E; O; D). This aspect of digital literacy for Ian remained at the level of ‘Understand’.

#### ***4.2.3.9 Evidence of Aspect 9 in Project One (Ian).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were seven instances of this aspect evident in the collected data. For example, the teacher observed that when Ian accidentally deleted the photo of people in a canoe, he could retrieve it from his USB without asking for teacher help. He could solve the problem of deleting the script from the application by copying and pasting it into a Microsoft Word document. He said, “I realised that each slide in Photo Story is just like a PowerPoint slide: if you delete it, all animation will be gone” (A; I). This indicates that he could acknowledge technology-related difficulties and solve some of them independently. However, when facing another problem, when his computer started lagging, he resorted to asking for the teacher’s help and followed teacher instructions, which demonstrates that he was not fully independent when solving technology-related problems.

Ian compared digital stories with PPT presentations. He said that he did not see much difference because both had the same principle of slides, images and text. He said, “I even experimented with a PPT at home and discovered that anyone can add narrations and music to a PowerPoint presentation” (I; O). He indicated that he liked the idea of making digital stories for English lessons; however, “I wonder how the teacher can assess such stories if the teacher cannot see script, unless he is looking at the project, not the exported movie” (R). This level of digital literacy remained at the level of ‘Understand’, but there were also some elements of the next level, ‘Create’.

#### ***4.2.3.10 Evidence of Aspect 10 in Project One (Ian).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Three instances of this aspect were evident in the analysis of Ian's final product (A), teacher observation transcripts and Ian's reflections. For example, although Ian created his product with the use of various tools embedded in the computer application, he was not able to critically evaluate all aspects of his presentation. In particular, he did not employ the function of zooming in and out, or transitions, which showed little creativity. Nevertheless, after completing his multimedia project in Photo Story2, instead of submitting a story written with pen and paper as required by the teacher, Ian wrote his story in a Microsoft Word document, saved it onto his USB drive, opened the student email program, typed the body of an email to the teacher, attached the document and sent the email to the teacher. He then used pen and paper to write his story (O). In his reflections, he explained that "first typing my story allowed me to see any underlined words and see their correct spelling; it was easier to write my story afterwards" (R). This indicates that although this level of digital literacy remained at the level of 'Understand', there were also some elements of 'Create'.

#### ***4.2.4 Ian's digital literacy in Project Two: 'William Tell' Story Review.***

Ian's story review is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant's identity).

##### ***4.2.4.1 Evidence of Aspect 1 in Project Two (Ian).***

(Aspect 1: Determine the nature of information and media needed)

Three instances of this aspect showed that Ian was able to skim through online content and decide whether the information and images were useful for the task. He read the story and conducted Internet research on the topic, accessing a number of different

websites about William Tell and the history of Switzerland and searching for images based on his information research. In the discussion with the teacher during the lesson, Ian said, “I collected more information that I needed, but this was because I could find so much relevant information that at first I was not sure which to use” (D-D:P2:I:1; O). This implies that he could also use technology tools (such as a search engine) independently. The image resolution was mostly of high quality. He explained, “I had sufficient time to find good-quality photo” (I). This demonstrates his awareness of the importance of the quality of images that are used for the purpose of digital storytelling. This aspect of digital literacy was assessed as being at the level of ‘Create’.

#### ***4.2.4.2 Evidence of Aspect 2 in Project Two (Ian).***

(Aspect 2: Locate information)

Four instances of this aspect showed that Ian was able to use research and technology skills to navigate and access information and to explain why this information was needed. For example, in the discussion with the teacher during the lesson, Ian said, “I collected more information that I needed, but this was because I could find so much relevant information that at first I was not sure which to use” (D-D:P2:I:2; A). According to teacher observations, Ian continued locating required information throughout the duration of the second project, showing that the process of locating information was non-linear. In the interview Ian said, “Locating information is easy if you know what you are looking for” (I; O). This indicates that for Ian, the process of locating information was informed by his ability to determine what information or media he needed, and this process was non-linear. Ian’s Aspect 2 was assessed as being at the level of ‘Create’.

#### ***4.2.4.3 Evidence of Aspect 3 in Project Two (Ian).***

(Aspect 3: Evaluate reliability of information and media content)

There were three instances of Ian's high level of awareness of the reliability of information and media content. He examined the websites carefully when he searched for relevant information and checked the author's expertise in the field, the information's age appropriateness, the copyright date and the way each source could supplement one another (O). He recorded each website's link and was able to show these to the teacher during the interview (I). He also could explain how he did it in his written reflections. For example, he wrote, "I knew exactly why some websites were reliable because I knew how to check it as the teacher explained it before" (R). Ian's Aspect 3 was assessed as being at the level of 'Create'.

#### ***4.2.4.4 Evidence of Aspect 4 in Project Two (Ian).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were 10 instances of Ian's ability to analyse, interpret and use a range of information and media to communicate meanings through multimodal texts. For example, he succeeded in finding meaningful images and could justify his choice of images from Flickr (O).

He added titles to each slide and provided meaningful key words to support the images and narration. He explained during a discussion with the teacher that consistency in colours was important (D-D:P2:I:3; O).

He customised motion for one slide to put emphasis on the apple and was able to justify his choice as follows:

I only zoomed in on the apple because I think it is very symbolic. If it was a word, I would highlight it and make it bold, but since you cannot do it to an image, you



can emphasise it in a different way. I wanted the apple to stand out in the whole presentation (I).

He added that as there were not many copyright images in Flickr, he had to use the zooming function to add variety to the only image of an apple (I).

He changed the colours of the slide titles to yellow for all apart from the last one, which was green (O; A). He again stated that consistency was important.

Ian did not use background music. He explained that this was because it was a story review and therefore different from *pourquoi*, which is a folk tale. Ian said that as the story review was a serious genre, there was no need for music (D-D:P2:I:4).

When the teacher inquired whether Ian was satisfied with the quality of all of the images, Ian said that he did the best he could considering there were not many images related to the topic (D-D:P2:I:5). Ian's ability to make meaningful use of modes to construct meanings in a cohesive manner was assessed as being at the level of 'Create'.

#### ***4.2.4.5 Evidence of Aspect 5 in Project Two (Ian).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

The only instance of Aspect 5 was evident during teacher observations of the class when Ian searched for an image of a crossbow and came across an image containing a person being pierced by an arrow. Ian showed the image to Andrew (another participant in the study). Although Ian did not use this particular image for his project, his attempt to discuss an inappropriate image with his classmate shows that this aspect of digital literacy was at the level of 'Understand'.

#### ***4.2.4.6 Evidence of Aspect 6 in Project Two (Ian).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were nine instances of Aspect 6 for this project. For example, the discussion of the planning document shows that Ian made notes in bulleted form in a blank PPT slide. He explained that it helped him organise his ideas. Also, he created a folder on the computer desktop in which he saved all the images he found online. He typewrote the scripts in a Microsoft Word document first and then copied and pasted chunks of text into the script window for each slide in Photo Story2 (D-D:P2:I:6; O).

Ian created a folder on the desktop for images. He accessed Flickr and after about 15 minutes of searching, had saved nine images into the folder. Each image had a title that corresponded to the picture and the author who had uploaded the picture to Flickr (e.g., “apple by striatic.jpg”). This was the format that the teacher had presented when she introduced the task for the first project (O).

Ian rendered the project independently and saved it into the designated folder in the Pupils Drive (O; A), which indicated his ability to work with technology independently.

He tried to upload his final project into the school online learning platform, to the Pupils Drive in the school Intranet and finally, to YouTube. He kept his story on a USB drive too and explained, “I always make multiple copies of projects” (I).

Ian created his iMovie in class because he had completed his digital story project in Photo Story 2 before his classmates were finished. He tried to share it through ThinkQuest, but he did not succeed due to the file size. He also attempted to send it as an attachment on email, but this also failed because of the large file size, so he logged into his YouTube account and uploaded the video there. He then created an email, copied and pasted the link to his YouTube video and sent the email to his classmates and teacher (O).

These instances illustrate Ian's ability to manage information in technology space and to save, store, retrieve and share files. Aspect 6 of Ian's digital literacy was assessed as being at the level of 'Create'.

#### ***4.2.4.7 Evidence of Aspect 7 in Project Two (Ian).***

(Aspect 7: Ethically use information and media (copyright))

There were four instances that demonstrated that Ian had developed this aspect of digital literacy by the time he engaged in Project Two. He used only copyright-free images from Flickr and listed the names of the authors who had uploaded these images to Flickr. When the teacher asked him to show how he searched for the images, he typed the key words (e.g., apple, Gessler) into Flickr (D-D:P2:I:7).

Although he collected a great deal of information, beyond the story given by the teacher, he did not indicate any sources of information in his last slide (credits). He said, "I did not copy what was in those websites. I paraphrased everything so I did not need to provide references" (I). Although he was able to use royalty-free information created by others and recorded the sources for his own use, he did not include them in the final credits slide, which means that he was fully aware of copyright issues but did not realise that the names of the authors should be included in one final slide, as suggested by the teacher (R; O). Nevertheless, this aspect of digital literacy was assessed as being at the level of 'Create'.

#### ***4.2.4.8 Evidence of Aspect 8 in Project Two (Ian).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were three instances of this aspect evident in the digital artefacts (final digital story) and interviews. For example, he used all elements of the genre to create his own digital story review and he did not include the resolution of the story he reviewed. He

justified this in the interview by saying, “If I were to provide an ending, it would not be interesting for the people to read the story. A review must have an element of intrigue” (I). He used non-blurred images, projected his voice clearly for narrations and used dynamic fonts to enhance the presentation (O; A). Therefore, Ian could apply information to design his own representation to communicate knowledge effectively to the target audience; this aspect of digital literacy was assessed as being at the level ‘Create’.

#### ***4.2.4.9 Evidence of Aspect 9 in Project Two (Ian).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were six instances of this aspect for Ian. His ability to solve problems related to technology and to reflect on his own technology skills were evident in the coded data. For example, during the class discussion he shared that he created his own storyboards in his Microsoft Word document and justified this by saying, “When it is time to type the scripts in Photo Story, I will just copy and paste the text” (D-D:P2:I:8; O). This demonstrated his ability to critically evaluate the required technology-related skills. Another indicator, as observed by the teacher, was when Ian covered the microphone with his palms to reduce the background noise (O).

When the teacher asked Ian about the process of exploring iMovie, Ian replied: Well, I know that for a PPT in a PC, there is a ‘Help’ option. It means that if you are not sure how to do something, you can type it up and the program will provide a solution. I assumed that this would be the case with the iMovie and I was right. There is actually a tutorial on how to use iMovie and how to create a video. I watched it and experimented with some holiday videos and photographs at home (I).

This shows his ability to independently explore the ways to share his digital stories and to succeed in this. The fact that he “experimented with some holiday videos and photographs at home” illustrated the development of the required technology skills through independent problem solving. Although Ian indicated in the interview that he preferred step-by-step instructions, this aspect of digital literacy was assessed as being at the level of ‘Create’ in this project.

#### ***4.2.4.10 Evidence of Aspect 10 in Project Two (Ian).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

There were 11 instances of this aspect of digital literacy for Ian. The teacher observed that he could access various websites, download images, create folders and save photos in them, organise researched data in a PPT, share final rendered stories through multiple online and offline technology platforms and tools (e.g., ThinkQuest, Pupils Drive and YouTube), and send an email with an attachment (O). This showed his ability use a variety of platforms and technology tools to complete a task.

The most significant evidence of this aspect was the creation of a second digital story, reusing the same media that he had used for first story in a different computer application that he had explored and experimented with on his own. Ian explained, “My dad has recently purchased a MacBook. I have been exploring it at home. It is quite amazing that there are so many different applications that look in a way similar to a PC, yet are different” (I; A; O). This illustrates that Ian was able to create an integrated multimedia product with authoring tools, using them to the best advantage: he edited the work as many time as he needed until he was satisfied with the result. Aspect 10 of Ian’s digital literacy at the end of the second project was at the level of ‘Create’ and exceeded teacher expectations.

The teacher asked Ian to compare the experiences of using Photo Story 2 and iMovie for the project. Ian said:

I find iMovie easier to use and it took me less time to complete the same project as compared to the one in Photo Story 2. I used editing tools in iMovie to make the images look more sharp [Ken Burns effect in iMovie] and overall it was easy to drag and drop the photos and apply the music to the iMovie project (I).

He also noted, “In iMovie, one can drag the narration along the timeline to whatever slide you need, while in Photo Story 3, this would be impossible: the narration gets deleted together with the photograph” (I).

#### **4.2.5 Ian’s digital literacy in Project Three: ‘Show-and-Tell’.**

Ian’s Show-and-Tell is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### **4.2.5.1 Evidence of Aspect 1 in Project Three (Ian).**

(Aspect 1: Determine the nature of information and media needed)

There were four instances of Ian’s ability to determine the nature of information and media needed in his third project. He searched for images that would match the content that he had in mind (O; A). However, due to the nature of the topic, he decided that there were no images that he could use for a math topic. He made an informed decision to create his own images instead. This suggests that the nature of the topic affected his search for media. According to a statement made during his interview, he could explain what kind of images he was looking for (I). This may mean that Aspects 1 and 2 overlapped in this case for Ian: he determined the information and media (Aspect 1) but he could not locate the media (Aspect 2), and this process was non-linear.

Ian decided to use iMovie to create his final project on the topic of ‘Fractions’. He explained his choice: “I am good at Math so I feel confident in this topic. I know a few of

my classmates are weak in this so maybe if they watch my presentation they can learn”

(I). This indicates that he could identify what information he required. Aspect 1 was assessed as being at the level of ‘Create’ for Ian at the end of this project.

#### ***4.2.5.2 Evidence of Aspect 2 in Project Three (Ian).***

(Aspect 2: Locate information)

There were two instances of Aspect 2 but as noted above, they were related closely to Aspect 1. Ian’s inability to locate the media could have meant that he could not locate information that he needed online. He spent a lot of time searching for images (O) but, the context (the nature of his topic) did not provide a good ground for him to find suitable images. Nevertheless, he solved this problem by creating own images and thus Aspect 2 overlapped with Aspect 9 (problem solving and troubleshooting). Ian created 34 slides for his presentation. After about 40 minutes of searching the Internet for images that would match his content, he said, “I am afraid it is not possible to find images that would best describe mathematical terms”. As a result, he converted his slides from Keynote into JPEG format. He used the Google search engine independently to find the instructions to do this (I).

Thus, even though Ian could navigate the Internet, access information and reflect on why it was needed, he did not use multiple sources for his third project. This means that Aspect 2 of Ian’s digital literacy at the end of Project Three was only at the level of ‘Understand’, which was one level below his score for the second project.

#### ***4.2.5.3 Evidence of Aspect 3 in Project Three (Ian).***

(Aspect 3: Evaluate reliability of information and media content)

There was only one instance of Ian attempting to evaluate the reliability of sources, as he did not use any online sources for information or images. This does not mean that Ian’s ability had deteriorated since Project Two; rather, this aspect was affected

by Ian's choice of topic. When the teacher questioned Ian about it during the interview, Ian said, "I rely on my own knowledge of the topic, so I don't need to think about the information and media available online" (see interview transcripts). Ian avoided using online sources and relied heavily on his own knowledge of the topic and his own technical skills and ability to provide relevant images, which actually overlaps with aspects 9 (problem solving) and 10 (creating digital information). Nevertheless, Aspect 3 of Ian's digital literacy at the end of Project Three was NE. A further study would be needed to prove that this aspect of digital literacy was informed by the topic of the digital storytelling task.

#### ***4.2.5.4 Evidence of Aspect 4 in Project Three (Ian).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were 15 instances of this aspect in the third project. For example, Ian created his own images with the use of Key Note and converted them into JPEG format so that he could later import them in his iMovie (O). This suggests that he was able to select images and justify their choice, even though the images did not contribute to the dynamics of the presentation, as according to Ian's classmates, the images were not very interesting and the final digital story was boring.

Ian imported his images into iMovie. He found that organising sequences was easy because the JPEG images were numbered: "When I converted my Keynote into JPEG images, they automatically got numbered. It is very convenient because one cannot get confused" (I). He organised them in a logical sequence and double-checked the draft. Then he asked a classmate to view them and check whether the information made sense. The classmate commented that the information was correct but the images were "too dull"



and did not contain any pictures. Ian disregarded this comment, saying, “This is a math concept, which does not require pictures”. Ian did not add titles to his slides, explaining, “The slides are self-explanatory” (E-E:P3:I:1; D). He edited the default transitions in iMovie. He said that he did not want to use the zooming effect because the text was important for the viewers (D).

As Ian started recording the narrations, he decided that because he already knew “the conventional way of recording narrations”, he wanted to “further explore technology”. He opened GarageBand and used music he had previously created and recorded his narrations. He created a podcast and was very proud of his achievement. He said, “I think my work is very original and unique: no one else created a podcast. Now I will import it in the iMovie and my project is done!” (I)

The music and narration did not hamper each other. Ian added:

I had to spend some time adjusting the volume of the music and my voice. I noticed that if you listened to them through your headphones, it all might sound different from when you project the video through the classroom projector (O; A; I).

This indicates that this particular mode was developed at the level of ‘Create’. Additionally, Ian edited the default transitions in iMovie, which contributed to the dynamic sequencing of the content. He could evaluate his own work by stating that the slides were “self-explanatory” and did not require additional text, showing that he understood that the linguistic content should be comprehensible (A; O).

Ian’s statement, “I had to spend some time adjusting the volume of the music and my voice” suggests that he could reflect on the problems that arose during the completion of the first two projects and by repeated editing, could ensure that the auditory components would be consistent from slide to slide (A; I).

Ian said he was very proud of his technology skills. He indicated that he would still prefer to work alone in future. He also noted that some of his classmates were too noisy and he had to record his voice again and again to ensure clarity (D). This aspect of digital literacy was assessed as being at the level of ‘Create’, as Ian could make meaningful use of most of the modes to construct meanings in a cohesive manner.

#### ***4.2.5.5 Evidence of Aspect 5 in Project Three (Ian).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

There was no evidence of Aspect 5 (use digital technology in a safe and socially responsible manner) in this project, possibly indicating that the topic of this digital story may have affected this Aspect 5. Even though Ian searched for images related to maths, he did not come across any inappropriate images or texts. He did not explain this during the interview with the researcher, even though she asked him twice. This aspect remained assessed as NE, but this does not mean that Ian did or did not display socially responsible conduct.

#### ***4.2.5.6 Evidence of Aspect 6 in Project Three (Ian).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were three instances of Aspect 6 in the third project. For example, Ian decided to create his own images in Key Note and explained that the slides were “a sort of a storyboard”, as this application provides a structure to work with content (A; D). Ian continued to consistently display his ability to copy and paste chunks of texts, save and retrieve files and troubleshoot when necessary. He demonstrated awareness that “in iMovie, one can drag the narration along the timeline to whatever slide you need” (A; I) and he justified his preference for iMovie over Photo Story2. This aspect was also evident

in his ability to share files with other independently. This aspect of digital literacy remained at the level of 'Create' in this project.

#### ***4.2.5.7 Evidence of Aspect 7 in Project Three (Ian).***

(Aspect 7: Ethically use information and media (copyright))

For his narration, Ian decided to use music that he had previously created with GarageBand. Although he did not use royalty-free images or any images created by others, he created his own media, which shows that he wanted to create original work. He said, "This is my original creation. I do not need to give a credit to anyone. I like it this way. It is my copyright now" (I). This demonstrates that he was fully aware of the issue of copyright. Thus, this aspect of digital literacy was assessed as being at the level of 'Create'.

#### ***4.2.5.8 Evidence of Aspect 8 in Project Three (Ian).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were four instances of Aspect 8 in this project. Although Ian attempted to apply information to design his own representations to effectively communicate knowledge to others, he showed little awareness of the target audience, as he selected a topic and images that were considered by his peers as "dull" (E-E:P3:I:2). However, he remained firm that since he was good at maths, his presentation could be helpful for some of his weaker classmates (D). He could reflect on his project and he did realise that the digital story was not very engaging, but he said, "I don't care as this is my Show-and-Tell and so I decided what to show and what to tell people about ... I realised that my Show-and-Tell is a kind of an instruction manual" (I; A). This means that Ian was aware of the target audience and could apply some skills to convey meanings clearly, but he showed lack of care with regard to whether the target audience would like his digital story or not.

Thus, this aspect of digital literacy declined from ‘Create’, in Project Two, to ‘Understand’ in Project Three.

#### ***4.2.5.9 Evidence of Aspect 9 in Project Three (Ian).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were three instances of this aspect of digital literacy in this project. For example, Ian used Google independently to search for the instructions on converting Key Note slides into JPEG format (O). He created his own music using Garage Band (not taught in class) (A). He created his digital story in iMovie (not taught in class) and he indicated that he preferred structured learning, or “step-by-step instructions” when working on projects involving technology (see interview transcript). This aspect echoed Aspects 1 (determine the information and media needed) and 2 (locate information), because Ian’s problem solving involved determining the required information and searching for it. Aspect 9 of Ian’s digital literacy was consistently at the level of ‘Create’, as he was able to critically evaluate the required technology-related skills and develop them through independent problem solving.

#### ***4.2.5.10 Evidence of Aspect 10 in Project Three (Ian).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

During this project, Ian used a variety of technology tools to create digital information (iMovie, Key Note, Garage Band), using them to his best advantage (see Aspects 4 and 6). He evaluated and edited his own work until he was satisfied with the final draft (O; A; I). He was able to create a multimedia product in the form of a digital story, which required the use of a variety of authoring tools. The level of this aspect of digital literacy for Ian was ‘Create’ and even exceeded teacher expectations.

#### **4.2.6 Summary of the evidence of the aspects of digital literacy across the pre-study and three projects for Ian.**

##### **4.2.6.1 *Pre-study.***

The researcher's two 'critical friends' evaluated Ian's PPT presentation. One of them commented, "... the kid did not apply any sounds. This and the lack of credits were the two things that lacked. Otherwise, this PowerPoint presentation is very good". They evaluated both Ian's PPT presentation and his Microsoft Word document as effective, at the level of 'Use/Understand', which was in line with the researcher's evaluation.

Ian's digital literacy prior to engaging in the digital storytelling task was assessed at being the level of 'Understand' (that is, has a set of skills that helps to comprehend, contextualise and critically evaluate digital media to make informed decisions about what one does and encounters online), with some elements of 'Use' (has the technical skills that are needed to engage with computers and the Internet, ranging from basic technical competences to more complex abilities for accessing and using knowledge resources (e.g., search engines).

##### **4.2.6.2 *Project One.***

After completing the first project, Ian's work showed evidence of the development of several aspects of digital literacy, compared to the pre- study. His skills of locating information and evaluating the reliability of the information and media had improved. He particularly succeeded in solving problems related to technology tools. He had developed the ability to position text and images to contribute to the dynamics of the presentation and he recorded narrations to support the visual images appearing on the screen.

Ian's digital literacy at the end of Project One was assessed as being at the level of 'Understand', with some elements of 'Use'. Aspect 5 did not develop at all, but this may

have been because the project task did not require searching for images online as the images were supplied by the teacher.

#### **4.2.6.3 *Project Two.***

Ian demonstrated development in almost all aspects of digital literacy in during Project Two. Scaffolded by the researcher, this activity provided a structure for Ian to plan and create his story. He confirmed this in the discussion with the researcher: “The second project was the easiest to make because you gave us guidelines. I prefer to know the step-by-step instructions as I know I will not make a mistake” (I).

Ian’s overall level of digital literacy for this project was assessed at the level of ‘Create’ (has the ability to produce content and effectively communicate through a variety of digital media tools), with Aspect 5 assessed at the level of ‘Understand’. Creating with multimedia (digital storytelling) is a set of advanced skills that include being able to adapt what we produce for various contexts and audiences; to create and communicate using rich media such as images, video and sound.

#### **4.2.6.4 *Project Three.***

Ian’s overall level of digital literacy in this project remained at the level of ‘Create’, but Aspects 3 and 5 were NE, due to the nature of the task and Ian’s choice of topic. Aspect 8 was assessed at one level lower than for Project Two, as although Ian was able to use most elements of the genre to create his own piece of information, he applied only some skills to convey meanings clearly and to appeal to the target audience. Figure 4.3 is a visual summary of the development of the aspects of digital literacy for Ian.

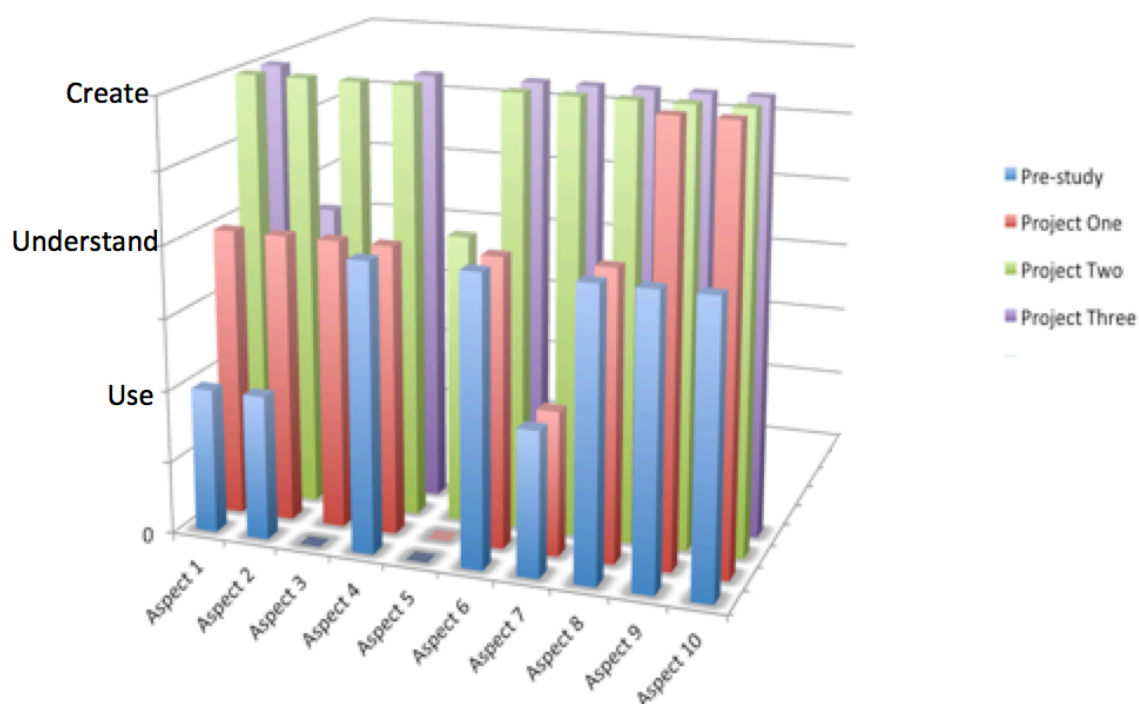


Figure 4.3. Ian's digital literacy development.

#### 4.2.7 Factors that inhibited the effective implementation of digital storytelling for Ian.

Although Ian consistently displayed problem-solving skills related to technology, he lacked creativity in his final project, where he was free to choose any content and media. He chose a 'safe' topic related to maths, a subject in which he said he excelled. However, his lack of awareness of the target audience resulted in a somewhat boring narration of a maths problem, rather than a dynamic show-and-tell digital story. It was structured as a lecture and was supported by images that contained only maths formulae and other maths-related information. Ian's focus on technology rather than content hampered his final project. However, given the clear guidelines regarding the content requirement, Ian was able to produce a meaningful and engaging digital story for his second project. It is possible that his prior practices (e.g., rote memorisation of facts) indirectly affected his process of creating digital stories.

#### **4.2.8 Section summary (Ian).**

After completing three digital storytelling tasks, Ian demonstrated the following abilities leading to the development of digital literacy:

- He independently solved hardware- and software-related problems.
- He reflected on the technology tools required to complete a digital storytelling task.
- He undertook a self-directed exploration of technology tools (e.g., iMovie applications) that had not been taught in class.
- He showed an ability to determine and locate the information and media required.
- He applied high-quality sound, narration and animation.

Ian, who was identified as a Technical Master, had not fully developed the following abilities:

- He did not use online media (e.g., images from Flickr) to ensure compliance with copyright laws. Instead, he used his own high-quality but unattractive images).
- He did not demonstrate an awareness of the target audience, instead choosing and creating a digital story that was disengaging for the viewers due to the lack of interactive elements and the uninteresting storyline.
- He needed scaffolding in the form of storyboarding and a discussion of the purpose of the digital story, to creatively and effectively create a digital story.
- He did not succeed in applying skills to convey meanings clearly.
- In using text to support his narration, he overused the text, resulting in rigid slide layouts that lacked variety and creativity.



Several themes emerged from the analysis of the coded data. Ian's focus on technology often dominated his decision making and impeded his creativity. He demonstrated strong development of all aspects of digital literacy when working on the second project, which was scaffolded by the teacher. Ian's ability to determine and locate the information and media was influenced by his knowledge of subject matter and he did not show much concern for whether the target audience would find his digital stories interesting.

He enjoyed exploring new technologies independently, in his own time, and attempted to use a lot of different technology tools throughout the study. He developed the ability to make meaningful use of modes to construct meanings in a cohesive manner, with the modes complementing each other dynamically for Projects One and Two. These themes will be further discussed in Section 4.6, which presents the analysis of the themes across the three cases under the study.

### **4.3 Case Two: Critical Analyser (Jane)**

#### **4.3.1 About Jane.**

Jane was an 11-year-old girl from a bilingual family in Hong Kong. She spoke Cantonese with her father and English with her mother. She was an average student, having scored 77, 78, 74 and 72 per cent respectively in the core subjects of English, Putonghua, Math and Science. In her free time, she enjoyed gymnastics, drawing and "chatting on the Facebook". During the class discussion prior to the study, she commented, "I like hanging out with my friends. If I don't have an opportunity to do so, there is always Facebook". She spoke little and was diligent when approaching all tasks assigned by the teacher.

With regard to her ability to think critically and evaluate information and media to suit the purpose of her digital stories, the researcher identified Jane as a 'Critical

Analysed'. To evaluate Jane's development in the various aspects of digital literacy, the researcher collected data through a range of data collection instruments, as outlined earlier. The overview of the findings for Jane is presented in Table 4.3, followed by a detailed description of these findings.

Table 4.3. *Analysis of the Aspects of Digital Literacy—Jane*

Aspect of digital literacy	Stage of the study	Level of digital literacy	Evidence						
			Questionnaire	Observation notes	Discussion transcripts	Reflections by students	Evaluation by peers	Planning documents and artefacts	Semi-structured interview transcripts
			(Q)	(O)	(D)	(R)	(E)	(A)	(I)
1. Determine the nature of information and media needed	Pre-study	UD	X	X	✓	NA	NA	NA	✓
	After P1	UD	NA	✓	✓	X	X	NA	✓
	After P2	CE	NA	✓	X	✓	✓	NA	X
	After P3	CE	NA	✓	✓	NA	X	NA	✓
2. Locate information	Pre-study	UE	✓	X	X	NA	NA	NA	X
	After P1	UD	NA	✓	X	X	X	NA	✓
	After P2	CE	NA	✓	X	X	X	NA	✓
	After P3	CE	NA	✓	X	NA	X	NA	✓
3. Evaluate reliability of information and media content	Pre-study	NE	X	X	X	NA	NA	NA	X
	After P1	NE	NA	X	X	X	X	NA	X
	After P2	NE	NA	X	X	X	X	NA	X
	After P3	UE	NA	X	✓	NA	X	NA	✓
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration)	Pre-study	UE	✓	✓	✓	NA	NA	✓	✓
	After P1	UD	NA	✓	✓	X	✓	✓	✓
	After P2	UD	NA	✓	✓	X	X	X	✓
	After P3	CE	NA	✓	✓	NA	X	✓	✓
5. Use digital technologies in a safe and socially responsible manner	Pre-study	NE	X	X	X	NA	NA	NA	X
	After P1	NE	NA	X	X	X	X	NA	X
	After P2	NE	NA	X	X	X	X	NA	X
	After P3	UD	NA	X	X	NA	X	NA	✓
6. Manage digital information in a technology space (hardware and software components; troubleshooting)	Pre-study	UE	✓	✓	✓	NA	NA	✓	✓
	After P1	UD	NA	✓	✓	X	X	X	✓
	After P2	CE	NA	✓	✓	X	X	X	X
	After P3	CE	NA	✓	X	NA	✓	✓	✓
7. Ethically use information and media (copyright)	Pre-study	UE	X	✓	✓	NA	NA	X	✓
	After P1	UE	NA	X	X	X	X	X	X
	After P2	UD	NA	X	✓	X	X	X	X
	After P3	UD	NA	X	✓	NA	X	✓	✓
8. Apply information to design own representations to effectively communicate knowledge to others	Pre-study	UE	X	✓	X	NA	NA	✓	X
	After P1	UD	NA	X	X	X	✓	✓	X
	After P2	CE	NA	X	✓	X	X	✓	✓
	After P3	UD	NA	X	X	NA	✓	✓	✓
9. Develop ability in problem solving and reflecting on own technology skills	Pre-study	UE	X	✓	X	NA	NA	X	✓
	After P1	UE	NA	✓	✓	X	X	X	X
	After P2	UD	NA	✓	✓	X	X	✓	X
	After P3	CE	NA	X	X	NA	X	✓	✓
10. Use a variety of technology tools to create digital information	Pre-study	UE	✓	X	X	NA	NA	✓	X
	After P1	UE	NA	✓	X	X	X	✓	X
	After P2	UD	NA	X	✓	X	X	✓	X
	After P3	CE	NA	✓	X	NA	✓	✓	✓

**Key:**

Symbol	Explanation
UE	Use (see Aspects of Digital Literacy Evaluation rubric)
UD	Understand (see Aspects of Digital Literacy Evaluation rubric)
CE	Create (see Aspects of Digital Literacy Evaluation rubric)
NE	Not evident: there were no instances of aspects of digital literacy
<b>Evidence of aspect</b>	
NA	Not applicable
✓	Instance of an aspect of digital literacy
X	No instances of aspects of digital literacy evident

### 4.3.2 Jane's digital literacy pre-study.

The researcher examined and evaluated Jane's PPT presentation titled 'Biography of Ronald Reagan' and a Microsoft Word document 'Comparison of two extraordinary people' to identify Jane's level of digital literacy before she engaged in the study. See Figures 4.4 and 4.5 below for reference when reading the descriptions of aspects 1–10 pre-study that follow.

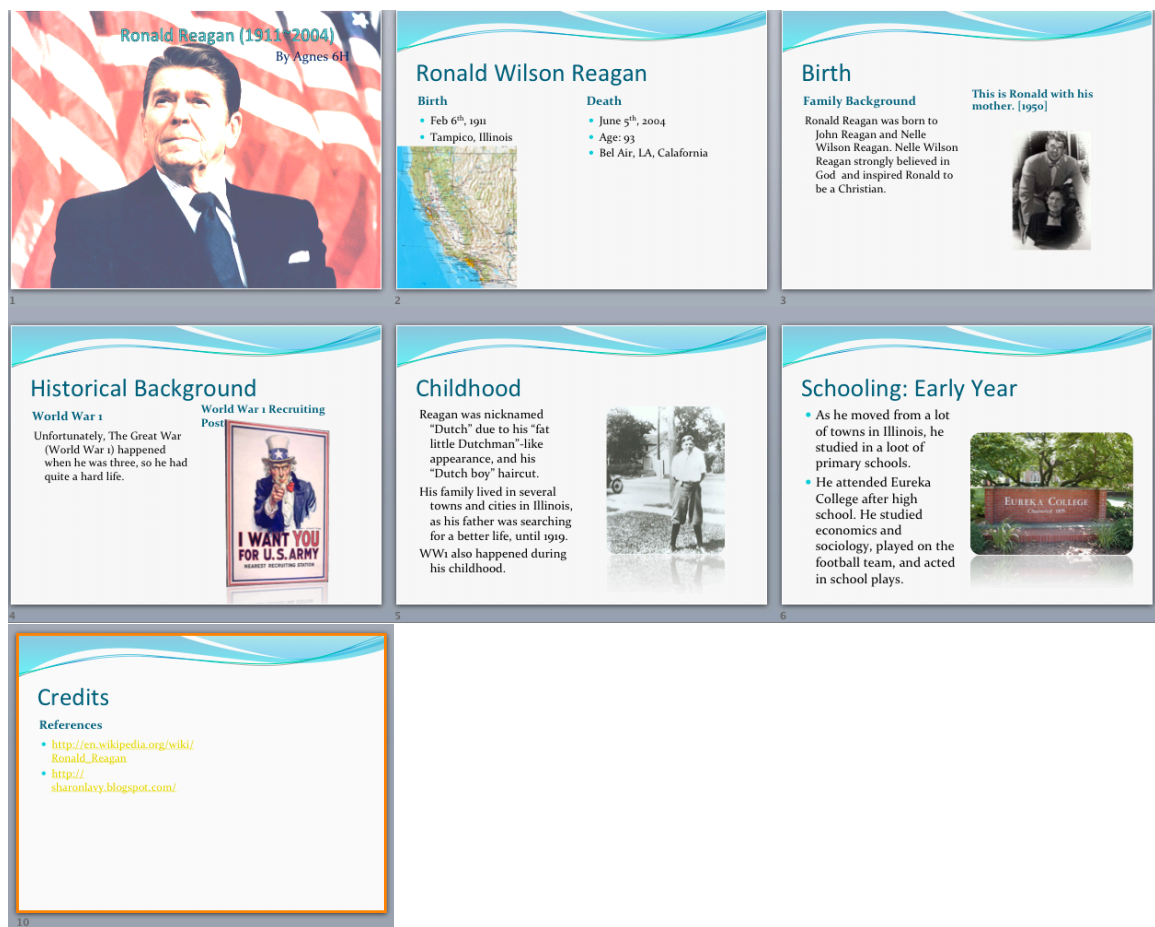


Figure 4.4. Jane's PowerPoint presentation.



Comparison	Braille	Gallaudet
Photo		
Birth		December 10 <sup>th</sup> , 1787
Childhood	January 4 <sup>th</sup> , 1808	1805- graduated from Yale University with Diploma 1808- Master degree from Yale University
Disability	Blind at 3 years old	-None-
Schooling	Paris Institution for Blind	Yale University
The dream	Invent a suitable writing system	Before- Being a preacher After- Find methods for teaching blind
Death	January 6 <sup>th</sup> , 1882	September 10 1851
Contribution to society	Form a convenient system for blind	Help found schools for blind
Similarities (use these words: alike, comparable, similar, both are, share common points)	Both wanted to help disabled and overcame obstacles.	

Figure 4.5. Jane's Microsoft Word document.

#### 4.3.2.1 Evidence of Aspect 1 pre-study (Jane).

(Aspect 1: Determine the nature of information and media needed)

Two instances of this aspect were evident during the pre-study exercise. Jane did not fill in all of the cells of the Microsoft Word table as she did not find information on Gallaudet's disability. Further, she deleted the cell 'Differences' because she said, "I did not understand what I needed to do so I just deleted it" (I:P3:J:X). This may indicate that although she recognised that certain information was required, she could not determine what it was and therefore deleted the cell. Further, she indicated that while she was not a confident speaker and writer, she felt confident in reading and listening. During the class discussion she used the verb 'to Google' confidently and could explain what it meant: "It means to find information online" (D). She said she knew how to find music on YouTube and believed that one could provide

a link to a YouTube video in order to have the music play during the PPT presentation. She could decide what media she needed but she did not possess the necessary technical skills to use it. Aspect 1 was assessed as being at the level of ‘Understand’.

#### ***4.3.2.2 Evidence of Aspect 2 pre-study (Jane).***

(Aspect 2: Locate information)

The only instance of Jane’s ability to locate information was shown in her completed questionnaire (Q). She relied heavily on Wikipedia to locate information online. This might indicate that her reliance on Wikipedia prevented her from exploring other ways of locating information, such as through entering the key words in a search engine. This aspect was assessed as being at the level of ‘Use’.

#### ***4.3.2.3 Evidence of Aspect 3 pre-study (Jane).***

(Aspect 3: Evaluate reliability of information and media content)

Two instances of Aspect 3 indicated Jane’s limited ability to evaluate the reliability of information and media content. During the class discussion, the teacher asked Jane whether she knew the identity of the person whose blog she had used in her research when looking up information on Ronald Reagan. Jane answered that she did not know the person. When the teacher inquired, “Do you think you can trust everything that an unknown person posted in his/her blog?” she replied, “I don’t know, maybe” (D). Further, Jane did not provide references to the websites from which she downloaded her images. She explained, “The names of the photographers were not printed on the websites, so I thought it was OK to just save the images” (I-I:P3:J:1). This demonstrates that although she was aware that a name could be a criterion to evaluate the reliability of information, she dismissed the lack of concrete evidence as unimportant. This aspect was not evident or ‘NE’ for Jane.

#### ***4.3.2.4 Evidence of Aspect 4 pre-study (Jane).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There was significant evidence, 19 instances in all, of Jane's ability to analyse, interpret and use a range of information and media to communicate meanings through multimodal texts. In the questionnaire, she indicated that she knew how to change the size, colour and style of fonts. This was also supported by teacher observations. For example, when the teacher opened a Microsoft Word document and asked Jane to change the size and colour of a paragraph, Jane could easily perform this task. She said that she liked to experiment with fonts (O; D). This could mean that she was aware that different fonts affected the attractiveness of the presentation; however, she did not consider the consistency of fonts to be important, as she mentioned during the class discussion she that she did not think text should be consistent throughout the document.

She could not explain whether she could edit an image. When the teacher asked, "Can you make a picture look smaller or bigger? Can you just select a part of a picture and crop it?" Jane said, "No" (I-I:P3:J:2). However, she could demonstrate how to resize an image in a Microsoft document by dragging the corners of the image (O; D). This indicated that she had limited ability to edit images to enhance her presentation. Nevertheless, overall her PPT was colourful and contained meaningful and relevant information (O). Jane provided images for all slides except 7 and 10. For slide 10, she explained that no pictures were required because "you cannot really illustrate credits". When the researcher asked about slide 7, Jane said, "This slide is about God. No one has ever seen God so there are no pictures of God in the Internet,

obviously” (I-I:P3:J:3; A). This could mean that she critically evaluated the correlation between the images and texts.

Jane’s PPT slides were somewhat cluttered with text. She said that there was a lot of information on Wikipedia and another website that she had used to research Ronald Reagan. She thought all of the information was important, so she copied and pasted large sections of text into her PPT presentation (A; D). She could not recall the address of the website from which she sourced her pictures. She explained, “I saw how my classmates all got the same pictures from Wikipedia, so I wanted to be different and got different photographs”. Jane did not notice that her font (Hobo Std, 12) was different from the one provided by the teacher (Times New Roman, 16): “I like the fonts in my table. I think they look cool” (I-I:P3:J:4; A). This demonstrated her lack of understanding with regard to consistency of fonts. This aspect was assessed as being at the level of ‘Use’.

#### ***4.3.2.5 Evidence of Aspect 5 pre-study (Jane).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

There was no evidence of Jane using digital technologies in a safe and socially responsible manner. However, this does not indicate that she lacked this aspect of digital literacy; rather, there was no opportunity for her to display it. This aspect was not evident or ‘NE’.

#### ***4.3.2.6 Evidence of Aspect 6 pre-study (Jane).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

Interestingly, there were eight instances of this aspect during the pre-study. Jane could copy and paste chunks of texts from the Internet to a Microsoft Word document and a PPT and she attempted to save and retrieve files. For example, she did



not experience difficulties saving her file into the designated folder created by the teacher. There was a fire drill during the lesson, so all electricity was turned off. Jane said that it did not affect her because she had been constantly saving her work. She could retrieve her file and knew the importance of giving the file a meaningful name that would allow her to retrieve it easily using the document search function on her computer (O; A). When asked about this, Jane explained:

I once made a very important document and could not find it later on. I asked my friend on Facebook a question how to find it. My friend told me that if I named my document in a way that makes sense I would be able to find the document. So I had to redo the whole thing. That was unfair, but at least I learn my lesson (I-I:P3:J:5).

Jane's PPT presentation was consistent in its use of colours. She chose one of the templates provided by the application, explaining that she liked the combination of blue and white colours because they would not affect the black text. Further, it was easy just to select one of the existing templates (O).

During her oral presentation, Jane spoke in a soft voice. She did not look at the PPT slides because she had printed them out earlier. She read from the paper and glanced at the audience from time to time. The presentation was displayed on the computer screen in the classroom, which had access to the Pupils Drive in the school Intranet (O). During the presentation, which was large in size due to a number of large-sized images, the PPT started lagging. Jane had a USB drive that contained a copy of her PPT presentation, so she asked the teacher whether she could play the presentation from the USB drive (O).

To complete the assignment, which included creating a Microsoft Word document, the students were required to fill in a table after searching for the necessary

information on the Internet. To share the document, the teacher created it in Microsoft Word and saved it as a read-only document called 'COPY FROM HERE' in the Pupils Drive. The teacher instructed the students to open the document, select and copy the text and table, open a new Microsoft Word document and paste the copied information into it. Then they were to save the document under their names in their own folders in the Pupils Drive. Jane succeeded in completing the task. She used Wikipedia to search for information and rephrased some of it and downloaded images from a different website (O). This indicated that she was able to manage digital information and even tried to rephrase some of it.

She could insert a link to a YouTube video of her choice in her PPT and could explain how she did it. She said, "You copy the address by right-clicking on it. Then you paste it where you like also by clicking." This is yet another instance of Aspect 6 (D). This aspect was assessed as being at the level of 'Use'.

#### ***4.3.2.7 Evidence of Aspect 7 pre-study (Jane).***

(Aspect 7: Ethically use information and media (copyright))

Jane was able to acknowledge several information and media sources created by others by providing a URL to the relevant websites, but she did not reference them properly. For example, she believed it was not wrong to copy and paste from Wikipedia and the other websites (a blog) because she "created the credits slide" at the end of her presentation (D). However, she did not provide references to all the websites she studied. She explained that she copied and pasted just a few sentences, "not everything", because she thought it was acceptable to "copy and paste a little bit of text, not all of it" (I-I:P3:J:6). In addition, she noted in her questionnaire that she did not know what copyright meant. This aspect was assessed as being at the level of 'Use'.

#### ***4.3.2.8 Evidence of Aspect 8 pre-study (Jane).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

The two instances of this aspect appeared in the teacher observations and the examination of digital artefacts. Jane was able to use some elements of PPT and Microsoft Word to convey information to the viewers. However, she did not ensure the quality of images and the consistency of fonts (O; A). This aspect was assessed as being at the level of 'Use'.

#### ***4.3.2.9 Evidence of Aspect 9 pre-study (Jane).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were four instances of this aspect. For example, the teacher observed (O) that during the presentation, which was large because of a number of large-sized images, the PPT started lagging. When she plugged her USB drive into the teacher's computer, Jane realised that she had only saved a draft of the PPT presentation, rather than the final version. Her presentation was therefore rescheduled to a later time. During the interview discussion of this experience with the researcher, Jane said, "I was very stressed as I did not know what to do. I don't understand why I could view my presentation in the computer lab when I finished working on it, but it let me down today" (I-I:P3:J:7). This may mean that although she was able to acknowledge technology-related problems, she could not solve them independently.

On another occasion during the lesson, the connection to the Internet was lost. Jane was not able to restore the connection, but as Andrew was sitting next to her, she observed how the teacher restored the connection to Andrew's computer and followed the steps independently. Later in the interview she explained, "I observed how you

helped Andrew, so I learnt from it” (I-I:P3:J:8). This indicated that Jane could analyse the problem and solve it after having been exposed to the solution, albeit indirectly. This aspect was assessed as being at the level of ‘Use’.

#### **4.3.2.10 Evidence of Aspect 10 pre-study (Jane).**

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

The two instances of this aspect were Jane’s evaluation of her own technology skills through the completion of the questionnaire and through the Microsoft Word document and PPT that she submitted (Q; A). She was able to create integrated multimedia products but was not able to evaluate and edit them appropriately. This aspect was assessed as being at the level of ‘Use’.

#### **4.3.3 Jane’s digital literacy in Project One: *Pourquoi* Story.**

Jane’s *pourquoi* story is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### **4.3.3.1 Evidence of Aspect 1 in Project One (Jane).**

(Aspect 1: Determine the nature of information and media needed)

There were three instances of Jane’s ability to determine the nature of the information and media required for this task. She spent about 15 minutes of the first lesson examining the photographs. She inquired twice whether she could only use the images from one folder. She asked whether she could skip some of them. The teacher replied that she could not. Jane asked whether she could use the Internet to search for some *pourquoi* stories. The teacher allowed this. Jane accessed YouTube and typed ‘*pourquoi* stories’ in the search window (B-O:P1:J:1).

She viewed several stories and then examined the images in the teacher’s folder and selected a folder (the same folder that Andrew selected). She explained her choice:

“There is a tale in YouTube that I liked. So, it kind of inspired me. It is about a lion becoming the king of the jungle” (I-I:P3:J:9). This demonstrated that she knew about that video and used this knowledge to search for it on YouTube. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.3.2 Evidence of Aspect 2 in Project One (Jane).***

(Aspect 2: Locate information)

Three instances of this aspect were evident in observations and in the interview with Jane. For example, she accessed YouTube and typed ‘*pourquoi stories*’, demonstrating that she not only knew what information she needed, but also was able to locate it on the Internet (B-O:P1:J:2).

Further, Jane attentively watched the teacher’s demonstration on the screen. She located the photographs in the designated folder and imported them into Photo Story 2. Then she saved the project onto the desktop (B-O:P1:J:3). This could indicate that she was able to locate information offline as well as online.

However, the strongest evidence came when she manipulated the photographs to try to reposition the images in the timeline. She used the image of the lion for the introduction and then used the same image again for the story ending. She explained:

I needed one more image of the lion but there was only one in the folder. So, since the task was to use only those images in the folder, I reused the same image. I changed the zooming so that in the first picture the lion stopped moving. I also changed the shading a little bit, so it became a bit grey, or black and white, something like that. This is like a cover page of the book (I-I:P3:J:10).

This could indicate that Jane realised that she needed a particular image that was not available in the designated folder, so she identified the existing image as one

that could be edited to convey the meaning that she intended to convey. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.3.3 Evidence of Aspect 3 in Project One (Jane).***

(Aspect 3: Evaluate reliability of information and media content)

There was one instance of Aspect 3 in this project. During the class discussion she inquired why the teacher provided the exact names of the photographers who had posted the images that the teacher downloaded from Flickr.com. Although this did not directly indicate that she had developed this aspect during her engagement in the first project, it indirectly indicated that it had started developing and that she thought critically about the use of the exact names (D). This aspect was not evident or ‘NE’.

#### ***4.3.3.4 Evidence of Aspect 4 in Project One (Jane).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were 13 instances of Jane’s ability to analyse, interpret and use a range of information and media to communicate meanings through multimedia text. The teacher had instructed the students to add a title to their story to emphasise the key ideas relevant to the individual slides. Jane typed the text for the first slide only (the introduction). She changed the colour to blue and positioned it at the bottom of the image. She explained that she did not want the text to cover the image (B-O:P1:J:4; D). Additionally, before engaging in creating her digital story, Jane viewed several stories online and then examined the images in the teacher’s folder. This informed her decision about selecting a particular set of images (B-O:P1:J:5). This could indicate that she was thinking critically about the selection process.

Jane's narration was clear (apart from slides 5 and 6), well paced and well projected. She said that she had to record each slide at least twice "to make the speech perfect" (I-I:P3:J:11; A). She customised motion and transitions, saying, "It was fun seeing how different my presentation looked if I selected different transitions. I changed the zooming so that in the first picture the lion stopped moving" (I-I:P3:J:12; B-O:P1:J:6; A).

She did not add background music to the story. She said:

Photo Story is like a PowerPoint presentation, but without the presenter standing in front of the audience. I know that it is important for my voice to be clear, we learn it in speech and drama lessons. So, when I experimented with music, it sounded too loud, louder than my voice. Therefore, I decided not to confuse the audience (I-I:P3:J:13; A).

This shows that Jane was able to compare and contrast the two applications.

The researcher transcribed Jane's narration from her final *pourquoi* story. The story contained a clear storyline. Her classmates liked it, commenting, "It is a cool story, I liked it!", "How did you make the first slide change colour? It's awesome" and "I like your story, but I think it would be better if you added music" (E). This was evidence that Jane's classmates found her story interesting and clear.

Writing a *pourquoi* story of 200 words was required by the school syllabus. Jane commented that it was easy for her to do: "I can write *pourquoi* story easy, because I already have a plan in my head. I remember how I did narration for the computer project" (I-I:P3:J:14). Thus, Jane could transfer the ability to read and write digital stories to traditional writing tasks.

Jane explained that she did not think it was important to add key words for each slide: "I am confident that I speak clearly, so I don't think this was necessary, although

a couple of classmates said they did not understand some parts. I think they just said it without meaning it” (I-I:P3:J:15). However, slides 5 and 6 contained some background noise that hampered the narration and without the key words, it was difficult to understand that part of the story. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.3.5 Evidence of Aspect 5 in Project One (Jane).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

There was no evidence of Jane using digital technologies in a safe and socially responsible manner. However, this does not indicate that she lacked this aspect of digital literacy; rather, there was no opportunity for her to display it. This aspect was not evident or ‘NE’.

#### ***4.3.3.6 Evidence of Aspect 6 in Project One (Jane).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were five instances of this aspect. Three of them came from teacher observations. For example, she saved the folder containing photographs on the desktop and manipulated the photographs to reposition the images in the timeline of the Photo Story2 application (B-O:P1:J:7). Additionally, when the teacher advised the students to write their narrations in the notes window, Jane opened a Microsoft Word document and wrote the script there. She explained that she felt more comfortable typing the whole story on one page: “Besides, it underlines in red if you make spelling mistakes”. Then she copied and pasted her story, paragraph by paragraph, into Photo Story 2 (B-O:P1:J:8; I-I:P3:J:16). This indicated that her ability to manage digital information in technology space, in particular the ability to use software applications, had improved compared to the pre-study stage.



Further, after the teacher created a folder in the Pupils Drive and instructed the students to save the published (rendered) stories in the folder ‘Finished *Pourquoi* Stories’, Jane succeeded in exporting the project on her first attempt. After viewing it, she realised that she had accidentally swapped two slides. She wanted to edit it but kept opening the ‘jane.wmv’ file. She said, “I cannot change anything because it has already been turned into a movie” (B-O:P1:J:9; D). This aspect was assessed as being at the level of ‘Understand’.

#### **4.3.3.7 Evidence of Aspect 7 in Project One (Jane).**

(Aspect 7: Ethically use information and media (copyright))

There was no clear evidence of this aspect during Jane’s engagement with the first project. An indirect indicator could be her inquiry about why the teacher had provided the exact names of the photographers who posted the images that the teacher downloaded from Flickr.com. However, when the teacher tried to clarify this, Jane could not explain why she needed this information. This aspect was assessed as being at the level of ‘Use’.

#### **4.3.3.8 Evidence of Aspect 8 in Project One (Jane).**

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were two evidences of this aspect. As noted earlier, Jane’s classmates liked her digital story (E). Further, after examining the final digital story, the teacher could see that Jane was aware of the target audience and could use most elements of the genre to create her own piece of information of the same genre (A). This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.3.9 Evidence of Aspect 9 in Project One (Jane).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

Three instances of problem solving while creating her digital story were demonstrated through the class discussion and teacher observations. For example, the teacher suggested exploring the ‘Save the story’ screen in Photo Story 2. Jane clicked ‘Learn more about the selected activity’ on the screen, as suggested by the teacher, and after a few minutes, she opened her Photo Story 2 project, edited it and rendered the story again. Jane then opened her folder in the Pupils Drive and dragged both her Photo Story 2 project and the WMV file into it. Then she saved both files onto her USB drive. The next day, she said she had wanted to edit the project again at home but she had not been able to do it. She added, “It is strange because I could view the other file (wmv)” (D). The teacher explained that because Photo Story 2 was not installed on her home computer, she would not be able to edit it there (B-O:P1:J:10).

In addition, Jane indicated that she considered her project in Photo Story 2 to be very similar to her project in PPT. After viewing other students’ movies, she said she would like to add background music to the story: “Perhaps I should have added more drama to my project. Like, adding classical music would make the slides when the crocodile was eating the children and animals more dramatic. I think next time if I work in Photo Story 2, I will add music” (D). This demonstrated Jane’s ability to acknowledge that there were technology-related difficulties. It also showed her understanding of the required skill but she could not solve those problems independently. This aspect was assessed as being at the level of ‘Use’.

#### ***4.3.3.10 Evidence of Aspect 10 in Project One (Jane).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

The main evidence of this aspect appeared in teacher observations and the examination of the final digital story. Jane was able to create an integrated multimedia product with the use of Photo Story2 but she was not always able to critically evaluate and edit it. This aspect was assessed as being at the level of ‘Use’.

#### ***4.3.4 Jane’s digital literacy in Project Two: ‘William Tell’ Story Review.***

Jane’s ‘William Tell’ story review is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### ***4.3.4.1 Evidence of Aspect 1 in Project Two (Jane).***

(Aspect 1: Determine the nature of information and media needed)

There were three instances of this aspect in this project. Jane was a confident reader and as she read the story, she used the Google search engine to find out the meanings of unknown words by typing in the word and searching online dictionaries. She then created her story map, as instructed by the teacher (O). This meant that she could recognise what information she needed by skimming through the content and deciding whether the information was useful.

Jane stated that the project was easy to complete because she already knew how to use Photo Story and she had a clear idea of what she was going to say in her narrations and what images she needed for the story. She indicated that she enjoyed searching for images at home because she was not stressed about time there: “It was fun doing it at home because I knew that the school bell would not ring. So I took my time. It took me maybe 20–25 minutes to find all images that I needed: (R). This was also supported by her classmate’s evaluation of the images when he exclaimed, “Wow,

these photos really match your story!” (E). These instances may indicate that although she had the ability to search for images and information, she was aware of the time constraints and took this into consideration when deciding on the amount of information she needed. This aspect was assessed as being at the level of ‘Create’.

#### ***4.3.4.2 Evidence of Aspect 2 in Project Two (Jane).***

(Aspect 2: Locate information)

Teacher observation and the interview with the student revealed two instances of this aspect. She used the Google search engine to find the meanings of unknown words (O), indicating that she not only knew what information she needed but also how to locate it online. Additionally, Jane used photographs that she found on the Internet to create her digital story review. She found four of them on Flickr and five through the Google search engine. She explained, “I was desperately looking for a picture of a heart and a bow, for example, and I just could not find it in Flickr” (I:P3:J:17). It is possible that she could navigate online but when she was not able to find the exact picture she had in mind, she was reluctant to search further. This aspect was assessed as being at the level of ‘Create’.

#### ***4.3.4.3 Evidence of Aspect 3 in Project Two (Jane).***

(Aspect 3: Evaluate reliability of information and media content)

As there was no evidence of this aspect during Jane’s engagement in the second project, the teacher asked her to explain how she evaluated the reliability of the information she found online. Jane was able to clearly explain the significance of the criteria for evaluation (e.g., the author and his expertise in the field, age appropriateness, etc.) This indicates that she did not regard this aspect as important. Therefore, this aspect was still not evident or ‘NE’ for Jane.

#### ***4.3.4.4 Evidence of Aspect 4 in Project Two (Jane).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were six examples of this aspect. Jane did not look for images of the actual people, as many of her classmates did. For example, some students searched for photographs of the main character, Gessler, without realising that his image could only be found in pieces of art such as sculptures and paintings, as there was no photography at the time when he lived. Jane used a photograph of a person with an angry face. She explained:

Since Gessler was very mean, I tried to find a picture of a mean man. It doesn't matter that it actually is not Gessler. I just tried to solve the problem: there are no photographs of him on the Internet. I searched up the Internet and it appears that photography was not invented at those times yet. So, I am thinking of drawing my own pictures. . I did that already but I do not know how to make them photographs and I do not really have time (I-I:P3:J:18).

This indicates that when she realised that there were no images that could help her to create a digital story, she looked for different ways of conveying meanings, such as using drawings.

Five instances were evident when Jane created a new project in Photo Story 2, imported all the images and organised the sequences according to the storyboards, then copied her written scripts into the application. After typing in the text for each slide, she copied it into a Microsoft Word document and used the spell check function. Afterwards, she copied and pasted the edited text back into Photo Story 2 (O).

She added titles to all of the slides and used meaningful key words for each one. She changed the colour of the title for every slide: “I like colours, so that’s why I changed them. When I first made them black they were no fun” (I-I:P3:J:19).

Jane customised motions for each slide. She said that she did not use any of the default settings of Photo Story 2 because she wanted her work to be original. She did not add background music. She had wanted to have some heroic music, but she could not think of an appropriate song or melody. She did not want to use the music in Photo Story 2 because she did not find any heroic music there either. When the teacher asked why she did not edit some of the musical pieces provided in Photo Story 2, she said that she did not have time to explore that option (D). Although she acknowledged that she could improve the cohesion, the time constraint prevented this, which means there was no solid evidence of this aspect of digital literacy. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.4.5 Evidence of Aspect 5 in Project Two (Jane).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

As in the earlier phases of this study, there was no evidence of Jane using digital technologies in a safe and socially responsible manner. However, this does not indicate that she lacked this aspect of digital literacy; rather, there was no opportunity for her to display it. This aspect was still not evident or ‘NE’ for Jane.

#### ***4.3.4.6 Evidence of Aspect 6 in Project Two (Jane).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were six instances of this aspect. For example, Jane recorded narrations for all slides and after listening to them, she re-recorded four of them. Her microphone had been broken by a student who had used it just before the class. She asked if she

could work outside the classroom to avoid the noise created by her classmates. Outside, while working in the corridor near the classroom and within the researcher's sight, she realised that her voice was too soft because she had recorded her narrations without a proper microphone, so she had to speak into the microphone inbuilt in the MacBook. She rolled a newspaper into a tube and used it as a loudspeaker by speaking into one end and placing the other end very close to the inbuilt microphone: "I just thought that since I was unlucky to not have a mic, I would as well try to do something about it" (O; D). This clearly demonstrated her ability to troubleshoot independently.

For the credits, Jane used an image created in ArtRage and typed 'Credits to the users of Flickr'. Jane rendered the project independently and saved it in the designated folder in the Pupils Drive. Although the last slide was not very clear, she did not have time to edit it again because of other commitments. Although the teacher scanned her drawings, Jane did not create another story with them, saying: "Since I already created one digital story review, I hope that is enough to pass" (O; D).

In addition, Jane submitted her story by uploading it to the folder as instructed by the teacher. She also tried to upload it to the school's online learning platform, ThinkQuest, but the file was too large and the upload failed. She saved her final rendered story in WMP format in her own folder in the Pupils Drive, as suggested by the teacher, as well as saving it onto a USB drive. She said, "I want to make sure that I have back-up in case if something goes wrong like last time" (O; D), referring to a prior experience with a PPT presentation during the pre-study stage. This indicated that this aspect of digital literacy had developed well towards the end of the second project. This aspect was assessed as being at the level of 'Create'.

#### ***4.3.4.7 Evidence of Aspect 7 in Project Two (Jane).***

(Aspect 7: Ethically use information and media (copyright))

There was one instance of this aspect of digital literacy. After downloading several images from Flickr.com, Jane did not fully understand why she had to provide credits for the individuals who had uploaded the images, even if she had used Flickr: “Well, they knew that they shared their photo in Flickr, so I don’t see why I need to still give them credit” (I-I:P3:J:20). Although this shows that she was aware of copyright during the completion of the second project, she did not demonstrate understanding of the importance of giving credit to acknowledge the sources. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.4.8 Evidence of Aspect 8 in Project Two (Jane).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were four instances of this aspect. When she embarked on the storyboards, she wrote the text then drew some pictures that she intended to use in the digital story review on paper. She explained, “I love drawing so I might as well draw my own images” (I-I:P3:J:21). This demonstrates that she knew how to convey meaning clearly through images, because since she could not find the images she wanted, she decided to create her own images.

Additionally, when she showed her project to the teacher and a few classmates, the teacher asked whether she was satisfied with the quality of all of the images. Jane said that even though the last slide was not very clear, she would not have time to edit it again. When the teacher gave her an option of editing it at lunch time, Jane said she had a choir rehearsal then but she might download Photo Story 2 to her home computer and try to edit the story (D; A). This indicates that although she was aware of the fact that her viewers (target audience) might find some images unclear, she did not consider this important and was only planning to edit her work if she had time.



Lastly, Jane's narration in the final rendered story review (A) showed a smooth flow of well-connected ideas and met all project requirements of the genre. This aspect was assessed as being at the level of 'Create'.

#### ***4.3.4.9 Evidence of Aspect 9 in Project Two (Jane).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

There were three instances of this aspect. For example, Jane brought along her USB drive, on which she had saved a few images from the Internet. She explained:

I don't have a scanner at home so I decided that I would just find the images in the Internet and use them in my story. I might create two stories: one with my drawings and the other one with the images from the Internet. I feel better using the images from the Internet because my friends all do this (D).

This demonstrates that she knew what skills she needed but the lack of opportunity to use those skills affected her performance.

Three of the images she created using ArtRage, a digital drawing software (<http://www.artrage.com/>), were of very low resolution, especially the image on the last slide. As Jane did not know how to export the digital image, she had taken a screen shot of the digital drawing and imported the resulting JPEG image into Photo Story (O; A).

Jane's final narration was still soft and difficult to hear. When her story was later played in the classroom, she said she should have tested it before the presentation: "It's interesting that when I listened to it through ... my headphones, I could hear everything clearly. It's a shame my voice can hardly be heard now" (D). This aspect was assessed as being at the level of 'Understand'.

#### ***4.3.4.10 Evidence of Aspect 10 in Project Two (Jane).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Two instances of this aspect were seen through teacher observations and examination of the final digital story. For example, Jane asked whether she could create her story map in a Microsoft Word document instead of on the printed handout. The teacher agreed and Jane created a chart representing her story map (D). This indicates that she was using technology tools not only for the story creation but also for the planning, which had not been required by the teacher.

In addition, she said, “I might create two stories: one with my drawings and the other one with the images from the Internet.” (D). This indicates her intention to use various technology tools to reach her objective of finding appropriate pictures, an objective that she reached. This aspect was assessed as being at the level of ‘Understand’.

#### **4.3.5 Jane’s digital literacy in Project Three: Show-and-Tell.**

Jane’s Show-and-Tell is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### ***4.3.5.1 Evidence of Aspect 1 in Project Three (Jane).***

(Aspect 1: Determine the nature of information and media needed)

There were four instances of Aspect 1 in this project. Jane had a strong interest in Facebook. She decided to create a show-and-tell presentation in the form of a digital story about Facebook (see the interview transcripts, observation notes and discussion transcripts). As she planned her story, she decided to compare Facebook to another social media website called Myspace. To represent their correlation, she decided to use

a picture of ‘rivals’. She then came up with the idea of creating an image of a boxing ring:

My dad has recently watched a boxing competition, which I happened to see too. So I thought that boxers are rivals in a way. Well, they are opponents actually, but when I typed ‘opponents’ in my script, I right-clicked that word and one of the words that popped up was ‘rivals’. So I thought ‘rivals’ is a much better word because Facebook and MySpace don’t literally fight (I-I:P3:J:22).

This could indicate that her knowledge of the topic influenced the way she determined the nature of the information she needed for the third project. She could identify the technology tools needed for the task, as she planned to use the Internet and search engines to look for images. This aspect was assessed as being at the level of ‘Create’.

#### ***4.3.5.2 Evidence of Aspect 2 in Project Three (Jane).***

(Aspect 2: Locate information)

Three instances of this aspect were evident in Jane’s interview with the researcher. Jane indicated that she much preferred digital storytelling to traditional storytelling. Using the computer as a tool for her English pieces was fun, easy and fast. She stated:

If a person knows exactly what she wants to do, then there is always Internet to find any information you need. Digital stories are great: the final product looks very pro. I wish we had more projects done with Photo Story 2. I am also interested in learning to use iMovie. I know that a couple of classmates used it at they reckon it is easier to use than Photo Story 2. I also realised that even in PowerPoint, there is an option to record the voice and add sounds! (I-I:P3:J:23).

This reflection indicates that Jane considered knowing that what one wants to do helps with locating information, which may indicate that she could confidently navigate the Internet, access information and reflect on why the information was needed.

In contrast, however, Jane used Wikipedia as her main source of information and did not use her creative drawing skills to create her own images for this project:

This project will not be assessed and so I did not have enough time to search ... websites other than Wikipedia to find information. Also, there were no guidelines as to what exactly should be included in the project, so I just did what was interesting to me. I still think that the first project was great because the images were already given to us, and the second was easy to make because the teacher guided us through the project (I-I:P3:J:24; O).

Although Jane displayed the development of the second aspect of digital literacy and could locate information easily online, in the end she used Wikipedia as a single source of information. Her explanation above may indicate that although she had the ability, she did not use it, as the grade for the project did not contribute to the overall grade for English. This aspect was assessed as being at the level of 'Create'.

#### ***4.3.5.3 Evidence of Aspect 3 in Project Three (Jane).***

(Aspect 3: Evaluate reliability of information and media content)

As there was little evidence (I-I:P3:J:25; D) of this aspect during Jane's engagement in the third project, the teacher asked her to explain how she evaluated the reliability of the information she found online. The teacher had previously asked this question after Jane completed the second project. As with the second project, Jane was not able to clearly explain the significance of the criteria for evaluation even though she had attempted to identify the date and the author of the Wikipedia webpage she used. This may indicate that she did not regard this aspect as important although she

did display understanding of the criteria for evaluation of the web sites. This aspect was assessed as being at the level of 'Use'.

#### ***4.3.5.4 Evidence of Aspect 4 in Project Three (Jane).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

There were 11 instances of this aspect for Jane. First, she typed the entire story in a Microsoft Word document and then printed it out and used it as a script when recording her narrations (O). Then she made screen shots of the Facebook and Myspace banners and used the JPEG pictures in her story. She was particularly proud of the image that she created by herself in ArtRage, which was an image of a boxing ring with two boxers. One boxer had a Facebook logo above him and the other had the Myspace logo above him. She said that she inserted the JPEG images of the banners into her ArtRage project, drew the rest of the image using digital tools in ArtRage, and exported the resulting image as a JPEG and imported it into Photo Story 2. The narration accompanying this image was 'Facebook and Myspace are rivals because Facebook and Myspace are really alike and they are competing with each other to see which website has more users and of course, Facebook has more users at the moment'. Jane said she had visualised that picture the moment she typed the word 'rivals' into her script (O; I-I:P3:J:26; D).

She had organised the images in a logical sequence according to her script. She had duplicated the image of the Facebook banner using the appropriate function in Photo Story 2. She said that although it was the same image, she planned to use a different motion for the two slides to make them appear different on the screen (I I-I:P3:J:27).

She did not add titles to the slides, explaining:

Well, I guess the banners of Facebook and Myspace speak for themselves.

Every literate person knows who Mark Zuckerberg is, so his photo speaks for itself too. The rest of the images also did not require texts. I know very well how to add texts to the slides. I even tried to add some to my slides. They did not make sense so I deleted them. I really think any more text would be redundant (I-I:P3:J:28).

Jane said that as she wanted to make her narrations perfect this time, she worked in the classroom next door to record them (O; D). Unlike the first and second projects, she added music for this project. She chose one of her favourite songs and asked her father to help her export it from the CD-ROM. She saved the audio file onto her USB drive, which she brought to school.

She did not ask the teacher for help when she imported the file into Photo Story 2 (O; A). She said:

I worked out how to do it at home. I had to Google for the instruction just to realise that it was easy. I just had to examine attentively the part of ... Photo Story 2 where background music is added (I-I:P3:J:29).

This aspect was assessed as being at the level of 'Create'.

#### ***4.3.5.5 Evidence of Aspect 5 in Project Three (Jane).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

Jane had a strong interest in Facebook. She knew that children below the age of 14 could not register, so she asked her parents to help her register. She told that her parents always monitored her Facebook activities (I-I:P3:J:30). This may indicate that she displayed socially responsible conduct. This aspect was assessed as being at the level of 'Understand'.

#### ***4.3.5.6 Evidence of Aspect 6 in Project Three (Jane).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

There were six instances of this aspect in this project. Jane did not experience difficulties with importing images into Photo Story. She said, “I have done it so many times already that I can write a manual with step-by-step instructions” (I-I:P3:J:31). This indicates that Jane had developed the ability to manage digital information in technology space and could do it with confidence.

Jane exported her project in WMV format and saved it onto her USB drive and in her folder in the Pupils Drive. She wanted to post it on YouTube, but the teacher reminded her that she had to be 13 years old or above to be legally allowed her own YouTube account. Jane said: “I can see why it is so. Some people type silly comment, for sure. I think that’s why this rule exists” (I-I:P3:J:32; O). Thus, she showed critical thinking when assessing the need to post her video on YouTube. In addition, the classmate sitting next to her expressed his surprise when he saw Jane using ArtRage to create an image for her digital story (E). Although this does not clearly indicate the development of Aspect 6, it indirectly indicates Jane’s ability to manage digital information effectively.

Jane submitted her script instead of writing the same story using pen and paper: “Since writing with the use of a pen is not required, I want to just give you my script. I am sure it doesn’t have any spelling mistakes as I used the spell check in ... Microsoft Word” (I-I:P3:J:33; A). This again demonstrates her ability and confidence with managing digital information. This aspect was assessed as being at the level of ‘Create’.

#### ***4.3.5.7 Evidence of Aspect 7 in Project Three (Jane).***

(Aspect 7: Ethically use information and media (copyright))

There were three instances of this aspect in the third project. For example, Jane tried to ‘borrow’ as few images as possible from Flickr.com (D). She provided credits in the last slide (A). In addition, Jane indicated that she had learnt a lot about copyright and the importance of giving credit to the ‘borrowed’ images and songs. She also said that she preferred to create and use her own images (I-I:P3:J:34). These instances show a strong indication that Jane developed the ability to download royalty-free images and to create and use her own media for the purposes of digital storytelling. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.5.8 Evidence of Aspect 8 in Project Three (Jane).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

There were four instances of this aspect in this project. Jane rehearsed her narrations a few times before rendering the final version of her digital story (I-I:P3:J:35). It was also evident in the submitted digital story: background music was soft and did not affect the narration, unlike in the previous project (A). Finally, the researcher’s evaluation of her story found that it was well planned and well delivered. She chose a topic that interested her the most at that time (Facebook) and she conducted independent research to compare the Facebook and Myspace social networks and delivered a clear indication regarding why she preferred Facebook (A). In addition, Jane’s last slide was also created in ArtRage. She said that she wanted to make it look as if she had handwritten it. She used a photograph of the founder of Facebook and all images were of a high resolution (I-I:P3:J:36).



This confirmed her ability to design her own representations to effectively communicate knowledge to others. This aspect was assessed as being at the level of ‘Understand’.

#### ***4.3.5.9 Evidence of Aspect 9 in Project Three (Jane).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

Two instances of this aspect were evident in the interview with Jane upon the completion of this project. For example, she said that she had wanted to make her narrations perfect, so she had worked in the classroom next door to record her narrations. Her voice projection was clear, appropriately paced and seemed well rehearsed: “I did a few rehearsals before I actually recorded my voice. I read the whole text at least three times aloud” (I-I:P3:J:37). This indicates that she had developed the required technology skills through independent problem solving.

Additionally, the music was soft in the background and did not interfere with her voice. She said that she had manipulated the volume sliders in Photo Story 2 to ensure that the music would enhance rather than overpower her voice:

Since my first two projects did not have any background music and I notice that most of my classmates’ stories had it, I thought it would be cool to import music into it. But it took me a while to work out how to upload one of my favourite songs (I-I:P3:J:38; A).

This evidence confirmed Jane’s ability use multimedia elements to enhance the digital story dynamics. She succeeded to “work out how to upload” a song independently (I-I:P3:J:39). In addition, in her interview she said that she was “interested in learning to use iMovie” (I-I:P3:J:40). This indicated her ability to critically evaluate the technology-related skills she needed and to compare and contrast

various computer applications. This aspect was assessed as being at the level of 'Create'.

**4.3.5.10 Evidence of Aspect 10 in Project Three (Jane).**

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

There were five solid instances of this aspect in this project. Throughout the completion of the third digital story, she used and integrated a variety of technology tools to create digital information (e.g., ArtRage, Photo Story 2, Microsoft Word, screen shots and a variety of multimedia) and used them to the best advantage, constantly evaluating and editing her own work (I-I:P3:J:41; A).

She decided to use Photo Story 2 to create her show-and-tell digital story. She did not create storyboards for this project, explaining that:

I know how to use Photo Story. I made two projects with it already and I even downloaded it and installed it at home to experiment with importing the music.

So, I think I am sort of a pro now making digital stories (I-I:P3:J:42).

This confirmed her ability to independently create an integrated multimedia product (digital story) using a computer application.

Jane's final digital story received a lot of praise from her classmates (E). The teacher observed Jane's ability to explore the functions of various computer applications independently and to identify those that would help her create media (e.g., images), which she consequently used for her digital story (O). This aspect was assessed as being at the level of 'Create'.

#### **4.3.6 Summary of the evidence of the aspects of digital literacy across the pre-study and three projects for Jane.**

##### **4.3.6.1 Pre-study.**

The researcher's two technology-competent colleagues assessed Jane's PPT presentation as effective and gave it 25 out of 40 marks, which was equivalent to a 'B' grade. One colleague commented:

There is definitely some planning involved, but the student used a template and typewrote too much information for most slides. There is inconsistency in the layouts and chunks of information are missing. There is plenty of information on the Internet about Reagan. The student could have gone beyond Wikipedia. A blog is not a very reliable source either. Thus, I gave her a 'B'. It is good but not excellent.

In the pre-study phase, Jane's level of digital literacy was identified on the Aspects of Digital Literacy rubric at the level of 'Use' (that is, having the technical skills she needed to engage with computers and the Internet) and at the beginning of 'Understand' (that is, having the set of skills that allowed her to comprehend, contextualise and critically evaluate digital media to make informed decisions).

##### **4.3.6.2 Project One.**

Jane demonstrated development in several aspects of digital literacies, compared to her level in the pre-study (see Figure 4.6). She could locate information independently after searching the Internet, but she did not acknowledge her sources. However, she could recall where she had retrieved the information. She improved her ability to save and retrieve information and media and she could successfully record narrations and add background music to the project. She carefully selected the media that would suit the purpose of creating a *pourquoi* story in the digital format and she

carefully analysed existing stories on YouTube to create a story that would have a similar structure and storyline.

#### **4.3.6.3 Project Two.**

Jane demonstrated the development of several aspects of digital literacy compared to the beginning and end of Project One (see Figure 4.6). In particular, she showed critical-thinking skills when approaching the project by constantly examining whether her work was consistent with the project guidelines. She improved her skill of using technology tools and solved problems independently by conducting online research. She could locate the necessary information and media and apply them to her own digital story. However, she did not go beyond the requirements of the project as outlined by the researcher.

Creating a digital story review, which was not required by the school syllabus, required the students to write a short story review using pen and paper (100 words). Jane completed this writing with ease, making only two mistakes in punctuation. She commented afterwards:

I am glad that I used the spell check when I worked on the scripts for my narrations in Photo Story because when I wrote the story review in pen and paper, I remembered the spelling of all tricky words. So it's kind of cool (I I-I:P3:J:43).

This may indicate that the process of creating this digital story had improved Jane's ability to write a traditional story review. This claim would need to be examined further.

#### **4.3.6.4 Project Three.**

Jane demonstrated the development of several aspects of digital literacy throughout her engagement in the three projects in this study (see Figure 4.6).

Although her images and information were credited and she made an attempt to make her own images by using screen shots, Jane used Wikipedia as her main source of information and did not use her creative drawing skills to create her own images for the project. Aspect 3 (ability to evaluate the reliability of information and media content) developed minimally. Nevertheless, she succeeded in successfully conveying meanings through creating an engaging digital story.

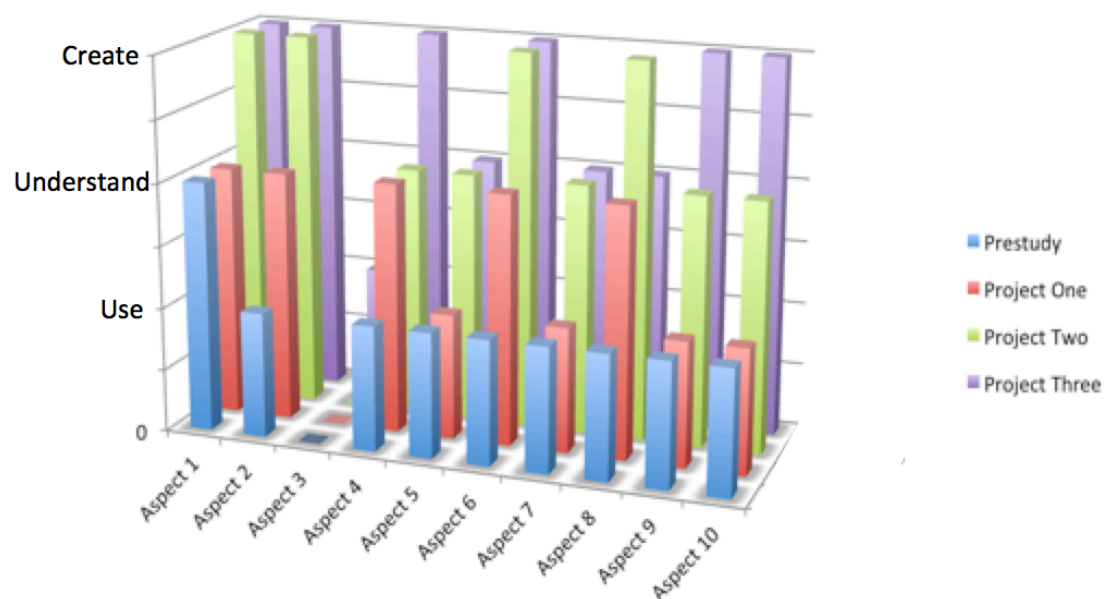


Figure 4.6. Jane's digital literacy development.

#### 4.3.7 Factors that inhibited the effective implementation of digital storytelling for Jane.

While completing the first project, Jane experienced several difficulties related to technology, which she was able to solve independently. However, she needed the teacher's approval before doing so. She often compared her work with the work of the top students and recognised that their digital stories were more interesting.

While working on the second project, Jane relied on her friends' feedback with regard to her work. She edited her work even though it did not require further editing. She drew pictures for a second digital story but did not use them in her project due to time constraints and her inability to use the class scanner.

For the third project, Jane selected the topic of Facebook without realising that children below 13 years of age should not use this social network. She did not have enough time to further edit her recorded narration and did not want to edit the work at home after finding out that the grade for this project would not contribute towards her total English grade.

#### **4.3.8 Section summary (Jane).**

Based on the researcher's observations, interview transcripts, discussion transcripts and evaluation of the digital artefacts created by Jane, the researcher noted that Jane displayed a high level of interest in the projects, especially the second project, which provided scaffolding. She conducted independent research when looking for information and media. She independently solved most of her problems related to technology, although she did not go beyond the requirements. She carefully compared and analysed information to create her own digital stories.

After completing all three digital storytelling tasks, Jane demonstrated the following abilities leading to the development of digital literacies:

- Prior to engaging in the digital storytelling activity, Jane found and analysed examples of stories (text-based and multimedia) in the genre prescribed by a digital storytelling activity.
- She solved technology problems independently by searching for the relevant information online.
- She examined technology problems experienced by peers and advised them

on ways to solve them.

- She reflected on her work after receiving feedback from her peers and teacher and edited her story to improve the quality of the presentation.
- She fulfilled all of the requirements of the digital storytelling task.

The following abilities were not fully developed for Jane, who was identified as a Critical Analyser:

- She did not always show creativity, as her work was influenced by similar stories studied prior to engaging in the digital storytelling activity.
- Although she fulfilled the requirements of the digital storytelling tasks, she preferred structure over creativity.
- As the assessment was informal and did not contribute towards her overall grade for the subject, she probably did not work to the best of her ability because she did not see the point.

The researcher noted some reappearing patterns or themes throughout Jane's engagement with the three projects. The three projects provided a meaningful context to create digital stories using digital storytelling applications. Jane demonstrated a high level of interest in the digital storytelling tasks through uninterrupted concentration on the tasks she was performing (engagement). She said that clear guidelines were very useful during her engagement in the second project (structure to work with media). However, when she realised that her digital stories would not be graded and the mark would not contribute to the overall grade for the semester, she did use multimedia to the best advantage and she did complete all three projects. After completing each digital story, she wrote the same stories using pen and paper and her content and language were of a high standard, with scores that were higher than her normal

composition scores. She consistently demonstrated the ability to think critically when solving hardware and software problems and conducting independent research.

However, her effort in ensuring high-quality media such as images and narration depended on time availability. She showed ability to convey meanings by carefully selecting media and content, often after thorough research and analysis of those. These themes are discussed further in Section 4.6, in which the researcher presents an analysis of the themes across the three cases in the study.

#### **4.4 Case Three: Creative Presenter (Andrew)**

##### **4.4.1 About Andrew.**

Andrew was an 11-year-old male who had been attending the school in the study since the age of nine. Prior to that, he had studied in his home country of China at a school where the language of instruction was Putonghua (Mandarin Chinese). He spoke very little English when he first joined the school and he had been learning English at school and at a tuition centre since the age of nine. His academic results across the subjects were average or slightly below average, with scores of 52, 70, 66 and 58 per cent respectively in the core subjects of English, Putonghua, Math and Science. In his free time, he enjoyed playing computer games and soccer. During the class discussion prior to the study, he commented, “I like playing computer [games] because it is fun and because I am good at this”. He volunteered to be an ICT monitor, which meant that his duties were to assist the teacher during the lessons, including switching on and off the teacher’s computer and the class projector and rolling the mobile cart towards the classroom and returning it to the storage room after class.

The researcher identified him as a ‘Creative Presenter’ because of his ability to create and use own images and his continuous attempts to ensure that the target audience liked his digital stories. To evaluate Andrew’s development of digital literacy



and its aspects, the researcher collected data through the various data collection instruments described earlier and the overview of findings is presented in Table 4.4, followed by detailed description of the findings.

Table 4.4. *Analysis of the Aspects of Digital Literacy—Andrew*

Aspect of digital literacy	Stage of the study	Level of digital literacy	Evidence						
			Questionnaire	Observation notes	Discussion transcripts	Reflections by students	Evaluation by peers	Planning documents and artefacts	Semi-structured interview transcripts
			(Q)	(O)	(D)	(R)	(E)	(A)	(I)
1. Determine the nature of information and media needed	Pre-study	UE	✓	X	✓	NA	NA	X	NA
	After P1	UE	NA	✓	X	X	NA	✓	X
	After P2	UD	NA	✓	✓	X	NA	✓	X
	After P3	CE	NA	X	✓	NA	NA	✓	✓
2. Locate information	Pre-study	UE	✓	✓	✓	NA	NA	X	X
	After P1	UE	NA	✓	✓	X	NA	X	X
	After P2	UD	NA	✓	✓	X	NA	✓	X
	After P3	CE	NA	X	X	NA	NA	X	✓
3. Evaluate reliability of information and media content	Pre-study	NE	X	X	✓	NA	NA	X	X
	After P1	NE	NA	✓	✓	X	X	X	X
	After P2	UE	NA	X	X	✓	X	X	X
	After P3	UD	NA	X	X	NA	NA	X	✓
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration)	Pre-study	UE	✓	✓	✓	NA	X	✓	X
	After P1	UE	NA	✓	✓	X	X	✓	X
	After P2	UD	NA	✓	✓	✓	X	✓	X
	After P3	UD	NA	X	✓	NA	✓	✓	✓
5. Use digital technologies in a safe and socially responsible manner	Pre-study		X	X	X	NA	NA	X	NA
	After P1	NE	NA	X	X	X	NA	X	X
	After P2	CE	NA	✓	X	X	NA	X	X
	After P3	NE	NA	X	X	NA	NA	X	X
6. Manage digital information in a technology space (hardware and software components; troubleshooting)	Pre-study	UE	X	✓	✓	NA	NA	X	X
	After P1	UE	NA	✓	✓	X	NA	✓	X
	After P2	UD	NA	✓	X	✓	NA	X	X
	After P3	CE	NA	✓	✓	NA	NA	✓	X
7. Ethically use information and media (copyright)	Pre-study	NE	✓	X	✓	NA	NA	X	X
	After P1	UE	NA	X	✓	X	NA	X	X
	After P2	UD	NA	X	X	X	NA	✓	X
	After P3	CE	NA	X	X	NA	NA	✓	✓
8. Apply information to design own representations to effectively communicate knowledge to others	Pre-study	UE	X	X	X	NA	✓	✓	X
	After P1	UE	NA	X	X	X	✓	✓	X
	After P2	UD	NA	✓	✓	X	X	✓	X
	After P3	UD	NA	✓	X	NA	X	X	✓
9. Develop ability in problem solving and reflecting on own technology skills	Pre-study	UE	X	✓	✓	NA	NA	X	X
	After P1	UE	NA	X	✓	✓	NA	X	X
	After P2	UD	NA	X	✓	X	NA	✓	X
	After P3	CE	NA	✓	✓	NA	NA	✓	✓
10. Use a variety of technology tools to create digital information tools to create digital information	Pre-study	UE	X	X	X	NA	NA	✓	X
	After P1	UE	NA	X	X	X	NA	✓	X
	After P2	UD	NA	X	X	✓	NA	✓	X
	After P3	CE	NA	✓	✓	NA	NA	X	✓

**Key**

Symbol	Explanation
UE	Use (see Aspects of Digital Literacy Evaluation rubric)
UD	Understand (see Aspects of Digital Literacy Evaluation rubric)
CE	Create (see Aspects of Digital Literacy Evaluation rubric)
NE	Not evident: there were no instances of aspects of digital literacy

**Evidence of aspect**

NA	Not applicable
✓	Instance of an aspect of digital literacy
X	No instances of aspects of digital literacy evident

#### 4.4.2 Andrew's digital literacy pre-study.



<p><b>Theodore Roosevelt</b></p> 	<p><b>Theodore Roosevelt</b></p> <p><small>Theodore Roosevelt was born on October 27, 1858 in New York and died on January 6, 1919 in Oyster Bay, New York.</small></p> 	<p><b>Introduction</b></p> <ul style="list-style-type: none"> <li>Theodore Roosevelt was the 26th president of America. He became President of the United States at the age of 35, after the assassination of President McKinley, making him the youngest President in U.S. history. He was known for carrying out progressive reforms and strong foreign policies.</li> </ul>	<p><b>Early Life</b></p> <ul style="list-style-type: none"> <li>Theodore Roosevelt's upbringing was different from other presidents of the United States because he was born in a wealthy family. However, he has also struggled for his life when he was on the verge of death for a serious illness name asthma at a young age. He survived, which also helped in shaping his strenuous character.</li> </ul>	<p><b>FIRST MARRAIGE</b></p> <ul style="list-style-type: none"> <li>Alice Hathaway Lee was the first wife of Theodore Roosevelt and mother of their only child together, Alice Lee Roosevelt. Alice Roosevelt died of an undiagnosed case of Bright's Disease two days after Alice Lee was born. Sadly enough, Theodore Roosevelt's mother Mittie died of Typhoid fever in the same house on the same day, Feb. 14, 1884. After the simultaneous deaths of his mother and wife, Roosevelt left his daughter in the care of his sister in New York and moved out to Dakota Territory.</li> </ul>
<p><b>SECOND MARRAIGE</b></p> <ul style="list-style-type: none"> <li>Following the election, he went to London in 1886 and married his childhood sweetheart, Edith Kermit Carow. They had five children: Theodore Jr., Kermit, Ethel Carow, Archibald Bulloch "Archie", and Quentin.</li> </ul>	<p><b>Foreign Policy</b></p> <ul style="list-style-type: none"> <li>Theodore Roosevelt steered the United States actively into world politics. He brought about the construction of the Panama Canal, which bridged Atlantic and the Pacific, he also brought about the Monroe Doctrine, which prevented the establishment of foreign bases in the Caribbean and arrogated the sole right of intervention in Latin America to the United States.</li> </ul>	<p><b>Nobel Peace prize</b></p> <ul style="list-style-type: none"> <li>He won the Nobel Peace Prize by mediating the Russo-Japanese War and reached the Gentlemen Agreement on immigration with Japan. He has contributed towards the turmoil brought about by wars around the world, which earned him the Nobel Peace Prize he greatly deserved.</li> </ul>	<p><b>Presidency</b></p> <ul style="list-style-type: none"> <li>Theodore Roosevelt served as the lieutenant colonel of the Rough Rider Regiment during the Spanish-American war. After the war, he became a hero and subsequently a Republican candidate for governor in 1898, he won and became the 26th President of the United States.</li> </ul> <p><small>He believed that the government had the responsibility to balance the conflicting economic forces in the country and governing justice to all people and dispensing favors to no one.</small></p>	<p><b>Death</b></p> <ul style="list-style-type: none"> <li>Leaving the Presidency in 1909, Roosevelt went on an African safari, then jumped back into politics. In 1912 he ran for President on a Progressive ticket. He was mentioned in the reporters that he felt as fit as a bull moose, using it as the name of his new party.</li> </ul> <p><small>While campaigning in Milwaukee, he was shot in the chest by a fanatic. Roosevelt soon recovered, but his words at that time can also apply to the time of his final death in 1919: "This man has had a happier life than I have had, a happier life in every way."</small></p>

Figure 4.6. Andrew's PowerPoint presentation.


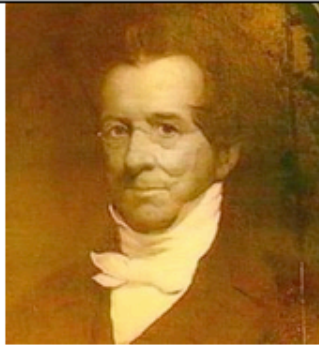
Comparison	Braille	Gallaudet
<b>Photo</b>		
<b>Birth</b>	January 4, 1809	December 10, 1787
<b>Childhood</b>	He lives in France, Paris. At the age of three he stabs an awl into his eye. It soon got infected. The infection spread into the other eye and, after a while he was blind	Thomas Hopkins Gallaudet was born in Philadelphia on December. 10, 1787. His family moved to Hartford in 1800. Thomas was a good student and impressed people with his intellect. When he was 15, he went to Yale. After he graduated, he tried different things but really didn't know what he wanted to do for a career.
<b>Disability</b>	He is blind	He was very weak
<b>Schooling</b>		He study in Yale university
	Royal Institution for Blind Youth	
<b>The dream</b>	To make a new system for the blind	He wanted to be lawyer, teaching, and business
<b>Death</b>	January 6, 1852	September 10, 1851
<b>Contribution to society</b>	Made a better system for blind	He made a school for deaf
<b>Similarities</b> (use these words: alike, comparable, similar, both are, share common points)	They contribute to the society and change the world	
<b>Differences</b> (use these words: dissimilar, while, whereas, contrasting points, one the one hand...on the other hand)	<b>Gallaudet is not <u>disable</u> but Braille is.</b>	

Figure 4.7. Andrew's Microsoft Word document.

#### 4.4.2.1 Evidence of Aspect 1 pre-study (Andrew).

(Aspect 1: Determine the nature of information and media needed)

In this task, Andrew did not comply with the teacher's instruction to provide images for each slide. He explained that he did not know how to do it. He said, "I cannot find photographs of Roosevelt's earlier life or his foreign policy". 'Foreign policy' was mispronounced and Andrew could not explain what it meant. Further, he could not explain the Nobel Peace Prize slide that he had created (D). This indicates that although he was able to skim through websites, he was not sure about what media he needed and therefore he preferred not to include any images at all in his PPT presentation.

Andrew indicated that he would sometimes prefer to work alone and sometimes with a partner. He explained, "I like working with my friends, especially boys. That is because they can help me and their English is better. I often do not understand what I need to do, and especially if I need to find information online" (I-I:P3:A:X). He evaluated his level of English as very low, answering 'No' to questions in the questionnaire about whether he was a confident speaker, reader, writer and listener of English (Q). This may show that he acknowledged that his language abilities hampered the process of searching for information even when he could identify what information he needed. There were three instances of this aspect for Andrew, at the level of 'Use'.

#### ***4.4.2.2 Evidence of Aspect 2 pre-study (Andrew).***

(Aspect 2: Locate information)

Andrew's image was taken from Wikipedia, together with entire paragraphs of copied and pasted text. When the teacher asked why he had done this, Andrew explained, "I always use Wikipedia for finding information because it is easy. I think that it is good website. I can find things I need. I think it is OK to copy from Wikipedia, because my friends always do it" (D) He used Wikipedia as the only source

of information and he could not explain why he needed to use that particular information. However, this may also reflect that he had not understood the question.

Andrew did not provide a reference to the website at the end of the presentation, but he showed how he searched for the information by typing ‘Theodore Roosevelt’ in the Google search engine and subsequently selecting the first suggested website, which was Wikipedia ([http://en.wikipedia.org/wiki/Theodore\\_Roosevelt](http://en.wikipedia.org/wiki/Theodore_Roosevelt)). He added that he looked at the table of contents on the webpage and created headings for his PPT slides (O). This indicates that although he could locate the necessary information on a page in Wikipedia, he was unable to assess what kind of information was important as he just used the structure provided on that page, whether or not it was relevant to his PPT presentation.

Andrew’s evaluation of his own ICT skills in Questionnaire One demonstrated that he was confident in searching for music on the Internet and looking up information using Wikipedia (Q). This shows that although he could navigate online and access information, he regarded Wikipedia as the only source. He called the Google search engine “a website that has images in it”, perhaps thinking that all images on the Internet come from Google. He was sure that he could easily find music online. He said, “Music is the easiest. You can just find it in YouTube”. Andrew could not explain how a video from YouTube could be imported into a PPT presentation (D, O). This again shows that even though he could navigate online and locate the media that he needed (e.g., music), he was not able to see how he would use it for his own project. There were five instances of this aspect for Andrew, which was assessed as being at the level of ‘Use’.

#### ***4.4.2.3 Evidence of Aspect 3 pre-study (Andrew).***

(Aspect 3: Evaluate reliability of information and media content)

This aspect was ‘NE’ during the pre-study, not only because there were no instances that would demonstrate the ability to evaluate the reliability of information and media content but also because he indicated that he could not explain what needed to be done to do so (D). This, however, might be due to his lack of ability to understand the meaning of certain words rather than a reflection of his level of digital literacy.

#### ***4.4.2.4 Evidence of Aspect 4 pre-study (Andrew).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

Andrew’s PPT presentation used black and white colours and lacked consistency in font size and style. For example, in slides 1–8, the font was Calibri with the size ranging from 18 to 44, while slides 9–10 used Times New Roman. He explained that he had not noticed the difference (A, D). This could suggest that although he used modes to construct meanings, his slides demonstrated poor cohesion.

He did not add any background colours to beautify the slides; nor did he add sound effects or transitions between the slides. He explained, “I did not know that I needed to do this”. The researcher asked, “What would you do if I asked you to change it now?” Andrew answered, “I don’t know. Maybe ask the teacher or find a textbook”. He did not state that he would make use of the ribbon (the user interface of Microsoft PPT) (D, A). This could suggest that even though the modes were not used, Andrew could not see that using them would complement his PPT presentation.

During the oral presentation, Andrew spoke in a soft voice. He did not look at his classmates or the teacher and he read from the slides, word for word. He explained later that he was shy and that was why he could not speak louder or look at the

audience. He added that he did not like speaking in public: “I don’t like it. It makes me feel nervous. But I did not know how to do narrations that the teacher suggested to do” (O, D). This instance indicates that although Andrew was not a confident speaker, he ignored the opportunity to record his voice to accompany his PPT slides, which would have eliminated the necessity to speak in public and would have allowed him to edit the recorded narration as many times as necessary.

Further, he could not explain how to edit an image. When the teacher asked, “Can you make this picture look smaller or bigger? Can you just select a part of a picture and crop it?” Andrew said, “No. I did not learn it before”. He admitted that he often asked his friends to help him “save pictures into PowerPoint” (D, O).

In the questionnaire, Andrew indicated that he knew a little bit about changing font sizes, colours and styles (Q). When the teacher opened a Microsoft Word document and asked him to change the size and colour of a paragraph, Andrew clicked randomly on the document interface and on random tools in the ribbon, but he did not succeed in completing the task. He eventually found the scroll-down menu for the font size. However, as he had not selected the text, no changes could be applied to the text. Andrew became even more nervous, as evidenced by his blushing face and slight stuttering, which was unusual for him (O). This may suggest that he did not know how to change the sizes and colours on the slides. There were 10 instances of this aspect, assessed as being at the level of ‘Use’.

#### ***4.4.2.5 Evidence of Aspect 5 pre-study (Andrew).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

Although there was no evidence of Aspect 5 during the pre-study, it is worth noting that Andrew used Wikipedia as the only source of information. The pages that he used did not contain any inappropriate images or information. Therefore, it was not



possible to identify his level in this aspect of digital literacy during the pre-study. This aspect was assessed as 'NE'.

#### ***4.4.2.6 Evidence of Aspect 6 pre-study (Andrew).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

Andrew asked many questions about saving and retrieving his work. As the lesson was interrupted by the school fire drill, the students could not finish their work on the same day. As a result, they saved their work into their designated folder in the Pupils Drive. Although all students had been given specific instructions regarding how to save their work, Andrew saved his work in the Documents folder, which was the default option. During the next lesson, he could not find his document and asked the teacher for help. "Somebody deleted my PowerPoint", he stated. The teacher asked, "Did you try to find it using the 'Search' option?" "No. I don't know how to do it." It took some time for the teacher to retrieve Andrew's PPT presentation because he had not followed the instructions to name his file as 'Name\_Class\_Biography'. Instead, he had saved it as 'Presentation 1', which was the default name (O, D). This indicates that he was not able to successfully save and retrieve files.

When working on this task, Andrew's mouse stopped working. He did not realise that it had become unplugged and he sat for a few minutes doing nothing. His neighbour noticed it and notified the teacher, who asked him why he hadn't raised his hand to ask for help. Andrew replied that he thought he had broken the computer and this was the reason for the mouse not working. When the teacher asked whether Andrew knew how to plug the mouse back in to the processor, Andrew replied in the negative (O, D). This suggests that he could not troubleshoot hardware-related problems independently.

When creating the Microsoft Word document, the students were required to fill in a table after searching for the necessary information on the Internet and save the document under their names in their own folders in the Pupils Drive. Andrew was not able to follow these instructions. He kept trying to edit the existing ‘COPY FROM HERE’ document, saying, “It doesn’t work!” He called the teacher, who showed him how to execute this task (O). This suggests that he was not able to manage digital information independently. This was further evident when the teacher asked whether he had had any difficulties when working on the assignments; Andrew mentioned that he clicked ‘Save’ when trying to save his work, but both times “it disappeared”. Document 1 was the name of his Microsoft Word document, which again, Andrew could not find independently. The teacher asked, “Why didn’t you save both documents in the Pupils Drive?” Andrew replied, “I never know how to do it. They always disappear or someone deletes them” (D). This was another demonstration of his inability to manage digital information in technology space: saving and retrieving files.

Andrew used Wikipedia again when he worked on the Microsoft Word document. He copied some text word for word from the site, such as the section on ‘Childhood’ for Gallaudet. He rephrased some of the information, which resulted in grammatical errors; for example, “He wanted to be lawyer, teaching and business” and he confused the past and present tenses. During a discussion with the teacher, Andrew admitted that the classmate sitting next to him during the lesson had helped him to insert both photographs in the table because he had forgotten how to do it. He also said that the same classmate had inserted the photograph for his PPT presentation entitled ‘Roosevelt’s biography’ (D). This could suggest that Andrew relied on classmates’ help when he needed to use images for his presentations. There were seven instances of this aspect, which was assessed as being at the level of ‘Use’.

#### ***4.4.2.7 Evidence of Aspect 7 pre-study (Andrew).***

(Aspect 7: Ethically use information and media (copyright))

In his Microsoft Word document ‘Comparison of two extraordinary people’, Andrew did not provide sources for his images and text. When the teacher asked him about it, he could not recall which websites he had used for the assignment (D). In the questionnaire, Andrew indicated that he had heard of the word ‘copyright’, but he had the impression that it gave one ‘the right to copy’, so it was therefore OK to ‘borrow pictures’ from the websites without mentioning the author’s name (Q). These two instances suggest that although Andrew was able to acknowledge information and media created by others, he was not able to provide the source of information. There were two instances of this aspect, which was assessed as being at the level of ‘Use’.

#### ***4.4.2.8 Evidence of Aspect 8 pre-study (Andrew).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

The instances of this aspect were seen in the final digital artefacts created by Andrew (A) and the evaluation by his classmates (E). Both indicated that although Andrew was able to use few elements of genre to create his own piece of information of the same genre, he could not apply all skills to convey information clearly, showing little awareness of the target audience. There were two instances of this aspect, which was assessed as being at the level of ‘Use’.

#### ***4.4.2.9 Evidence of Aspect 9 pre-study (Andrew).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

During the lesson, the connection to the Internet was lost. Andrew raised his hand and told the teacher, “My Internet is broken”. The teacher explained that the

connection to the Internet had been lost and asked whether Andrew knew how to open network diagnostics and check the connection settings. Andrew did not know anything about it, so the teacher demonstrated it and restored the Internet connection (O, D). This indicates that was able to acknowledge that there were technology-related problems but he was not able to identify the required skills to solve those problems.

Based on the teacher's feedback, Andrew was instructed to edit his PPT presentation at home and send it to the teacher via email. Andrew did not complete this task. One week later, when the teacher asked him about it, Andrew replied, "I did not know how to change my presentation and my email does not work anyway". He had forgotten his password to log in to the email account (D). This indicates that when facing a technology-related problem, he was not able to solve it independently by requesting a new password. There were three instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.2.10 Evidence of Aspect 10 pre-study (Andrew).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Andrew was able to create an integrated multimedia product from a template but he was not able to edit it to ensure that it communicated meanings effectively (A), which shows that his level of the 10th aspect of digital literacy was 'Use'.

#### ***4.4.3 Andrew's digital literacy in Project One: Pourquoi Story.***

Andrew's *pourquoi* story is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant's identity).

##### ***4.4.3.1 Evidence of Aspect 1 in Project One (Andrew).***

(Aspect 1: Determine the nature of information and media needed)

In this project, Andrew manipulated the photographs to try to reposition the images in the timeline. He spent 15 minutes doing this because he was still unclear about his storyline. Eventually, he was satisfied but his published story did not make much sense to the viewer because the first image with the introduction to the story ended up at the end of the storyline (F-A:P1:A:1; O). This suggests that although he could skim through the images and select those he wanted, he was not able to justify his choice. He was not able to determine the nature of the media (images) that he needed as he did not know what his storyline would be. There were two instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.2 Evidence of Aspect 2 in Project One (Andrew).***

(Aspect 2: Locate information)

Aspect 1 and 2 overlapped for Andrew, as due to his inability to determine what information and media he would need, he located the media rather randomly, without putting much thought into the process of selecting the images provided by the teacher in the five different folders. He mentioned during the class discussion, "Since I did not know what story I needed to make, I just chose the folder with nice pictures" (D-D:P1:A:1, O). There were two instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.3 Evidence of Aspect 3 in Project One (Andrew).***

(Aspect 3: Evaluate reliability of information and media content)

This aspect was not evident or 'NE' because he did not try to find sample *pourquoi* stories online.

#### ***4.4.3.4 Evidence of Aspect 4 in Project One (Andrew).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

Andrew spent 20 minutes of the first lesson examining the photographs. He could not decide which story he wanted to create. He explained that he was not sure how to put the photographs together to make a sensible storyline. He said, “I don’t understand how to start. They [pointing to the photographs] do not make sense. I like the photographs of jelly fishes and alligator, so I want to use them”. He selected folder 5 (D-D:P1:A:2; O). This indicates that his choice of images was not informed by the storyline; rather, he chose the images that appealed to him, without having in mind the actual digital story he would create.

The teacher instructed the students to add titles to their story to emphasise the key ideas relevant to the individual slides. Andrew started typing the text but later deleted them all, saying that he could not decide which words were relevant (O). He compared this to creating a PPT presentation: “Like, for example, when I make PowerPoint, I put much words in every screen [slide], but here is not much space. I cannot type everything I want in one screen. So I don’t want to do it at all” (D-D:P1:A:3). He transferred his knowledge of the PPT presentation application to Photo Story2 but he did not see the how this digital story application was different and that adding titles would have enhanced the appearance of the image and give it additional meaning.

The teacher advised the students to write their narrations in the notes window. According to Andrew, narrations caused him the most trouble: “I am not good speaking English, so I am afraid I make much mistakes. Will you mark this for spelling

and grammar?” The teacher assured him that spelling mistakes in this section of Photo Story 2 would not be seen in the final published story. However, Andrew asked whether he could record his narrations first: “Can I say the story first?” He obtained the teacher’s approval to do so. Andrew typed the texts after recording his narrations, but the type-written words did not completely convey what he had said. The teacher observed that Andrew spent a lot of time listening to his voice and typing (D-D:P1:A:4; F-A:P1:A:2; O). This instance of the aspect demonstrates that Andrew lacked confidence typewriting, as he was afraid to make spelling mistakes. He gained more confidence when he realised that he would not be marked down for spelling and punctuation mistakes made in the notes window.

Andrew chose not to customise the motion and duration of each slide. He said, “If this is not the must. I will not do it. The computer already make it,” (D-D:P1:A:5), meaning that the application did it by default. During the discussion after the completion of this project, the teacher asked the students whether they used the ‘Customise motion’ and ‘Transition’ functions in their projects. Andrew said that he did not use these functions because he did not quite understand why it was necessary (D-D:P1:A:6). This shows that Andrew did not understand that the two functions would have enhanced the appearance of his slides and therefore chose not to do it.

Andrew did not add background music to the story. He said that he did not like any of the music provided in the application. He said he wanted to use his own music from YouTube, but he did not know how to import it into the project. He asked, “How I import the music? I want Justin Timberlake but I don’t know how to put him in my story”. The teacher advised him to bring a CD with the songs by that singer, as downloading YouTube music would infringe copyright, but Andrew did not do it, mentioning that the CD was too expensive to bring to school because someone might

steal it. The teacher suggested exploring the function of creating his own music in Photo Story 2, but Andrew did not do it (D-D:P1:A:7). This indicates that Andrew wanted to enhance the digital story by adding music, but he did not see that the chosen song would not match his storyline. He wanted to add music only because he liked a particular song.

The students were required to write a *pourquoi* story of 200 words. After writing his story, Andrew commented that it was easy for him to do it because he already had a plan in his head: “I can write *pourquoi* story easy, because I already have a plan in my head. I remember how I did narration for the computer project” (D-D:P1:A:8). This shows that creating narrations had helped Andrew not only to typewrite the story in the Photo Story 2 but also to do it with more ease in pen and paper. Planning the digital story had affected his traditional writing in a positive way.

Although Andrew used different modes to construct meanings, they demonstrated poor cohesion and did not complement each other. There were 10 instances of this aspect, which was assessed as being at the level of ‘Use’.

#### **4.4.3.5 Evidence of Aspect 5 in Project One (Andrew).**

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

Although there was no evidence of this aspect in this project, this could have been due to the fact that the student was given images and did not do further research online and thus he did not encounter any inappropriate digital information.

#### **4.4.3.6 Evidence of Aspect 6 in Project One (Andrew).**

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

Andrew opened the Photo Story 2 application as instructed by the teacher, but he could not work out how to import the photographs. He asked his friend to



demonstrate how to do it but even after the demonstration, he could not cope with the task. He said, “I don’t understand why there is no slides like in PowerPoint. How I make slides?” (D-D:P1:A:9). The teacher guided Andrew towards the successful importing of the photographs. At one point (after importing the sixth photograph), Andrew accidentally quit the application. He could not find it on his computer because he had not saved it as per the teacher’s instructions. Thus, he had to start all over again. This time, he succeeded in opening the application, importing the photographs and saving the file as ‘andrew’. However, he saved the file into the ‘Documents’ folder instead of the designated folder (O). This demonstrates that at first he was unable to save and retrieve files independently and even when he did try to do it by himself, he did not save the file in the designated folder.

Andrew’s microphone did not function properly because the volume control slider was broken. Andrew finished recording the narrations for all 10 slides, only to realise during the preview that none of the slides had a voice-over. He said he was “a loser” because he had spent a lot of time recording in vain. During the second round of recording the narrations, Andrew narrated slide by slide and previewed each slide to listen to his recorded voice (O). This shows that he developed understanding of the issue and could foresee what might happen if he experienced technical difficulties. He attempted to save his narration for each slide to avoid losing it again.

The teacher had created a folder in the Pupils Drive and instructed the students to save the published (rendered) stories in the folder ‘Finished *Pourquoi* Stories’. Andrew saved his story as ‘andrew’ but bypassed the option to ‘Browse’, which would have allowed him to select a location for storing the file. Therefore, the file was automatically saved into the ‘Documents’ folder on the computer. When asked to demonstrate his story using the classroom computer (a computer located in the

homeroom, not in the computer laboratory in which Andrew had created his story), he could not find it. At recess, the teacher led Andrew to the computer laboratory and explained why the file he had saved in the 'Documents' folder of a computer could not be accessed through the school network (O). This instance shows that Andrew had saved the files without thinking about their location, which later resulted in him not being able to find them.

Further, Andrew had manipulated the 'Settings' function even though he was instructed to save his file in the default resolution of 640X480, which is the screen resolution that works well for playback on the computer. Instead, Andrew had selected the largest possible resolution. As a result, the rendering process took 12 minutes, resulting in computer lag. He asked for the teacher's help and the teacher helped him to restart the computer. After restarting the computer, Andrew viewed his story and realised that the narration for the last two slides was missing. He re-recorded the narration but accidentally changed the sequence of the slides in the timeline, which moved the first image to the end. He did not realise this until during the demonstration and class discussion of the finished projects (F-A:P1:A:3; O). This shows that Andrew's inability to manage digital information affected his final digital story.

The teacher asked the students whether they had viewed and edited their final stories after rendering. Andrew indicated that he did not know that he could edit his project. He said, "I did not know that I can edit the story. I already saved it, so I did not know how to do it". He did not see the difference between the raw Photo Story 2 file and the WMP file. The teacher showed two files to Andrew: the file called 'andrew.wp3' (which was the raw Photo Story file that could be edited) and the file called 'andrew.wmv' (which was a Windows Media file). The teacher inquired whether Andrew had noticed the difference in the files' extensions, but Andrew said

that he did not know what extension meant or how two files were different (D-D:P1:A:10; O). This instance further demonstrates Andrew's inability to recognise the necessity to edit his digital story and to save and retrieve it in the appropriate digital format. He was not able to manage digital information in technology space and troubleshoot. There were eight instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.7 Evidence of Aspect 7 in Project One (Andrew).***

(Aspect 7: Ethically use information and media (copyright))

Andrew said he wanted to use his own music from YouTube, but as noted earlier, he did not know how to import it into the project. This indicates that Andrew was not aware of copyright and considered it appropriate to download YouTube videos and use them in his project without giving credit to the author. He was not able to use this media ethically. There was one instance of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.8 Evidence of Aspect 8 in Project One (Andrew).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

Andrew was able to use few elements of the genre *pourquoi story* to create his own digital story of the same genre. The researcher transcribed Andrew's narration from the final rendered *pourquoi* story. There was no clear flow of ideas and the story contained many grammatical errors. The title of Andrew's story was in the last slide because he had accidentally moved it towards the end of the timeline in Photo Story 2. The font was black, which hampered its viewing against the image of two children in the canoe. Andrew tried to fulfil the requirements of the *pourquoi* story genre; however, there were no smooth transitions between the paragraphs because he did not

use connectors (F-A:P1:A:4). This indicates that although he was somewhat aware of the target audience, he could not apply all skills to convey meanings clearly.

Nevertheless, after viewing Andrew's video, his classmates commented that the story was clear to them. His classmate Beatrice, whose English-language proficiency was high, commented:

Andrew's narration does not always make sense to me, but I can see the images that go with his talking and can understand what he wanted to say. If I were him, I would edit the narration, as his voice is sometimes too loud and sometimes too soft. I think he did a relatively good job, but he needed to edit the story. I don't understand why he did not use any music. It was so much fun experimenting with different melodies! (E-E:P1:A:1).

Andrew did not edit his digital story based on the classmates' feedback, which may indicate that he was not aware that the target audience is important when creating digital stories, as they would not be able to appreciate a story that lacked clear voice projection and contained images that did not make the storyline clear. There were two instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.9 Evidence of Aspect 9 in Project One (Andrew).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

Andrew was able to acknowledge when there were technology-related problems. In his reflections, Andrew claimed that the project was challenging because he had experienced technical difficulties and was not sure how to troubleshoot. He wrote, "When my computer does not work, I was too nervous. I do not know how to do. My friends all do it well because they are good in english but I am bad in english. I think teacher will help but I ask so many questions and I had a lot of questions after. I

don't know computers good too. I know power point and I know other one that we wrote about two people. But this is not same. It has speaking and it has sound and pictures move. Also I think writing is easy but making movies is not. If I make movie stories I do not know if it is good or not. I need my teacher to tell me and my friends cannot help because I don't want talk in lesson. But I like my friend movies because they are like real movies!!!!!" (C-R:P1:A:1). He did not display an understanding of the way different media could complement each other and he tried to avoid using some of them. For example, he did not add background music because he could not see how the music could complement his story (D-D:P1:A:11). He was not able to identify the skills needed to solve technology-related problems and relied heavily on the teacher's help. There were two instances of this aspect, which was assessed as being at the level of 'Use'.

#### ***4.4.3.10 Evidence of Aspect 10 in Project One (Andrew).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Andrew was able to create an integrated multimedia product from template. He created a digital *pourquoi* story using Photo Story 2 for Windows. He did not change the default functions of the computer application (F-A:P1:A:5). There was one instance of this aspect, which was assessed as being at the level of 'Use'.

#### **4.4.4 Andrew's digital literacy in Project Two: 'William Tell' Story Review.**

Andrew's 'William Tell' story review is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant's identity).

#### ***4.4.4.1 Evidence of Aspect 1 in Project Two (Andrew).***

(Aspect 1: Determine the nature of information and media needed)

Andrew's ability to recognise what information and media were required improved during his engagement in Project Two. He read the story with interest and commented that he liked armour and archery and he was interested in the picture shown by the teacher, which depicted a scene of a man holding a bow and arrow and aiming at another person who had an apple on his head. Andrew could not understand a few words in the text distributed by the teacher. He said he would try to find "the same picture online" (D). However, when the teacher instructed the students to provide a brief description of each slide for the future digital story review, draw simple sketches of the images they would be searching for and write scripts for the narrations, Andrew's response to this was, "How do I know what picture I will find on the Internet? I don't know it if I cannot see it" (D). Nevertheless, he drew simple sketches. In the space for the narrations, he wrote the description of the drawing rather than what he would be narrating later when completing the digital story (O; A). These instances demonstrate that he was able to determine the nature of the information and media he needed, even though he did not know what sources he could use.

He searched Wikipedia for more information about Switzerland and the characters in the original story. He explained that he wanted to know more about them because it would make his own digital story longer (D). This shows that he was able to skim through the contents to decide what additional information he could use.

There were four instances of this aspect, which was assessed as being at the level of 'Understand' in the second project, as he had started using online information sources apart from those provided by the teacher.

#### ***4.4.4.2 Evidence of Aspect 2 in Project Two (Andrew).***

(Aspect 2: Locate information)

Andrew was able to navigate and access information and reflect on why this information was needed. For example, he used the Google search engine to search for images. He first opened the Wikipedia website. He commented that there were no images that he liked, so he asked where else he could find images. The teacher advised him to explore the Flickr and Creative Commons websites for images. Andrew spent a lot of time looking for images that would correspond to the sketches in his storyboards (D; O). He was looking for a photograph of the main character, Gessler, without realising that his image could only be found in pieces of art, such as sculptures and paintings, because there was no photography at the time when he lived. He said that he could not find Gessler (D). This indicates that although he used two sources to find information and media (Wikipedia and Flickr), he was unable to locate information that would help him understand this. Nevertheless, he used a photograph representing a medieval costume (A), which demonstrated his ability to read images and reflect whether they were appropriate for his purpose. There were three instances of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.4.3 Evidence of Aspect 3 in Project Two (Andrew).***

(Aspect 3: Evaluate reliability of information and media content)

In his written reflections Andrew wrote that he “did not need to evaluate the sources” because the teacher provided the story, and that he made use of Wikipedia (R). This shows that he was not able to see that he was supposed to write about the online sources that he used. However, it is possible to say that he used one criterion for evaluating the given source when he said that it was “provided by the teacher”, who was seen by Andrew as an expert in the field. There was one instance of this aspect, which was assessed as being at the level of ‘Use’.

#### ***4.4.4.4 Evidence of Aspect 4 in Project Two (Andrew).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

Andrew used different modes to construct meanings, demonstrating average cohesion as the modes somewhat complemented each other. For example, he recorded his narrations slide by slide and listened to each narration before moving to the next slide. He told the teacher that it took him two or three attempts to be satisfied with his voice. During the process of recording the narrations, he asked if he could go to the end of the classroom away from the noise and he received permission (D; O). This shows that he was able to reflect on the quality of the recorded narration and attempted to improve it by editing.

In addition, Andrew added titles to the slides and positioned them in the centre of the screen. The titles started with small letters and were black in colour. Andrew chose meaningful key words to go on the slides. Although the key words corresponded to the narration (A), the black font blended with the background, which somewhat distracted the viewers.

Andrew customised the motion of each slide. He used the ‘zoom in’ and ‘zoom out’ functions when he wanted to emphasise a detail on the slide. In the written reflections he explained, “I, example, want to show big apple. So I made it come closer to the eyes. I did it because I speak about apple so peoples who watch my story can see it too” (R; A). This indicates that he was aware of the way his target audience would perceive the appearance of the images on the screen and attempted to enhance their appearance.



He did not add background music. “I don't know music good for this story. I like my voice so when I try to add music, it is louder than me, so I cannot hear my voice” (D). This shows that Andrew did not have the technology skills to make use of the slider in Photo Story 2 to adjust the volume of the background music. He was satisfied with his voice but did not take into account that it did not enhance his digital story.

#### ***4.4.4.5 Evidence of Aspect 5 in Project Two (Andrew).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)

Andrew displayed socially responsible conduct when a classmate showed him an inappropriate image: the image of a man pierced with an arrow and blood oozing from his wounded body. Andrew reacted, “This is too gruesome, no need to show it” and did not look at the image further or discuss it, unlike several other classmates (O). This demonstrated his ability to use digital technologies in a socially responsible manner. There was one instance of this aspect, which was assessed as being at the level of ‘Create’.

#### ***4.4.4.6 Evidence of Aspect 6 in Project Two (Andrew).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

Andrew’s ability and confidence to manage digital information in technology space improved in Project Two. For example, Andrew exclaimed, “Hurray!” when the teacher announced that the students would be working on a digitised story review (O).

He found a few images that he liked and started dragging them from the Internet browser into the opened Photo Story 2. The classmate sitting next to him advised Andrew to save the images into his student folder. Andrew tried to drag the images into the folder. When that did not work, he asked the teacher for help. After the

teacher demonstrated how to save the first image, Andrew succeeded in saving the rest of the images into his folder (O). This shows that he was able to cope with the task after being prompted by the teacher.

Andrew rendered the project independently and saved it in the designated folder in the Pupils Drive. He edited his project once after viewing his own story and receiving advice from his peers that the teacher's name should be written with a capital letter. He managed to edit the project and to render it again, thereby deleting the first draft (O). In his reflection he wrote, "I finally managed to save the file and then find it where I saved it!" (R). These two instances demonstrated that he had significantly improved in this skill.

Andrew initially plugged his earphones with the inbuilt microphone into the wrong audio jack in his MacBook. He initially thought the microphone was not working properly, but after manipulating the plug, he succeeded in solving the problem independently. He was very pleased with himself, stating, "I did it! Hah!" (O). This instance may indicate that he could troubleshoot hardware-related problems independently.

Further, Andrew saved the picture he created in ArtRage into his student folder and followed the necessary steps to import the picture into his Photo Story 2 project. Similarly, he made a 'thank you' image. There were six instances of this aspect, which was assessed as being at the level of 'Understand'.

#### ***4.4.4.7 Evidence of Aspect 7 in Project Two (Andrew).***

(Aspect 7: Ethically use information and media (copyright))

Andrew attempted to acknowledge information and media sources created by others. For example, he provided credits in the last slide of his digital story: "Credits to Ms Churchill, Wikipedia and Internet". He mentioned Flickr in his narration: "This

sources and maybe Flickr” (A). This shows that he could identify the sources but he did not format credits appropriately. There was one solid piece of evidence of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.4.8 Evidence of Aspect 8 in Project Two (Andrew).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

Andrew was able to use most elements of genre to create his own digital story of the same genre. For example, he used the ArtRage software (installed on all school MacBooks) to create a picture of a pig holding a gun (O). His narration for the picture was, “Let me say a short excursion from the story: ‘How dare you disrespect my hat?’ roared Gassler”. He mistakenly said ‘excursion’ instead of ‘excerpt’. Nevertheless, it was an excerpt from the original story (A). During the class discussion of his digital story review, Andrew stated:

I could not find a picture to match my script so I want to make my picture. I started ArtRage because I used it before in the Art lessons. I know how to make a picture in ArtRage and save it in the computer [pointed to the desktop]. I tried to bring it in my Photo Story and it worked! (D).

The researcher transcribed Andrew’s narration from the final rendered story review (see Andrew’s Story Review Transcript). Andrew viewed his story review and said that he did not want to edit it further after the teacher pointed out some spelling and grammar mistakes in the text appearing on the screen. He said, “It doesn’t matter. My friends watched the story and said they liked it” (D; A). These instances demonstrate that Andrew was aware of the target audience and could apply some skills to convey meanings clearly. There were five instances of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.4.9 Evidence of Aspect 9 in Project Two (Andrew).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

Andrew was able to acknowledge technology-related difficulties and demonstrated understanding of the needed skills. For example, he used the ArtRage software to create his picture of a pig holding a gun when he could not locate the image that he needed (D; A). Further, Andrew referred to the digital story he created as a “podcast”. The researcher inquired why he did this and Andrew replied, “I went home and wanted to know more about digital stories. I searched the Internet and I read that it can be called podcast” (D). Even though the word definition does not directly reflect the ninth aspect of digital literacy, this instance demonstrates that he reflected on own technology skills and conducted independent research to find the solution to the technology problem that he faced. There were three instances of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.4.10 Evidence of Aspect 10 in Project Two (Andrew).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Andrew was able to create an integrated multimedia product (a digital story) but was unable to critically evaluate it and edit accordingly. For example, in his reflections, Andrew commented that he coped with the second project much better than the first one. He said that he knew how to use Photo Story 2 and that storyboards helped him when he was working with the application. He mentioned that he liked working by himself and that he was proud that he did not ask too many questions when he experienced difficulties. He emphasised that he had used ArtRage to create his own slide (R; A). However, his classmates and the teacher expressed the view that his

digital story could have been edited to provide more clarity and coherence (E). These instances indicate that although he learnt to use a variety of tool to create digital information, it did not communicate meaning effectively. There was one instance of this aspect, which was assessed as being at the level of ‘Understand’.

#### **4.4.5 Andrew’s digital literacy in Project Three: Show-and-Tell.**

Andrew’s Show-and-Tell is available on YouTube (the video is unlisted not provided in this thesis to conceal the participant’s identity).

##### **4.4.5.1 Evidence of Aspect 1 in Project Three (Andrew).**

(Aspect 1: Determine the nature of information and media needed)

Andrew’s work in this project showed that he had developed the ability to determine the nature of information and media that he needed. For example, he said that he loved his dog and decided to talk about it in his show-and-tell digital story. He explained that there were two reasons for his choice of topic:

I am tired to remember where in the Internet I found my pictures. Like, for Project Two, I did not know where I found those pictures. So in the credits I said I take them from the Internet. If I use my photographs I don’t have to worry any more. These images are mine so I don’t have to credit me. Also, my dog is my best friend. I want everyone to know it (I).

This indicates that Andrew made informed decisions regarding the information and media he would use for his digital story.

In addition, he selected eight photographs out of the 27 that he had taken. He explained his choice: “I first wanted to have many photos of my dog. Unfortunately, a lot of them were not good. So I only choose the best.” Indeed, the majority of the photographs were blurred (A; D). Although the resolution of some of the images was

not high, he could reflect on this, which shows his awareness of the issue. There were three instances of this aspect, which was assessed as being at the level of ‘Create’.

#### ***4.4.5.2 Evidence of Aspect 2 in Project Three (Andrew).***

(Aspect 2: Locate information)

Andrew could navigate and access the information and media he needed. For example, he did not want to use photographs from Flickr because he could not find the photographs he needed. Instead, he took eight pictures of his dog (I). This instance demonstrated his ability to locate information and if necessary, create his own resources for his digital story. There was one instance of this aspect, which was assessed as being at the level of ‘Create’.

#### ***4.4.5.3 Evidence of Aspect 3 in Project Three (Andrew).***

(Aspect 3: Evaluate reliability of information and media content)

Andrew’s ability to evaluate the reliability of information and media content did not develop fully by the time of undertaking this project. For example, he said that he was confident in creating digital stories but he still preferred to use Wikipedia for information because the articles contained the most information for any topic he needed (I). This demonstrates that although he could explain the significance of some criteria for evaluation, he attempted to explain their significance without actually trying to explore this topic further. There was one instance of this aspect, which remained at the level of ‘Understand’.

#### ***4.4.5.4 Evidence of Aspect 4 in Project Three (Andrew).***

(Aspect 4: Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration))

Andrew used various modes to construct meanings. For example, he added titles to his slides, but they were coloured black and lacked capital letters. They represented the key ideas from the accompanying narration, which had remained unchanged since the Project Two. When the researcher asked Andrew about this, he replied, “I like black colour of the texts. It looks cool”. He did try to change the colour and position of the text on the screen, but he kept the black colour in the final draft of the project (D; A). This demonstrates that he could use texts effectively to complement the images.

In addition, Andrew’s narrations were very clear and had no background noise. He recorded his narrations in the empty classroom next door to avoid the background noise produced by his classmates and the volume of his voice was consistent throughout the presentation. He narrated with the appropriate pace and pronounced all words clearly. However, there were grammatical mistakes in his narration and he called his story a podcast, as in the previous project. When the teacher asked Andrew about the process of creating the narrations, he replied that it had taken him a few attempts to record them:

When I previewed my story, I was not happy about my voice. So I recorded maybe three times each slide until I was happy about the results. I dragged the volume slider over and over again until I liked how I sound (I).

This instance demonstrates that he had attempted to ensure that his recorded narration was of a high quality even though it took him a long time. Grammatical mistakes were perhaps due to his language abilities, rather than being unable to evaluate his work and identify those mistakes.

Andrew chose the default motion for six out of the eight slides. He said that he had zoomed in on his face when introducing himself only for the first slide because he

wanted to emphasise that he was the author of the digital story: “I did it for everyone to see that it was me”. He used the ‘zoom in’ function for slide four and recorded the narration, “Let’s take a closer look”. He did not edit the transitions between the slides because he said the computer did it for him, which meant that he left the default transitions unchanged (I; A). He used the zooming option effectively and was able to explain why he did it.

Finally, unlike the first and second projects, Andrew added music for the Project Three. He selected the default classical music and said that he had originally wanted to import a song by one of his favourite singers, but he remembered the issue of copyright (which the teacher had discussed in class) and he decided not to “steal” anyone’s songs. Besides, he did not know how to import audio, even though he had a CD. He said the music made his story look like an advertisement on television: “It was like a music video of a hotel that I saw on TV”. The music volume was adjusted so it did not overpower the narration (I; A; E). This instance demonstrates that his understanding of the importance of the background music had evolved and he could choose it to effectively complement the narration and images.

Nevertheless, this aspect remained at the level of ‘Understand’ because he could have retaken the photographs of his dog to construct the meanings in a cohesive manner, but the final digital story that he submitted demonstrated only average cohesion. There were eight instances of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.5.5 Evidence of Aspect 5 in Project Three (Andrew).***

(Aspect 5: Use digital technologies in a safe and socially responsible manner)



This aspect was NE for Andrew in the third project. This does not mean that it was not developed; rather, it indicates that since he did not search for information and media online, he did not encounter any inappropriate resources.

#### ***4.4.5.6 Evidence of Aspect 6 in Project Three (Andrew).***

(Aspect 6: Manage digital information in a technology space (hardware and software components; troubleshooting))

Andrew confidently managed digital information in technology space. For example, he imported photographs into Photo Story 3. He saved the project immediately onto his USB drive, explaining that he did not want to lose it (D). This shows that his previous experience of losing files had provided a good lesson in how to manage the resources.

In addition, Andrew exported his project in the WMV format, saved it onto his USB drive and tried to upload it to the school's online learning platform, ThinkQuest. However, the size of the file was too large and the upload failed. He then uploaded the digital story to YouTube and shared the link with his classmates and the teacher through email (O). This shows that even though his first attempt to save the digital story failed, he found another way to save and share his digital story. There were two instances of this aspect, which was assessed as being at the level of 'Create'.

#### ***4.4.5.7 Evidence of Aspect 7 in Project Three (Andrew).***

(Aspect 7: Ethically use information and media (copyright))

Andrew could ethically use information and media, explaining, "If I use my photographs I don't have to worry any more. These images are mine so I don't have to credit me" (I; A). Further, Andrew said he had learnt that it was wrong to "steal" or "borrow" other people's photographs from the Internet, which was why he had decided to take his own photographs (I). These instances show that he was able to create and

use his own media to create digital stories. There were three instances of this aspect, which was assessed as being at the level of ‘Create’.

#### ***4.4.5.8 Evidence of Aspect 8 in Project Three (Andrew).***

(Aspect 8: Apply information to design own representations to effectively communicate knowledge to others)

Andrew was able to use most elements of genre to create his own digital story of the same genre. He showed awareness of the target audience but he could only apply some skills to convey meanings clearly. For example, Andrew referred to his storyboards when organising the sequence of images in the timeline in Photo Story 3. He changed one of the photographs after previewing his photographs in the timeline, explaining:

When I looked at all photographs in the computer [timeline of Photo Story 2], I saw that one photograph did not fit in the story because in my storyboards for slide 3, my dog was not in the picture, there was only my bed. I actually had two photographs of my bed: one with my dog on it and one without it. So I accidentally choose one without my dog. But I must speak about my dog so the dog must be in the picture! (I).

This demonstrates that although he used the pictures relevant to his storyline, he did not ensure that the image fitted the narration, which confused the viewers somewhat (O).

The researcher transcribed Andrew’s narration from the final rendered show-and-tell story. The story contained a clear storyline and there was a clear flow of ideas. The story was engaging for the viewers but several images were blurry, which demonstrates that the digital story was not fully effective. There were two instances of this aspect, which was assessed as being at the level of ‘Understand’.

#### ***4.4.5.9 Evidence of Aspect 9 in Project Three (Andrew).***

(Aspect 9: Develop ability in problem solving and reflecting on own technology skills)

Andrew was able to critically evaluate the required technology-related skills and develop them through independent problem solving. For example, he created storyboards in Microsoft Word for his story, explaining that it helped him to create his story review. He sent it to the teacher via email. Although there were some mistakes in sentence construction, there were no spelling mistakes. Andrew explained that he had used the spell check function in Microsoft Word. He sent his first email without an attachment and he sent a second email a few minutes later with the story attached (A; I).

In addition, he took his own photographs and succeeded in importing them from his camera to the school computer and then into his Photo Story 2 (D; O). This further demonstrates that he was equipped with skills to solve technology-related problems independently. There were four instances of this aspect, which was assessed as being at the level of 'Create'.

#### ***4.4.5.10 Evidence of Aspect 10 in Project Three (Andrew).***

(Aspect 10: Use a variety of technology tools to create digital information tools to create digital information)

Andrew was able to create integrated multimedia product (a digital story) with authoring tools, using them to the best advantage. For example, he took eight pictures of his dog. He said, "I looked on the Internet to learn how to move my photographs to the computer. It said I need to have reader [card reader] and I don't have it. May I please borrow one from you?" Once he had the reader, he dragged and dropped the photographs onto his USB drive, stating that he did not want to lose them (D; O).

In his final interview, Andrew indicated that he had thoroughly enjoyed working on all three projects. He said that the first project was very difficult and he had been particularly nervous when he could not locate his saved project. He had enjoyed creating the third project the most because he liked the task, which allowed him to choose his own topic, and he liked the idea of being able to edit his narrations. He said:

I don't like speak in front of my classmates and even teachers. I am afraid to make mistake. With digital story I am not afraid any more because I can record my voice many times until I am happy how I sound. I don't need know good English because I don't need read photographs. And I practise speak for my digital story many times and then finish when I like it (I).

This demonstrates his understanding of the technology tools and the opportunity to edit his work to make it look better and be more effective for the target audience's perception.

In addition, the digital story was created by Andrew independently and it was interesting, which shows that he attempted to use technology tools to the best advantage. There were three instances of this aspect, which was assessed as being at the level of 'Create'.

#### **4.4.6 Summary of the evidence of the aspects of digital literacy across the pre-study and three projects for Andrew.**

##### **4.4.6.1 Pre-study.**

Using the Aspects of Digital Literacy Evaluation rubric (see Section 2.4), the researcher's two critical friends evaluated Andrew's PPT presentation as ineffective. The researcher used the same rubric and evaluated his level of digital literacy at the level of 'Use'; that is, his skills ranged from basic technical competences (e.g., using

computer programs such as word processors, web browsers and email) to more complex skills such as accessing and using knowledge resources (e.g., search engines).

#### ***4.4.6.2 Project One.***

Andrew demonstrated the development of several aspects of digital literacy compared to the pre-study. He attempted to create a digital story using the technology tools demonstrated by the teacher, but he could not solve technology-related problems independently. He attempted to conduct independent research, but he did not go beyond Wikipedia. He considered his language ability the main obstacle in his work, which also affected his confidence when working with technology.

#### ***4.4.6.3 Project Two.***

Andrew demonstrated the development of several aspects of digital literacy compared to the beginning and end of Project One. He could conduct independent research online and at the school library and he demonstrated the ability to create a digital story using some elements of the given genre. He was able to acknowledge certain technology skills that he lacked, but he could not work out how to solve problems independently. He relied heavily on the teacher's feedback and help. He demonstrated strong interest in digital storytelling. His overall digital literacy was at the level of 'Use' with some elements of 'Understand'.

#### ***4.4.6.4 Project Three.***

Andrew demonstrated the development of several aspects of digital literacy during the completion of the third project. He used digital tools to independently create a digital story and he chose to use his own photographs, to avoid copyright issues. Andrew succeeded in troubleshooting and solving technology-related problems independently. Although his photographs did not have a high resolution, he succeeded in effectively conveying meaning through clear narration and the volume of the background music

did not hamper his presentation. His overall digital literacy was at the level of ‘Understand’, with some elements of ‘Create’. A visual summary of the development of Andrew’s aspects of digital literacy, from the pre-study phase to the end of the study, is shown in Figure 4.8.

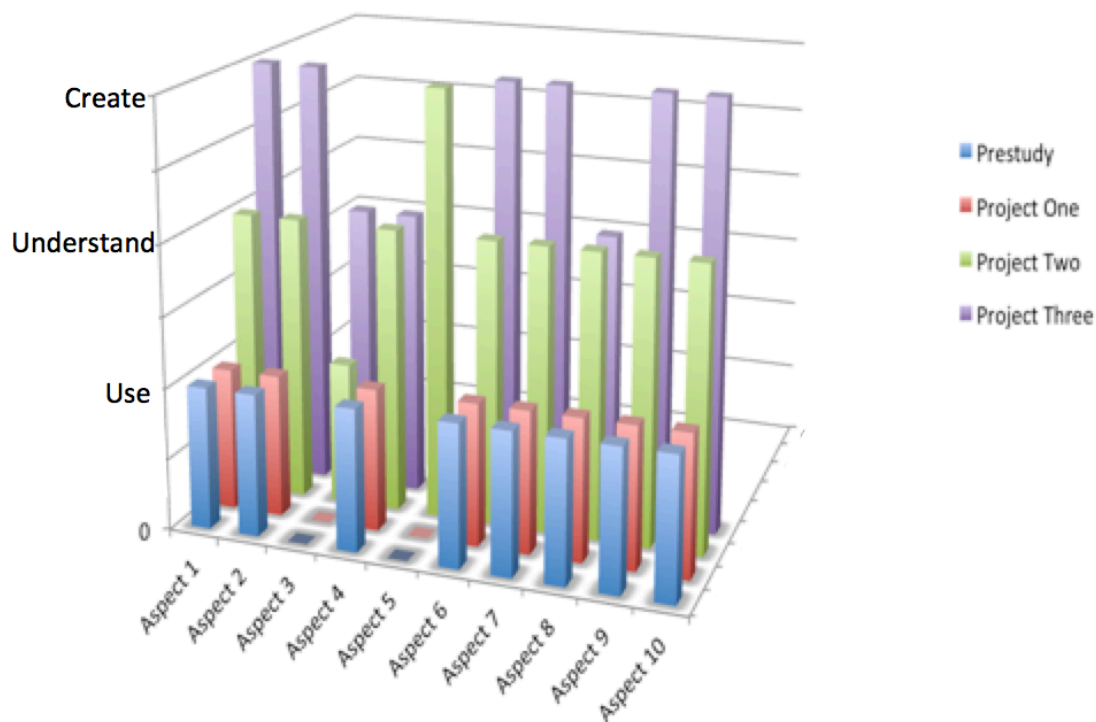


Figure 4.8. Andrew’s digital literacy development.

#### 4.4.7 Factors that inhibited the effective implementation of digital storytelling for Andrew.

Andrew’s lack of confidence in his own abilities, as well as his technology problems, lack of problem-solving skills, inability to read images and inability to evaluate his own work, hampered his progress during the completion of the first project. He displayed increased confidence in his abilities during the course of the second project, although he still relied heavily on the help of the teacher and his peers when solving technology-related problems. His lack of problem-solving skills

continued to hamper his decision-making process, although there was an improvement in relation to selecting images. Andrew attempted to evaluate his own work by looking through the final draft; however, he did not edit his work.

By the end of the study, Andrew had shown a significant improvement in his confidence in his own abilities. He attempted to solve problems independently and often succeeded. His language skills still hampered his work, but he compensated for this with an effective choice of media and an entertaining storyline. His decision to use his own photographs and his selection of a topic related to his personal life allowed Andrew to create a comprehensive and cohesive multimedia project.

#### **4.4.8 Section summary (Andrew).**

After completing all three digital storytelling tasks, Andrew demonstrated the following abilities leading to the development of digital literacies:

- He could create authentic media, using his own pictures.
- He could select background sounds that enhanced his narration.
- He could determine the information and media required.
- He felt empowered to create a presentation requiring narration, due to the opportunities to edit the project as many times as necessary (this is especially important for ESL (English as Second Language) students).
- He had made his best effort to create and share a digital story, even while knowing there was no formal assessment.

The following abilities were not fully developed for Andrew, who was identified as a Creative Presenter:

- The quality of his images was not of a high or acceptable standard, as his focus was placed more on the content than the visual representation.
- Technology-related problems were not being solved independently at the

start of the study, as he was focused on the storyline and content, which resulted in an inability to explore the technology tools.

- As a beginning ESL learner, in the initial stages of learning about digital storytelling he experienced emotional challenges related to difficulty in understanding the language of instruction.

Several themes emerged from the analysis of the coded data. The researcher noted that the longer Andrew worked with technology, the more his confidence improved in using the technology tools to express himself using multiple media. The first project was the most challenging because Andrew considered his language ability an obstacle to creating a digital story. His problem-solving skills improved significantly throughout the engagement with the three digital storytelling projects. He did not fully develop his research skills, but he used creative ways of expressing himself by taking his own photographs and editing his narration and background music until he reached the communicative goal of the project and he took pride in his work. These themes are discussed further in Section 4.6, which presents the analysis of the themes across the three cases in the study.



## **4.5 Chapter Summary**

This chapter reported the results of the analysis for each individual case study student for the pre-study project and the subsequent three digital storytelling projects. The researcher presented the key results of the research in an orderly sequence without interpreting their meaning. The results follow the sequence of the methods described in the methodology. The relevant tables and figures were generated and presented to illustrate the results. The chapter that follows will discuss the analysis across the three case study participants.

## **Chapter 5: Discussion of Results Across the Three Cases in the Study**

### **5.1 Introduction**

This chapter analyses the similarities and differences across the three case studies and identifies the themes that emerged from the data in relation to the research questions:

*RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom? (see Section 5.4)*

*SQ1. What aspects of digital literacy develop through digital storytelling? (see Section 5.2)*

*SQ2. What are the factors that inhibit the effective implementation of digital storytelling? (see Section 5.3).*

The discussion of the findings and cross-case analysis begins by answering SQ1. This provides a logical progression and leads the reader through the process of analysing the aspects of digital literacy as they developed through digital storytelling, of identifying factors that inhibited the implementation of digital storytelling, and consequently of answering the central question of the study.

The digital storytelling activities described earlier in this document promoted the development of aspects of digital literacy among the three participants. The analysis of the aspects of digital literacy across the three cases is summarised in Table 5.1.

Table 5.1. *Aspects of Digital Literacy Across the Three Cases*

Aspect of digital literacy	Stage of the study	Level of digital literacy		
		Ian	Jane	Andrew
1. Determine the nature of information and media needed	Pre-study	UE	UD	UE
	After P1	UD	UD	UE
	After P2	CE	CE	UD
	After P3	CE	CE	CE
2. Locate information	Pre-study	UE	UE	UE
	After P1	UD	UD	UE
	After P2	CE	CE	UD
	After P3	UD	CE	CE
3. Evaluate reliability of information and media content	Pre-study	NE	NE	NE
	After P1	UD	NE	NE
	After P2	CE	NE	UE
	After P3	NE	UE	UD
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration)	Pre-study	UD	UE	UE
	After P1	UD	UD	UE
	After P2	CE	UD	UD
	After P3	CE	CE	UD
5. Use digital technologies in a safe and socially responsible manner	Pre-study	NE	UE	NE
	After P1	NE	UE	NE
	After P2	UD	UD	CE
	After P3	NE	UD	NE
6. Manage digital information in a technology space (hardware and software components; troubleshooting)	Pre-study	UD	UE	UE
	After P1	UD	UD	UE
	After P2	CE	CE	UD
	After P3	CE	CE	CE
7. Ethically use information and media (©)	Pre-study	UE	UE	NE
	After P1	UE	UE	UE
	After P2	CE	UD	UD
	After P3	CE	UD	CE
8. Apply information to design own representations to effectively communicate knowledge to others	Pre-study	UD	UE	UE
	After P1	UD	UD	UE
	After P2	CE	CE	UD
	After P3	UD	UD	UD
9. Develop ability in problem solving and reflecting on own technology skills	Pre-study	UD	UE	UE
	After P1	CE	UE	UE
	After P2	CE	UD	UD
	After P3	CE	CE	CE
10. Use a variety of technology tools to create digital information	Pre-study	UD	UE	UE
	After P1	CE	UE	UE
	After P2	CE	UD	UD
	After P3	CE	CE	CE

This table shows the various aspects of digital literacy that were developed or consolidated through the three students' engagement with the three digital storytelling activities conducted in the sixth-grade English-language classroom. To evaluate the

aspects of digital literacy, the researcher use the model created by Canada's Centre for Digital and Media Literacy (2009) (see Section 2.4 of the Literature Review chapter of this document). The participants in the study were graded in 10 areas (aspects of digital literacy). A given criterion was stated in three different levels of completion or competence from the digital literacy model mentioned above: Use, Understand and Create.

The researcher in this study attempted to create a comprehensive rubric that would allow a teacher integrating digital storytelling in their classroom to evaluate various aspects of digital literacy developed by the students. The integration in the rubric of the three levels (Use, Understand and Create) allowed the researcher to evaluate each of the 10 aspects of digital literacy to answer SQ1 as part of the central research question that guided the study and informed the research design and data collection: *SQ1. What aspects of digital literacy develop through digital storytelling?*

## **5.2 Aspects of Digital Literacy that Develop Through Digital Storytelling**

### **5.2.1 Determine the nature of the information and media needed.**

In the pre-study phase, Ian and Andrew showed evidence of being able to use information and Jane appeared to understand how to determine the nature of the information needed.

The three students lacked some of the skills to determine the nature of the information and media required for Project One. Although they were given a set of photographs to choose from, they were confused with regard to the way the images should be organised to form a logical sequence of events for a story created in a digital format, using the Photo Story 2 application. Jane and Ian carefully examined the photographs, and Jane searched for videos on the Internet and selected the photographs

based on an animation she watched on YouTube. Andrew selected photographs based on how they appealed to him rather than taking into consideration how the visual elements would enhance the flow of his story. Their digital stories were very similar to commonly known tales. Ian's and Jane's choice of photographs was informed by stories already existing online, rather than by the ability to determine what images would suit their multimedia design. Andrew struggled to understand this aspect.

The ability to determine the nature of the information and media needed for a project had improved significantly for all three participants towards the end of Project Two, during which the researcher introduced tools for planning a digital story. Scaffolding, in the form of storyboards and a story map, allowed the students to carefully plan their stories when working on this project. This scaffolding gave them a framework for thinking about how to divide their story review into a sequence of screens, as well as what media to include on each screen. In her study of digital storytelling implementation in science lessons, Werby (2010) emphasised the importance of scaffolding with script writing:

Script writing is not a simple task and film schools typically devote semester-length courses to this topic ... a simple handout, that shows how to format ideas into a script, can help students avoid the most obvious pitfalls of movie making. A short lecture can explain how the script is used during the digital storytelling project. The teacher can approve the students' scripts prior to allowing them to move into the production phase of the project (Werby, 2010, p. 7).

The researcher observed that all three students could determine what nature of information and media they needed after completing their storyboards.

Project Two provided evidence that Ian now understood this aspect and Jane and Andrew had remained at their previous level. Ian carefully selected photographs

from Flickr, a free social repository. Jane drew pictures for her digital story and initially planned to scan them but later changed her mind. According to the discussion transcript, she said, “I feel better using the images from the Internet because my friends all do this.” Both Jane and Ian submitted their storyboards in digital format: Jane filled in the handout, scanned it at home and sent to the teacher as an attachment to her email; Ian used the images from the storyboards for his digital story and explained this choice with, “Why waste time if I can just reuse the same images? I knew what images I need for the digital story, so I planned to use the same images to save time,” he said in his interview. This clearly demonstrates Ian’s ability to determine the media that he needed for his digital storytelling activity. Andrew still relied heavily on Wikipedia as his only information resource and he copied and pasted photographs from the Wikipedia website.

For Project Three, all three students created final digital stories using original elements. Ian created Key Note slides and saved them as JPEG images that he used for his digital story. Jane took screen shots of Facebook and Myspace pages and created a slide in ArtRage. Andrew used his own photographs, which he took and uploaded to use in Photo Story 2.

By the end of the study, all three participants had demonstrated the ability to determine the nature of the information and media required to create a digital story independently. They could skim through the content and decide whether the information and images were useful for the task and they could identify the technology tools needed for the task. However, they could not always decide which image resolution was acceptable.

As Project Two involved scaffolding in the form of storyboards, this developed the participants’ ability to organise their thoughts and predict what they would need

when creating their digital stories for Project Three. Digital storytelling applications such as Photo Story 2 for Windows and iMovie for Mac allowed the students to appreciate the interface for planning their digital stories. They no longer considered pen-and-paper storyboards necessary. For example, Andrew organised all of his images in the timeline of Photo Story 2 in accordance with his storyboards. During the discussion, he said, “I like storyboards. It helps me put images in the Photo Story. It is easy to make the digital story like this”.

All three students showed evidence of using, understanding and creating for this aspect of digital literacy, while Jane showed understanding of this aspect prior to the study, which incorporated the category of Understand.

**Key finding1:** All three students could successfully locate information, reaching the level of ‘Create’ in the third project. Evaluating the required information was not a linear process for all three participants, as they could do this by revising their digital story projects and changing the media and text during the course of the project.

### **5.2.2 Locate information.**

Prior to the study, all three participants showed evidence of being able to use some skills to locate information and they used Wikipedia as the only source of information.

During Project One, Andrew still relied on Wikipedia as the only information resource, while Ian and Jane explored beyond it. For Project Two, Andrew located all of the necessary information in Wikipedia, while Jane and Ian explored a number of websites to find information on the topic. For Project Three, Andrew chose to create a digital story about his dog and collected all of the necessary information and media using a digital camera and by observing his dog’s behaviour. He indicated that, “I think it is easier to make a presentation about my dog because I can collect all information I

need at home”. Ian selected a maths textbook and transferred the information into PPT. He explained his choice: “I am good at maths so I am confident using the textbook. But I rephrased the information”. Jane took screen shots of the Facebook and Myspace banners. She said, “I Googled these social networks as I really like to use them and learn more about their history. I used Wikipedia as I know for sure that the information is correct”.

According to School Libraries in Canada (2001, p. 3), “The teacher’s task is to create opportunities that encourage the development of skills and techniques that instil critical and creative thinking into the handling of a wide range of information, including the Internet”. This current study extends this further and claims that given the immense amount of information available online, students should be taught explicitly how to identify useful information and media and how to work with it effectively. Locating information online may become a tedious task because of the vast number of sources available. It is essential for students to develop the ability to effectively search for the required information within a particular timeframe. For this, they need to be equipped with skills for searching for information in the most meaningful and effective way. They need to identify sources of information and know how to find them (Webber & Johnston, 2000; ISTE, 2007; UNESCO, 2008).

For the digital storytelling tasks conducted in this study, the Internet became the main source of information and the media repository. It became clear that digital storytelling activities promoted the development of the skill of locating information, as the students were able to use search engines confidently and use the best words to define their searches, using theme-specific vocabulary to locate videos on YouTube or in texts. It is interesting to note that Andrew, who was a Creative Presenter, felt more confident about locating information for his show-and-tell project, as he chose to create



a digital story about his pet dog. Ian, who was a Technical Master, could find information for the given topic with ease but he relied on his knowledge of maths for his show-and-tell project.

It is interesting to note that all three students showed evidence of using, understanding and creating as they located information for their project. Ian did not show evidence of Create in Project Three, although he had managed this in the previous project. This could be explained by his choice of a topic that did not require research as all the information was recalled from his memory.

**Key finding 2:** Across all three projects, the three students demonstrated the ability to locate the required information to create digital stories independently, reaching the level of ‘Create’ in Project Three, apart from Ian, who used only his prior knowledge. They could navigate, access information and reflect upon why the information was needed, but they did not use multiple sources of information for all three digital storytelling projects.

### **5.2.3 Evaluate reliability of information and media content.**

Prior to the study, there was no evidence that the three participants could evaluate the reliability of information and media content. Although all three participants acknowledged the importance of copyright at different stages of the study, this aspect of digital literacy did not fully develop for any of them. Andrew’s and Jane’s ability to evaluate the reliability of information and media content was not observed at the beginning of the study or upon completion and both relied on Wikipedia as their only source of information. They started developing awareness of the reliability issue while working on Project Two. For Project Three, Andrew avoided using Internet images, explaining, “If I use my own photographs I do not have to worry about anything. All information and photographs are original”. Similarly, Ian avoided

the issue of information reliability when he created his own presentation in Keynote for Project Three. For Project Two, he ensured that he used ‘.org’ websites for the information and Flickr for images. Jane showed an understanding of the importance of the reliability of information and media content, but said: “Looking for reliable websites takes a lot of time. I don’t always have it”.

Although all of the students developed an awareness of the issue of the reliability of information and media, it remained a challenge that they tried to avoid rather than explore further. Research shows that on the Web, there is no systematic monitoring of much of what is published, except for articles published on reputable websites. Students in this study were not equipped with the skills to identify the origins and authoritativeness of the sources of information and media. As noted by UAF (2014):

Important information, such as dates, author(s), references and alike are not always easy to locate. While a reader can easily note this information in a book or periodical article, the Web user must often search through several pages, if the information is provided at all (para. 10).

Web resources that use hypertext links might not be organised in a linear fashion and students can be easily ‘led astray’ from their topic. This issue caused a lot of difficulties for Andrew, who felt overwhelmed with the amount of information he encountered when searching for sample *pourquoi* stories for Project One and images for the Project Two. To solve this problem, he used his own photographs for Project Three, a show-and-tell about his pet dog. This identifies the need for further inquiries into students’ research skills at schools.

**Key finding 3:** This aspect was not fully achieved by the students, who tended to avoid using material that required referencing and authenticating, rather than trying to identify the criteria for evaluation and to explain their significance. However, it is possible that the students developed increased awareness of this aspect.

#### **5.2.4 Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts.**

Prior to the study, the participants displayed differing levels of ability in analysing, interpreting and using a range of information and media to communicate meanings through multimedia text (text, image, animation, sound, layout and narration). Ian showed understanding of this aspect and both Ian and Andrew could use certain skills; for example, they asked themselves questions such as, Why is this in bold? Should it be in a text box like the key findings?

The three participants could construct text in the form of key words or phrases to enhance their narration for Project One; however, none of them took into consideration the layout of individual slides and did not think the appearance of the text on the slides was important. This was demonstrated through the interviews and the analysis of their digital artefacts. The overall opinion given by the three participants was that images and narration were more important than the text appearing on the screen.

Martinec and Salway (2005) suggested three possibilities for the text–image relationship: text supporting image, image supporting text, and the two being equal (that is, the whole image is related to the whole text). Jewitt (2008) wrote that all modes contribute to the construction of meanings in some way and “no one mode stands alone in the process of making meanings; rather, each plays a discrete role in the

whole” (p. 247). Viewing is not to be understood apart from the other language skills that together form what we might understand as a new literacy.

Digital storytelling supported the development of students’ viewing skills and their ability to use text, images, animation, sound effects, layouts and narration to make meanings and communicate effectively. The challenge here was the students’ lack of ability in identifying key words or phrases to support their images and narration.

By the end of the study, the three participants were able to find meaningful images but they did not perceive the resolution of the image as important. When the researcher asked the participants whether they were satisfied with the quality of their images, they each had replies that showed this attitude. Ian said, “I know that it is hard to find good images. That is why I decided to make slides in Keynote first. I did not want to bother looking for maths-related photographs online”. He preferred to have good-quality but somewhat unattractive images over looking for high-resolution images online. In her interview Jane said, “I think that no matter how good or bad the images are, my viewers could still understand what I was talking about, as everyone knows about Facebook”. Similarly, Andrew said in his interview, “I took photographs of my dog at home. I did not know they were not good until I used them for my final story.”

All three participants could use the default animated components in Photo Story 2. However, only Jane explored customised options by using the ‘zoom in’, ‘zoom out’ and slide transition functions. She explained in her reflections that it was “fun doing something unique”.

The three participants showed an awareness of sound effects when compiling their digital stories. They used the playback option in Photo Story 2 to edit their sounds. They made use of default auditory components (such as sound effects) and

they could explain their purpose. Ian created his own music, which complemented his content. By the end of the study, all the participants had created specific layouts to structure their design components and they had aligned text and images to the margins.

The three participants made use of recording to create their narrations. They used the playback function to edit their narrations where necessary and their voices were projected clearly. Ian and Jane succeeded in understanding this option during the completion of Project One, while Andrew realised that his narration was not clear only after publishing Project One. He carefully planned and recorded his narrations for Projects Two and Three. In the informal interviews, all three participants indicated that narrating was the most fun part of the digital storytelling activities.

The volume of the narrations was not consistent from slide to slide for Ian and Jane. Jane explained: “It all depends on the projector and the computer from which the story is being played in the classroom. When I tested my narration in my laptop, my voice sounded OK”. Ian seconded this by saying, “I agree with Jane”. Andrew’s narration for Project Three was very clear and the volume of his voice was consistent throughout his narrated story. He explained in his interview, “I was embarrassed the first two times when my voice was not good enough, so I tested my story during the recess”.

**Key finding 4:** Overall, the participants made meaningful use of modes to construct meanings, with two students reaching the level of ‘Create’ in Project Three. Ian showed an awareness of the way the different modes complemented each other but chose image quality over other modes, which affected his creative expression. The other two participants created cohesive digital stories, even though their images were of rather low quality.

### **5.2.5 Use digital technologies in a safe and socially responsible manner.**

Prior to the study, Ian and Andrew showed no awareness of the importance of the use of digital technology in a safe and socially responsible manner, while Jane displayed

Interestingly, since all three participants used Wikipedia prior to the study and during Project One, there were no instances of a participant encountering inappropriate material. However, in Project One, Ian indicated in his reflections that he might thought about the appropriateness of images when he discussed Flickr and wrote in his reflections, “I think there can be no inappropriate images there”. When Ian searched for an image of a crossbow and came across an image containing a person being pierced by an arrow, he showed the image to another participant in the study. Although Ian did not use this particular image for his project, his attempt to discuss an inappropriate image with his classmate shows that this aspect of digital literacy was not well developed. Ian’s search for maths-related images did not give rise to finding inappropriate images, which may lead to an understanding that the nature of the content may inform this aspect of digital literacy for students. Interestingly, Andrew displayed socially responsible conduct when Ian showed him the inappropriate image of a man pierced with an arrow and blood oozing from his wounded body. According to researcher’s observation, Andrew reacted, “This is too gruesome, no need to show it” and did not look further at the image or discuss it, unlike his other classmates. However, this was the only instance throughout the duration of the study and it is not possible to provide any generalisations.

There were no instances of this aspect for Jane in Projects Two and Three but in Project Three, she was able to explain the some Facebook regulations, which is why this aspect was at the level of understanding her. It is possible that the nature of the

activities and the researcher's short lecture about the importance of the use of digital technologies in a safe and socially responsible manner influenced the findings of the study.

Similarly, the literature suggests that working with technology and online resources requires students to understand the risks related to online searches, such as knowing how to behave when coming across inappropriate images (ISTE, 2007; UNESCO, 2008; Chauvin, 2003; Australian Communications and Media Authority, 2009). Digital storytelling in this study provided some opportunities for students to exercise social responsibility when working with online media. However, teaching that is more explicit might be necessary, as students may encounter images that could be considered inappropriate in the primary-school context and it is important to help them develop awareness of this issue when conducting technology-enriched lessons.

**Key finding 5:** There were very few examples of this aspect in the data. This could be due to the nature of the projects or the participants' lack of understanding about what constitutes an inappropriate image, which in itself is a contested area.

#### **5.2.6 Manage digital information in a technology space (hardware and software components, troubleshooting).**

Prior to the study, Jane and Andrew were able to manage digital information in a technology space at the level of 'Use', while Ian was at the level of 'Understand'. Managing digital information in technology is an aspect of digital literacy that was greatly supported by digital storytelling. Each student developed the skill of solving various technology-related problems independently. Andrew experienced many difficulties at the beginning of the study because he could not save his work in a designated folder. Initially, he did not ask for help and simply sat at his desk without trying to solve the problem. He said in the interview, "I did not know how to explain

my problem. I did not know the words [terminology] so I got confused”. During Project Two, Andrew saved his work but could not retrieve it. His classmate helped him to solve the problem. When working on Project One, Andrew could not save or import photographs or music files into Photo Story 2. However, towards the end of the study, he was able to use his own CD to download an audio file and use it for Project Three. During the completion of Project Two, Andrew accidentally chose the Windows platform and was surprised that he could not find the Photo Story 2 application.

Ian and Jane tried to solve problems independently by using the Google search engine (Ian) or by approaching the teacher (Jane). Both explained that it was exciting to explore how to troubleshoot independently. Ian said he explored how to use the iMovie application at home and created Project Two both in Photo Story and iMovie, using exactly the same content. He said he preferred iMovie because “it was easier to make changes in the project” (see Ian’s interview). This has also been highlighted by Warlick (2005), who wrote that digital storytelling is easy to implement, as it requires minimal technical skills. In this study, digital storytelling also allowed the teacher, who was also the researcher, to concentrate on the pedagogical aspects of implementation rather than being overwhelmed by students having technical difficulties.

All the participants were able to copy text from a webpage and paste it into a word-processing document (e.g., scripts for the third digital story) and they were able to save and retrieve files in and from the designated folder on the local server and external drives (e.g., USB drives). In addition, they were able to share files with others. Ian and Jane tried to work out how to manage the technology independently by searching the Internet or manipulating the functions of the software (Photo Story 2 for Windows or iMovie for Mac). This aspect of digital literacy developed gradually for Andrew, as he relied heavily on the teacher for help.



**Key finding 6:** By the end of the study, all three participants could confidently troubleshoot software and hardware problems related to the use of digital technology and they could transfer their skills to their peers, reaching the level of ‘Create’ in Project Three. Ian showed exceptional ability in troubleshooting independently from the very beginning of the project, while Jane and Andrew developed this aspect gradually throughout the three projects. It is remarkable that Andrew, who lacked confidence in the beginning of the study and relied heavily on the teacher’s help, succeeded in overcoming his fear of working with technology.

### **5.2.7 Ethically use information and media (copyright).**

Prior to the study, Ian and Jane were at the level of ‘Use’ and Andrew did not show any evidence of how to use information and media ethically. As seen in the questionnaire and researcher observations, during Project One, Ian and Jane continued to have little or no awareness of copyright, while Andrew started developing some awareness of it. Ian collected images for Project Two from Flickr and attempted to provide references to all images. He deliberately used his own Keynote slides and converted them into JPEG format to observe the copyright. “I did not want to search for math images online. These are my own images,” said Ian in the interview. The researcher observed that Jane provided references to some of the websites she had used but she did not use the correct format; rather, she copied the link to the website or the Google search engine. After completing Project Three, Andrew acknowledged that he understood the importance of copyright: “That’s why I used my own photo. So I don’t need to worry about stealing anyone’s work,” stated Andrew in the interview.

This aspect is also highlighted in the literature. School Libraries in Canada, (2001) states: “All teachers are entrusted with the responsibility of educating students on the ethical use of information.” This claim has been supported by other educational

institutions and researchers in the field, such as Webber and Johnston (2000), ISTE, NETS-S (2007), ALA (2008), Australian Communications and Media Authority (2009) and Florida Technology Literacy Profile (2009).

**Key finding 7:** The analysis of the study results demonstrates that the three participants developed an awareness of copyright and the ethical use of information and media, with Ian and Andrew reaching the level of ‘Create’ in Project Three. In accordance with the teacher’s requirement, they attempted to use royalty-free information created by others for Project Two, but they did not document the links and dates when they retrieved the information. They also used their own images to avoid copyright issues.

#### **5.2.8 Apply information to design own representations to effectively communicate knowledge to others.**

Prior to the study, Ian understood how to apply information to design his own representations to effectively convey knowledge to others, while Jane and Andrew could use only some elements of this aspect. Across the three cases, their ability to effectively communicate their knowledge to others was at different levels throughout the study, mainly depending on how much awareness of their audience they had, as one of the characteristics of effective communication. During the completion of Project One, both Ian and Andrew remained at the same level while Jane improved her ability in this aspect. Ian and Jane both reached the highest level, ‘Create’, in Project Two, but neither of them reached the same level in Project Three. Ian’s third project consisted of 34 images containing information on maths problems. One student said, “It is too boring. Maybe it’s interesting for those who like math, but I am not a math fan so I don’t really find it interesting”. This was seconded by a peer who liked maths, who

said, ‘Well, although I also like math, I am not sure if this is a good topic to share with us’. Jane’s narration was not clearly audible; a peer commented, “I think she should speak clearly because I cannot understand everything that she says”. Andrew’s final project was a digital story about his dog. However, after viewing the project, the researcher observed that a few peers commented, “The story is somewhat interesting but the pictures are not very clear.”

Hobbs (1998, 2007) highlighted that media literacy allows students to communicate messages in a variety of forms. Redmond (2012) seconded this by stating, “Media literacy education extends knowledge and skill competencies from reading and writing print texts to include analysis of texts in all forms”. Similarly, the National Association for Media Literacy Education (NAMLE, 2014) summarised the importance of media literacy by claiming that modern information technologies “communicate to us through a powerful combination of words, images, and sounds”. The association called for the need to develop a wide set of literacy skills that would help people understand the messages they receive and use technology tools to design and share their own message. Digital storytelling activities designed by the teacher, who was also the researcher, provided opportunities for the participating students in this study to express themselves creatively and communicate meanings.

**Key finding 8:** The three participants were able to use elements of various genres to create their own pieces of information of the same genre, but their lack of consideration of the target audience meant they did not reach the level of ‘Create’ in the final project. Awareness of the target audience remained an issue for all three participants (e.g., image resolution, clarity of voice projection and attractiveness of content) and this affected the viewers’ appreciation of the digital stories.

**5.2.9 Develop ability in problem solving and reflecting on own technology skills: manage technology (hardware and software components, troubleshooting, connectivity between devices, and connectivity with network).**

Prior to the study, Ian was at the level of ‘Understand’, while Andrew and Jane were at the level of ‘Use’. Andrew heavily relied on the teacher’s help and sought feedback on his work throughout the study. However, he started developing problem-solving skills towards the end of the study. His language ability no longer affected his learning because although he could still not use the correct technology-related terms, he could explain what he needed by demonstrating it on the screen. He said, “If I have to make another digital storytelling project, I will be able to do it by myself,” claimed Andrew in the interview. Ian grasped the concept of digital storytelling quickly and reached the level of ‘Create’ during Project One and maintained this level in the other projects. Jane’s and Andrew’s ability to solve problems independently and reflect on their own technology skills developed gradually through the study, reaching the level of ‘Create’ in the final project. According to NAMLE (2014), “Being literate in a media age requires critical thinking skills that empower us as we make decisions, whether in the classroom, the living room, the workplace, the boardroom, or the voting booth. All three participants could solve problems independently by the end of the study. Further, they were able to critically evaluate the required technology-related skills and they attempted to solve problems independently.

**Key Finding 9:** By the end of the study, the three participants exhibited increased confidence by solving problems independently, reaching the level of ‘Create’ in the final project. Ian and Jane demonstrated the ability to locate the information they needed and to find instructions online, while Andrew preferred real-life tasks that did

not require much research.

#### **5.2.10 Use a variety of technology tools to create digital information.**

Prior to the study, Ian was at the level of ‘Understand’ for this aspect, while Andrew and Jane were at the level of ‘Use’. Towards the end of the study, all three participants demonstrated the ability to create integrated multimedia products with authoring tools. Ian used Microsoft Word, Keynote, Photo Story 2 and iMovie at different stages of the study. He converted Keynote slides into JPEG images after conducting independent research online. He explored cropping tools in iMovie to edit his photographs and he used a USB drive to back up all of his work. In addition, he explored the functions of GarageBand independently and created music to accompany his final project. Jane explored ArtRage and taking screen shots when working on her final project. Further, she used Microsoft Word to record her findings when working on the Project Two. Andrew used his own camera to take photographs and uploaded them to his computer. He later used the photographs to create his own original digital story. He then used Microsoft Word to create a script for the story. Andrew’s final project was saved onto a USB drive and uploaded to the Pupils Drive.

According to the Florida Technology Literacy Profile (2009):

Technology literacy is the ability to responsibly use appropriate technology to communicate, solve problems, and access, manage, integrate, evaluate, and create information to improve learning in all subject areas and to acquire lifelong knowledge and skills in the 21st century.

The participating students developed an understanding of what a computer can do and an appreciation of the limitations under which computers operate. Through their engagement with the digital storytelling activities, they developed an ability to use a variety of technology tools to create digital information (e.g., Photo Story 2, Microsoft

Word, iMovie, Keynote, GarageBand and ArtRage). Ian used these tools to the best advantage for Project Two, when he independently created the second version of his digital story in iMovie. This is in line with the Singapore Ministry of Education ICT Standards Key Stage 2 (2007), the General Capabilities in the Australian Curriculum (2012) and the Florida Technology Literacy Profile (2009) guidelines, which emphasise the importance of technology tools skills that enable students to solve problems and carry out tasks.

**Key finding 10:** The three participants developed the ability to employ various technology tools to create their second and third digital stories, reaching the level of ‘Create’ in the final project. They developed an understanding of what a computer can do and an appreciation of the limitations under which computers operate. In addition, the participants developed an ability to use a variety of technology tools to create digital information.

### **5.3 Factors that Inhibit the Effective Implementation of Digital Storytelling**

The implementation of a curriculum in the classroom is mediated by a range of issues that can cause classroom practices to deviate significantly from the goals of the curriculum. Digital literacy learning can be affected by both curricular and extracurricular constraints. Kwek et al. (2007) stated that when the English-language syllabus is implemented in Singapore’s classrooms, it applies “a narrow range of textual forms and organisational ‘rules’ that students are asked to reproduce” (p. 74). Further, they state that new literacies are required for representing through multimodal texts, but they warn that such literacies in teaching and learning are rarely practised in the classroom. This problem became obvious during the course of this study. The

factors that inhibited the effective implementation of digital storytelling in the sixth-grade English-language class are examined below.

### **5.3.1 Limited focus on digital text.**

The current English-language syllabus for Singapore's primary schools does not distinguish explicitly between literacies for print and screen, but it does provide for digital literacy learning. This study demonstrated that although digital storytelling as a tool for digital literacy learning was integrated effectively in the teaching syllabus for the class that participated in the study, there were limited multimedia resources for the teacher to use in her lesson planning. The school curriculum did not have a repository of digital resources, which increased the teacher's preparation time and effort. As the term 'digital story' has a strong association with print-based rather than technology-based material, this association is likely to encourage curriculum designers, school leaders and teachers to favour the use of the former as a means of developing reading and writing skills, while ignoring digital literacies. Kress (2006) underlined the importance of screen literacies, while Merchant (2007) suggested that "what may be called digital literacy can be quite different in character from print literacy" (p. 118). For Merchant, digital literacy includes the communication of meanings through digital artefacts created and delivered via computers and other technologies. A focus on screen literacies would allow teachers to have a clearer focus on digital literacies involving digital multimodal texts.

**Key finding 11:** Limited emphasis on digital literacy and lack of multimedia resources affected teacher preparation time and effort but did not detract from the learning about digital literacy that took place through the storytelling activities.

### **5.3.2 Sociocultural factors.**

Students who are exposed to teacher-centred teaching often become heavily dependent on the teacher, with teacher-dominated and -directed instruction allowing students little opportunity to use their initiative and work independently. Andrew, who had been exposed to teacher-centred practices previously during his studies in China, said he felt overwhelmed by digital storytelling during the initial stages of the study and especially by the first task, which required him to make decisions regarding the storyline, select images and solve technology-related problems. He waited for the teacher to help him with the technical problems and he was unable to evaluate his own work. The second project, which included scaffolding with a story map, storyboards and provided text, made Andrew feel more at ease and allowed him to explore technology and start developing some independence. This goes in line with Herrington, Reeves and Oliver's (2010) suggestion that scaffolding may become a strategy "that may assist students who are reluctant to engage with student-centered and problem-based tasks" (p.95). During the completion of the third digital storytelling project Andrew demonstrated independent thinking and problem solving, as well as confidence with exploring the use of digital technologies.

This is in line with the literature. According to Chew (2005), digital literacy learning requires student-centred pedagogical practices, as learning outcomes cannot be achieved simply by instruction and memorisation. The development of creativity, independent thinking, group work and other forms of student-centred engagement in classrooms are some of the suitable strategies for achieving the learning outcomes. Chew further suggested that students should be engaged in working on relevant tasks that require them to make meanings, communicate through digital text and investigate language use through technology. However, there are other indications in the literature



that some pedagogical practices across the world may not support independent learning through digital literacy. For example, Watkins and Biggs (2001) wrote that English-language teaching in China is dominated by direct instruction, whole-class lectures and the teacher's interpretation of texts for students.

**Key finding 12:** Digital literacy learning requires student-centred pedagogical practices, as learning outcomes cannot be achieved simply by instruction and memorisation. A teacher needs to resist the temptation to answer all technology-related questions from the students and allow the students to solve problems independently.

### **5.3.3 Lack of an appropriate multimodal assessment.**

The lack of an appropriate multimodal assessment strategy and the examination culture of Singapore's classrooms have a strong mediating influence on digital literacy learning. Research suggests that the types of assessments in schools influence the teaching pedagogy. The lack of appropriate multimodal assessments might predispose teachers to continue with traditional practices. The existing English-language syllabus in Singapore is not accompanied by an assessment strategy that reflects the nature of projects undertaken with the use of multimedia. Although teachers use rubrics for assessments, the results often do not affect students' final grades. According to Vincent (2006), the current assessment strategies are monomodal and despite efforts to increase multimodality in primary-school classrooms, assessments in most English-language classrooms emphasise 'words' above everything else.

It is noteworthy that the lack of an appropriate multimodal assessment did not affect the teacher, who was an enthusiastic ICT pioneer at the school in the study. However, the lack of formal multimodal assessment indirectly affected one of the participants, Jane, and inhibited her development of digital literacies. Once she realised that her final digital story would not be assessed formally and would not contribute

towards the final grade, she demonstrated lack of interest and created a somewhat careless digital story. Thus, teachers need to possess an adequate means of assessing multimodal texts; otherwise students are unlikely to accept multimodal texts as a normal means of text production.

The examination culture leaves little space for innovative and student-centred pedagogical practices. Although Singapore's education system has undergone a series of important reforms since the time when this study was conducted, and viewing and representing through digital multimodal texts have been added to the current English-language curriculum, the examination culture is still predominant in Singapore and to date, challenges to digital literacy learning in this school remain.

**Key finding 13:** Assessment influenced the effort and thought given to digital storytelling projects by the three students. For Jane, lack of assessment was demotivating, as she did not want to put a lot of effort into a project that would not be formally assessed; however, for Andrew, this was highly motivating, as he did not feel the pressure of being assessed formally and therefore was free to explore various multimedia elements in class and at home without worrying about making mistakes.

#### **5.3.4 Students' perceptions of their own language proficiency.**

Studies conducted on ESL students' perceptions of their own English-language ability show that students may attribute their difficulties in class participation and required work completion to a lack of confidence in the language skills of reading, writing, listening and speaking (Ferris, 1998; Lee & Carrasquillo, 2006). Similarly, one of the participants in this study, Andrew, who had joined the school in the study one year prior to the beginning of the study, explained the difficulties that he encountered by his inability to use English proficiently. He had come from China, where he studied in a school where the language of instruction was Putonghua (Mandarin Chinese). He

spoke very little English when he first joined the school and at the time when the study started, he scored 52% in English; that is, he barely passed his examinations and if he did not score 55% in the year-end examinations, he might not have been promoted to the affiliated secondary school.

On various occasions at the beginning of the study, Andrew said that he did not understand the texts and was confused when searching the Internet when it required using English. However, it is remarkable that upon completing the third digital storytelling project, Andrew had gained confidence and even expressed that digital storytelling helped him learn how to plan his pen-and-paper writing, as he could visualise the storyline, similar to the way he visualised the storyboards that he created for Project Two. He said, “I don’t need know good English because I don’t need read photographs. And I practise speak for my digital story many times and then finish when I like it” (see Andrew’s interview)

**Key finding 14:** In a classroom with mixed English-language-proficiency students (e.g., native and non-native speakers), digital-storytelling-enriched lessons require scaffolding. The scaffolding was in form of storyboards to help the ESL students overcome the challenges caused by their lack of language proficiency. This requires extra teacher preparation time and understanding of the principles of differentiated learning instruction.

### **5.3.5 School logistics (availability of computer laboratories, timetabling constraints and lesson interruptions).**

Schools logistics may be an important factor that inhibits the development of digital literacies in students. The availability of computer laboratories, timetabling constraints and lesson interruptions may lead a teacher to opt for an alternative to a digital storytelling activity. Development of skills in digital literacy requires “constant

exposure to technology, and where there are time constraints on the part of the learner and the teacher, the teaching of such skills may be curtailed” (Mutula & Wamukoya, 2007). Similarly, Dwyer (1986) noted that one of the obstacles to the use of ICT in classrooms is when teachers experience “intense inner conflict” when integrating technology into their lessons. This might be because technology has been perceived as secondary and other priorities, such as syllabus coverage and examination preparation, may take precedence over digital literacy. Although Dwyer wrote about this factor as long ago as 1986, this factor can still be an impediment to the development of digital literacy by primary-school students now.

Digital literacy teaching in this study required the teacher to be digitally literate herself and to be a confident technology user, to be able to plan digital storytelling activities while also considering lesson interruptions and time constraints. The teacher-researcher in this study was confident in integrating technology in her lessons. If digital storytelling activities planned by the teacher were to be conducted elsewhere in a Primary 6 English-language classroom, a teacher who lacks similar digital literacy proficiency might opt to exclude digital storytelling activities from his or her teaching. Instead, he or she might deliver the lessons in a traditional way, such as telling the students to write or typewrite an essay and read it aloud to the class.

**Key finding 15:** Lack of resources (e.g., availability of computer laboratories), timetabling constraints and lesson interruptions do not necessarily create a challenge for a teacher who is equipped with digital literacy skills.

## **5.4 Digital Storytelling as a Means of Supporting Digital Literacy Learning in an Upper-primary-school English-language Classroom**

Contemporary text and communication are increasingly multimodal; hence, literacy requires a blend of skills in speaking, listening, reading, writing, viewing and representing, to be fully functional. Kress (2004) emphasised a key aspect of these developments as being a move from the dominance of the book (or print-based media in general) to the dominance of the screen medium (computer screens in particular). Kress (2006) noted that the new medium of the screen makes it “easy to use a multiplicity of modes, and in particular the mode of image—still or moving—as well as other modes, such as music and sound effects for instance” (p. 5). This leads one to think about how literacy learning could be extended to encompass the skills required to specifically view and represent (make meanings) through digital multimodal texts. In the context of this thesis, this aspect of literacy is referred to as ‘digital literacy’, which is not an alternative or replacement to traditional literacies; rather, it is an extension that contributes to the overall literacy required for working, learning and socialising in the contemporary world.

As this is a case study, the researcher did not aim to uncover all possible patterns (Yin, 2009). It is important to note that there may have been biases in the context of this study (a sixth-grade English-language classroom) and any patterns or themes emerging from the study may or may not be found in a similar study conducted in the context of another subject (e.g., science or maths).

During the course of this study, the researcher identified eight themes with regard to the way digital storytelling supported digital literacy learning in the class participating in the study. Instances of these themes emerged for all three cases in the study.

#### **5.4.1 Engagement.**

Contemporary pedagogical approaches suggest that teachers need to plan student-centred activities in which learning is more *situated*, *active* and *engaging* (e.g., Brown et al., 1989; Dwyer et al., 1985, 1998; Grabinger, 1996). The transformation to student-centred practices requires technology to be placed in the hands of learners as a tool to *learn with* rather than as a tool to *learn from* (Hokanson & Hooper, 2000; Jonassen & Reeves, 1996). In the classroom participating in the study, digital storytelling encouraged the students to work with technology and use a wide spectrum of technology tools to plan, produce, present and review a digital story.

The three participants in the study displayed high levels of engagement in the digital storytelling activities. Ian was engaged right from the first project and his interest in the digital storytelling tasks was evident through his desire to learn new technologies and striving to complete the tasks. Jane's interest in the digital storytelling activities was maintained as long as she thought the final projects were contributing to her final English-language grade. When she realised that the third project was not going to be assessed, she lost interest and created a rather short digital story that met all of the guidelines but lacked creativity. Andrew, an ESL learner, developed greater interest in digital storytelling when he knew that his work would not be assessed. He explained, "I am struggling with English. Every English-language lesson, I am worried that I will not understand something. So, digital storytelling is great because I don't need to worry as it is not an exam" (see Andrew's interview).

The experience gave the students multiple opportunities during the course of the study to increase their skills in working with technology and in turn, to increase their digital literacy. In the context of this study, technology is seen as an intellectual

partner (Salomon et al., 1991) and a tool that supports learners’ “cognitive operations that they might not have been capable of otherwise” (Lim, 2006, p. 3).

**Key finding 16:** Digital storytelling engaged students in tasks, which led to the development of digital literacy. Digital storytelling activities harnessed the participants’ interest in learning with technology. One participant, Andrew, liked this form of expression very much, as it allowed him to plan and rehearse his representations until he was satisfied with his work; Jane showed interest mostly when she thought that digital storytelling would be formally assessed; Ian went beyond the teacher’s expectations, as he also explored other technologies that could be used for the purpose of digital storytelling (e.g., iMovie and Keynote).

#### **5.4.2 Meaningful context.**

The digital storytelling activities involved authentic activities that helped the three participants in the study to build a greater understanding of the content and skills developed by engaging with the tasks. It helped to merge their existing knowledge and skills with the skills and competencies outlined by the general objectives of the lessons—in this study, developing aspects of digital literacy. Images provided by the researcher for the creation of digital *pourquoi* stories allowed the three participants to make meanings of the images and use them in their own stories to create new meanings and convey them to the viewers. The ability to manipulate images in the timeframe of Photo Story 2 allowed the students to experiment with the images and change the storyline until they felt that the story was complete. Andrew found this the most challenging, due to the lack of written or oral texts, which initially confused him. As he continued working with digital storytelling, he began to express himself with greater confidence and his ideas had a clearer shape. The third project allowed the students to choose their own topic of interest, which contributed to the creation of meaningful

stories for all three participants. However, unlike Jane and Andrew, Ian selected a topic that was of interest to potentially a very small group of viewers, as his digital story on a maths concept was not very interesting to the target audience.

These findings are supported elsewhere in the literature. In particular, digital storytelling can be conceptualised as “constructionism” or “learning by making” (Harel & Papert, 1996). Building on the theories of constructivism, the students in the study actively constructed knowledge from their experiences, especially when working on the show-and-tell project. This construction of knowledge occurred when they were engaged in building personally meaningful objects (Kafai & Resnick, 1996). For example, Ian’s final digital story was about his favourite topic (a maths problem), whereas Jane chose the topic of Facebook and Andrew created his digital story about his pet dog. Knowledge construction in this context also occurred when the students were consciously engaged in constructing external artefacts that they could reflect upon and present to others. Han and Bhattacharya (2001) suggested that “learning by design” is a form of constructionist learning and that students design artefacts for a pre-selected target audience. In the context of this study, the digital story became such an artefact.

**Key finding 17:** Digital storytelling provided a meaningful context for developing students’ digital literacy. Show-and-Tell, *Pourquoi* Story and Story Review completed in the process of digital storytelling provided the students with opportunities to connect with the world and allowed them achieve tangible products (e.g., digital stories) that were shared with their community (e.g., peers and teachers). Potentially, these digital stories could also be shared with the world (e.g., on YouTube).



### 5.4.3 Structure to work with media.

The three digital storytelling projects had different goals that would all lead to the development of digital literacy in the students. Project One, the *pourquoi* story (narrative genre), was intended to help the students develop or improve their technology skills, which varied according to their prior experience with technology at school and at home. It also aimed to help the students develop aspects of visual literacy (the ability to read images and use them to create new meanings). According to Han and Bhattacharya (2001), students immersed in learning-by-design activities (in this study, the digital storytelling activities) become more engaged in learning because they “become more accountable for their learning through designing, sharing, piloting, evaluating, modifying their work and reflecting on the process”. The three students approached this task in different ways. Ian used all of the given images and kept changing the images in Photo Story 2 until he had constructed a story that made sense to him. While keeping in mind the images provided by the teacher, Jane researched *pourquoi* stories on YouTube and compared and analysed them until she had created a meaningful story. Andrew struggled with the storyline and due to his lack of technology skills, jumbled up the slides, which affected the final rendered digital story. This first project helped the students conceptualise the digital storytelling process, read images and explore a digital storytelling technology tool.

Project Two, the digital Story Review (response genre), had a clear structure and scaffolding in the form of story maps and storyboards created by the students. They developed a story map, or what Ohler (2004) calls a “visual portrait of a story”. The students’ story maps became visual representations that displayed the key events and progression of the story: beginning, tension, conflict, resolution and closure. The planning then moved to the construction of a set of storyboards as a blueprint for

producing the digital story. The storyboards provided information about each scene from the story, the media that needed to be included and the narration to accompany the scenes. The storyboards were also subjected to review and revision (see Storyboards for ‘William Tell’). The text that was given to the students was short and aimed at developing their research skills to help them identify the information they needed and to locate it and evaluate its reliability. All three students said that this task provided clear guidelines and a clear structure, which helped them to create their digital stories. This second project helped the students develop research skills and broaden their understanding of the media elements in a digital story.

Project Three, which was intended to consolidate the students’ digital literacy skills (aspects of digital literacy developed through the engagement with the study), allowed the students to use their imagination and creativity and create stories for Show-and-Tell (a story without a predefined genre). Jane and Andrew created engaging stories, while Ian’s story, although well structured, did not hold his classmates’ interest (see Peer Evaluation). Nevertheless, this third project provided opportunities for the students to consolidate all the skills required for digital storytelling.

**Key finding 18:** Digital storytelling activities provided a clear structure for learning and consolidating aspects of digital literacy. Each project successfully facilitated different aspects of digital literacy. In brief, the first project provided images that allowed the students to develop and improve aspects 1, 2, 4, 6 and 8. The second project included scaffolding to provide opportunities to develop and improve aspects 3, 5, 7 and 8. The third project aimed to develop, improve and consolidate all aspects of digital literacy, particularly 9 and 10 (see the Aspects of Digital Literacy rubric).

#### **5.4.4 Creative expression in multimedia format.**

The three participants showed varying levels of creativity when working on the projects. For Ian, a creative story meant a story with clear images, a clear structure and his own images, albeit not very attractive ones. The second story, scaffolded by the researcher, was his most creative because he knew what was expected of him. Jane's most creative story was the digital *pourquoi* story, as she improved her analytical skills by contrasting and comparing similar stories online. For Andrew, the third project was his most creative because by the time he embarked on it, he had significantly improved his technology skills and gained confidence in creating digital stories, especially because he could edit his narrations as many times as he needed until he was satisfied with the final result.

Digital literacy learning is a requirement imposed by the wide development and application of new technologies for communication and representation (Gleva & Bogan, 2007; Huffker, 2006; Kress, 2006; Resnick, 2002). The Internet and emerging tools and technologies are transforming the way we work with information and the way we communicate. Today, the Internet is flooded with digital text that is consumed, produced and published not only by traditional 'information authorities' but also by ordinary Internet users. Individuals can now easily publish and distribute digital text to millions of others around the world via the Internet. This significantly increases one's ability to be heard and seen. In addition, the speed at which new information is published and updated has significantly increased, while emerging mobile phone applications allow individuals to remotely publish content as and when they wish to do so. This means that ordinary people are now able to provide new information by expressing themselves creatively through digital multimodal texts.

**Key finding 19:** Digital storytelling stimulated creativity in students working with multimedia to complete each project. The three digital storytelling projects supported the development of the 10 aspects of digital literacy that the students will be able to build on and transfer to their life in the broader community and their future development.

#### **5.4.5 Work with technology tools.**

The three participants worked with the technology tools suggested by the researcher (Photo Story 2) and at different stages of the study, they each independently explored and applied other technologies that were not introduced in the lessons: iMovie, GarageBand and Keynote (Ian); ArtRage (Jane); and Paintster (Andrew). They also used technologies they had learnt before engaging with the digital storytelling activities: email and Microsoft Word.

Digital storytelling engaged the students in the study to work with technology and use a wide spectrum of technology tools to plan, produce, present and review a digital story. The digital storytelling activities helped the students to increase their skills in working with technology and in turn, to increase their digital literacy. In this context, technology was seen as an intellectual partner (Salomon et al., 1991) and a tool to support learners' 'cognitive operations that they might not have been capable of otherwise' (Lim, 2006, p. 3). Technology used in this way was a tool for students to create digital artefacts that represented their knowledge and ideas. The transformation from teachers being in control of technology and technology as instructional tools to learners as active technology users was an important strategy for student-centred learning in the course of this study. It could lead not only to advancements in the learning of curriculum content (the three types of stories—*Pourquoi*, Story Review and

Show-and-Tell), but also to the preparation of students for the world outside the school environment.

**Key finding 20:** Digital storytelling tasks provided opportunities for the students to work with various technology tools. The students not only learnt technology tools suggested by the teacher but also explored and applied other technologies independently.

#### **5.4.6 Research.**

By planning the stories, the three participants searched for, located and evaluated pertinent information and media. They developed an awareness of copyright issues, although Ian and Andrew chose to use only their own images for the third project, explaining that this was a way to avoid copyright issues. Conducting research also promoted the use of technology to copy, paste, save and retrieve information and media.

The enormous growth in information available on the Internet, as well as the spectrum of engaging Web 2.0 applications (e.g., Facebook, Friendster and Myspace), has resulted in an increase in the information needs and expectations of ordinary people. For example, individuals now expect information to be rich in modalities and to be delivered not just via computers, but also via a range of devices, such as iPods, mobile phones and iPads. As a result of the types of information that are now being consumed, through the processes of consuming information and an increased urge to create rather than just consume information, these individuals are distinctly different from older generations and people who are not active technology users in terms of their ability to work with information. Many of these individuals are school students. Unlike most of their teachers, they have been active technology users (e.g., through electronic

toys, digital games, mobile phones and the Internet) and digital ‘content creators’ from a very early age (McLellan, 2006).

To keep up with the information age, students need to be exposed to a variety of research techniques to improve their research skills, especially when searching for information online. The digital storytelling activities designed for this study provided research opportunities and guided the students towards developing research skills such as the ability to determine, locate and evaluate the validity of information found online.

**Key finding 21:** Digital storytelling tasks promoted the development of research skills.

The second project in particular required a large amount of online research into an historical event—a task with which all three participants coped well. One participant, Jane, conducted research when planning and working on her third project, while Ian relied on his own knowledge of the subject and Andrew chose an authentic topic that did not require research.

#### **5.4.7 Critical thinking and problem solving.**

The digital storytelling practices in this study were examined as a design-type of problem-solving project. For Jonassen (2000), design-type problems have unclear goals and no predetermined solution paths and they require the integration of multiple knowledge domains as well as commitment and self-regulation by students. Hence, Jonassen recommends that students develop their own system for evaluating their emerging designs. The students in this study were given opportunities to view and edit their digital stories during the process of working on them and to reflect on their learning upon completion of each project, thus developing their self-evaluation skills. This led to increased independence and self-regulation in problem solving and learning during each subsequent project.

The three participants had varying abilities to think critically and solve problems, based on sociocultural factors and their prior experiences with technology. For Ian and Jane, who had been in the participating international school since kindergarten, critical thinking and problem solving occurred when solving technology-related problems or when making decisions regarding the use of images (e.g., in the first project). However, Andrew experienced difficulties that related to his previous educational background, as he came from a school where teacher-centred lessons were the norm and students were given ready-made answers and drilled for exams, rather than receiving opportunities to try to solve problems independently. Andrew especially struggled with the first project, during which he kept asking questions related to technology issues such as microphone connectivity to the processor. He struggled to create content for his story using the given images. His ability to think critically and solve problems independently increased through his engagement with the digital storytelling activities.

Similarly, Roth (1996) identifies the key benefits of design activities in which students learn to manage the complexity of ill-structured problems. While engaging in digital storytelling, the students not only designed a story but also engaged in the processes of planning and delivering their project outcomes. Roth's research confirmed these processes as being mediated by emerging designs created by the students themselves, which allow them to construct and test their knowledge. Similarly, the participants' learning in this study was not exclusively represented in the final products but also in the process of designing. In particular, the planning process forced them to make careful decisions and to reflect and engage in research as it is conducted in real-life problem-solving projects.

**Key finding 22:** Digital storytelling enhanced the students’ skills in critical thinking and problem solving. Through the process of actively analysing, evaluating, synthesising and applying information obtained via experience (e.g., manipulating media in Photo Story2), reflection (e.g., written student reflection), communication (e.g., class discussions) and reasoning (e.g., making decisions if any editing of the digital stories was required), the participants developed skills in critical thinking and problem solving.

#### **5.4.8 Traditional literacy.**

The three digital storytelling activities were planned with consideration of the sixth-grade English-language syllabus. The syllabus required the students to write a *pourquoi* story (narrative genre), a story review (response genre) and a show-and-tell (a story without a predefined genre). One of the benefits of storytelling is that it provides opportunities for expression. In its *Position statement on storytelling*, NCTE (1992) stated, “everyone who can speak can tell stories”. This allows students who are not confident writers an opportunity to express themselves verbally.

Storytelling allows students to communicate their ideas with more complexity than in writing. For example, Craig et al. (2001) suggested that students have the ability to express information in the form of a story “at a level usually above their ability to write” (p. 46). The increase in complexity when the students engage in storytelling enhances the students’ traditional literacy skills.

After completing the three digital storytelling projects, the students were required to write respective short essays and read them to their classmates, thus engaging in traditional literacies. In this study, traditional literacy was defined as the literacy outlined in the official educational standards and assessments of the four language skills of reading, writing, listening and speaking (O’Brian & Scharber, 2008).



After completing and sharing each digital story, the students wrote the same stories using pen and paper and submitted them to the English teacher to be graded. Although the formative assessment of the writing pieces created by the students did not contribute to their final grade, they put significant effort into them because they were to be assessed, graded and sent home for their parents' signature. The students treated the writing tasks very seriously. The researcher explained that the digital stories were drafts or practices for their actual writing. As a result, the students wrote appropriate text that had clarity and structure for all three story genres. The three participants expressed that each digital storytelling activity that preceded their writing had helped them to plan and write their stories using pen and paper. Andrew noted in his reflections that when he needs to write a composition in the future, he will try to visualise the storyboards when planning his writing. This is supported by Doherty and Coggeshall (2005), who stated that storyboarding allows students to draw their ideas before writing them in words. This helps visual students to access the pictures in their mind and gives them an opportunity to translate their picture ideas into words.

This study's findings have demonstrated that digital storytelling supports students' development of traditional literacy, which is examined as an essential component of digital literacy. Sylvester and Greenidge (2009) supported this point by stating that digital storytelling potentially can help students "reposition themselves from struggling writers to competent writers" (p. 291), while Frick (1986) suggested that a class activity in which students listen to their classmates' stories can motivate them to write and read (Frick, 1986).

**Key finding 23:** Digital storytelling was shown to improve the participating students' writing skills by helping the students, especially Andrew (who was an ESL student), find their own voice and overcome shyness. All three participants commented that it

was easier for them to write stories in pen and paper after they had completed the digital stories first. Although the researcher did not intend to analyse and compare students' digital and traditional stories, she noticed that Andrew's writing had improved as compared to similar writing tasks (e.g., story writing) done before his engagement with digital storytelling.

## 5.5 Chapter Summary

Section 5.2 answered the first SQ of the study: *SQ1. What aspects of digital literacy develop through digital storytelling?* The researcher has presented the aspects of digital literacy that developed across the three cases and has attempted to provide a generalisation, using theoretical triangulation to increase the credibility and validity of the results. Table 5.2 summarises the aspects of digital literacy that were developed during the course of this study.

Table 5.2. *Aspects of Digital Literacy that Were Developed*

Aspect of digital literacy	How the aspect of digital literacy developed
1. Determine the nature of information and media needed.	All three students could successfully locate information, reaching the level of 'Create' in the third project.
2. Locate information.	Across all three projects, the three students demonstrated the ability to locate the required information to create digital stories independently, reaching the level of 'Create' in the third project, apart from Ian who used only his prior knowledge in this project.
3. Evaluate reliability of information and media content	This aspect was not fully achieved by the students, who tended to avoid using material that required referencing and authenticating, rather than trying to identify criteria for evaluation and explain their significance. However, the students did develop awareness of this aspect.
4. Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration)	Overall, the participants made meaningful use of modes to construct meanings, with two students reaching the level of 'Create' in the third project.
5. Use digital technologies in a safe and socially responsible manner	There were very few examples of this aspect in the data.
6. Manage digital information in a	By the end of the study, all three participants could

Aspect of digital literacy	How the aspect of digital literacy developed
technology space (hardware and software components; troubleshooting)	confidently troubleshoot software and hardware problems related to the use of digital technology and they could transfer their skills to their peers, reaching the level of 'Create' in the third project.
7. Ethically use information and media (copyright)	The three participants developed an awareness of copyright and the ethical use of information and media, with two students, Ian and Andrew, reaching the level of 'Create' in the third project.
8. Apply information to design own representations to effectively communicate knowledge to others	The three participants were able to use elements of various genres to create their own pieces of information of the same genre. However, lack of consideration of the target audience meant the students did not reach the level of 'Create' in the third project.
9. Develop ability in problem solving and reflecting on own technology skills	By the end of the study, the three participants exhibited increased confidence in solving problems independently, reaching the level of 'Create' in the third project.
10. Use a variety of technology tools to create digital information	The three participants developed the ability to employ various technology tools to create their second and third digital stories, reaching the level of 'Create' in the third project.

In Section 5.3, the researcher discussed the results of the study that answer the second SQ of the study: *What are the factors that inhibit the effective implementation of digital storytelling?* In this study, three categories of potentially inhibiting factors were identified: school, curriculum and student. As the teacher was able to overcome these factors in this study, they did not actually inhibit the students' engagement in these three projects, but they could be factors in other school contexts. The issues identified were:

1) School:

- school logistics (availability of computer laboratories, timetabling constraints and lesson interruptions)
- lack of digital resources

2) Curriculum:

- limited focus on digital text
- lack of an appropriate multi assessment (curriculum constraints)

3) Student:

- sociocultural factors (e.g., students learning habits with regard to risk taking and problem solving)
- students' perceptions of their own language abilities (communication).

In Section 5.4, the researcher discussed the main question of the study:

*RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom?* The study results and analysis showed that digital storytelling can support digital literacy learning in a sixth-grade English-language classroom. The level of digital literacy development may vary from student to student and would depend on the students' characteristics when working with technologies as well as the construction of the digital literacy project.

Eight themes, observed for all three participants, emerged over the course of the study. Digital storytelling was found to promote or provide:

- 1) student engagement
- 2) meaningful contexts for learning
- 3) structure for working with media
- 4) creative expression in multimedia format
- 5) working with technology tools
- 6) research
- 7) critical thinking and problem solving
- 8) an alternative approach to teaching traditional literacy.

The next chapter presents the conclusions and recommendations that have resulted from this study.

## **Chapter 6: Conclusions and Recommendations**

### **6.1 Study Summary**

This study examined the way upper-primary-school students engaged in digital storytelling with the goal of developing or increasing their digital literacy to the level necessary for representing through multimodal texts. In this study, digital storytelling was examined as a contemporary strategy for the creation of digital multimedia content through which to express ideas, represent knowledge and otherwise communicate information through digital artefacts. In the production of digital storytelling, students were required to integrate modalities such as music, sound effects, text, narrations, transitions, graphics and images. Digital storytelling engaged these students in working with technology and digital media to create multimodal texts. A spectrum of technology tools was used to plan, produce, present and review a digital story.

A substantial body of evidence indicates that schools across the world are attempting to integrate information technology into mainstream lessons to help students develop the literacy skills they need to cope with the emergence of new technologies.

Well before the digital era, we started to hear about visual literacy, media literacy and information literacy. With the advent of digital technologies, these literacies have taken on added importance and new ones have begun to emerge. But it's unsettled terrain. Both technologies and literacies are continuing to shift in mutually constitutive ways (Pegrum, 2014, p. 157).

Changes in language usage and consequently, the methodology of teaching English, are reflected in the Singapore Ministry of Education English-language syllabus (2001, 2010). The related literature suggests that integrated multimedia representations may be called “multimodal texts” (Kress, 2006). Various other

associated concepts have been used for this extended idea of traditional literacy; for example, “new literacies” (Bruce, 1998), “multiliteracies” (Cope & Kalantziz, 2000), “new media and popular culture” (Howard, 1998), “digital literacies” (Merchant, 2007) and “new media and online literacies” (Hagood, 2003).

This study took place at a primary school in Hong Kong. The school was financed by the Singapore Ministry of Education and parents. The study class consisted of Hong Kong, Singaporean and mainland Chinese boys and girls of 11 or 12 years of age. The students were bilingual or trilingual: they could all communicate (orally and in writing) in English and Mandarin Chinese and some were effective Cantonese speakers. The researcher in the study was also the teacher of English language in the class under study.

The purpose of the study was to identify and describe the digital literacy development of three Primary 6 students as they engaged in three digital-storytelling activities over one semester. In addition, the researcher aimed to examine the factors inhibiting the development of the digital literacy of the three students. Lastly, the researcher intended to provide recommendations for teachers who are planning lessons with digital storytelling, to enable the development of students’ digital literacy.

The collected data were richly descriptive and included digital artefacts and planning documents created by the students, teacher observations, interviews with the students, students’ written reflections, peer evaluations, class discussions and evaluations by and discussions between the researcher and associates. The researcher created assessment rubrics to evaluate any development of aspects of digital literacy as the students became engaged in the three projects.

Theoretical triangulation guided the study, as an important strategy to observe the internal validity of the study. According to Merriam (1988), in a qualitative study, a

researcher is “a primary instrument of data collection and analysis” and he or she is “left to rely on his own instincts and abilities throughout most of the research effort”.

Triangulation involves “multiple reviewers, multiple sources of data and multiple methods to confirm emerging findings” (Merriam, 1988).

The following central research question guided the study and the research design and data collection:

*RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom?*

The following specific SQs were also addressed:

*SQ1. What aspects of digital literacy develop through digital storytelling?*

*SQ2. What are the factors that inhibit the effective implementation of digital storytelling?*

To answer these questions, three digital storytelling activities were designed and a rubric was developed to assess the development of aspects of the three students’ digital literacy. According to Woods (2006), “The qualitative researcher seeks to discover the meanings that participants attach to their behaviour, how they interpret situations, and what their perspectives are on particular issues” To understand the participants’ engagement with digital storytelling and to interpret the data, the researcher compared the digital literacy that developed in the three students, to identify any similarities and differences between the three cases.

The study was pursued through the classroom application of digital storytelling and involvement with students, adopting a methodology in the form of a case study (Merriam, 1988). Data from the case studies were converged and studied in a cross-case analysis.

Some researchers may question the reliability of a case study in which the three cases are three individual students. To address this issue, the researcher called on studies with a small number of cases (and even only one) under the study. The researcher found that a single case is suitable for qualitative research, as the aim of such a study is not to generalise beyond the specific context but to provide rich description of the experience (Flyvbjerg, 2006; Stake, 2000).

The focus of qualitative studies in general is “to detail many specifics that give the context its unique flavour” (Lincoln & Guba, 1985, p. 201), rather than to “deliberately [divorce] a phenomenon from the context, so that attention can be focused on a few variables” (Yin, 1989, p. 23). Merriam (1988) and Yin (1984) stated that the external validity of a qualitative study is demonstrated through “generalisation”. In this study, the researcher used rich descriptions to ensure that the findings were generalisable. Through these rich descriptions of the study phenomena, readers can assess for themselves whether the results are applicable to their own contexts.

## **6.2 Study Conclusions**

The findings of this study helped to answer the central research question and the two SQs of the study.

### **6.2.1 RQ. How does digital storytelling support digital literacy learning in an upper-primary-school English-language classroom?**

The results from the study indicate that digital storytelling supported digital literacy in the three students by giving them the opportunity to:

- access several aspects of digital literacy
- build on and extend aspects of digital literacy
- use known aspects of digital literacy in a new story format



- receive feedback on aspects of digital literacy from their peers
- work with various technology tools
- explore and research various digital literacy applications
- access a framework for using aspects of digital literacy within a familiar genre (storytelling)
- improve their ability to read images
- appreciate the importance of copyright
- critically evaluate their own digital literacy skills through editing.

A number of additional benefits arose from storytelling through digital literacy:

- 1) *Engagement*: Digital storytelling kept students engaged in tasks, which led to the development of digital literacy.
- 2) *Meaningful context*: Digital storytelling provided a meaningful context for developing the students' digital literacy.
- 3) *Structure to work with media*: Digital storytelling activities provided a clear structure for learning and consolidating aspects of digital literacy.
- 4) *Creative expression in multimedia format*: Digital storytelling stimulated creativity in students working with multimedia to complete each project.
- 5) *Research*: Digital storytelling tasks promoted the development of research skills.
- 6) *Critical thinking and problem solving*: Digital storytelling enhanced the students' skills in critical thinking and problem solving.
- 7) *An alternative approach to teaching traditional literacy*: Digital storytelling improved the participating students' writing skills by helping the students, especially ESL learners, to find their own voice and overcome shyness.

In conclusion, digital storytelling was an effective strategy for digital literacy learning in a Primary 6 English-language classroom. Digital storytelling clearly supported the digital literacy learning of the three participating students and provided an excellent context for the development of digital literacy. In addition, it enhanced other aspects of teaching and learning that contribute to effective digital literacy development.

#### **6.2.2 SQ1. What aspects of digital literacy develop through digital storytelling?**

To identify and analyse the aspects of digital literacy that the three students developed, an assessment rubric was developed by the researcher. Rigorous application of this rubric produced evidence that all aspects of digital literacy were developed through the three digital storytelling projects. These aspects were:

- 1) Determine the nature of information and media needed.
- 2) Locate information.
- 3) Evaluate reliability of information and media content.
- 4) Analyse, interpret and use a range of information and media to communicate meanings through multimodal texts (text, image, animation, sound, layout and narration).
- 5) Use digital technologies in a safe and socially responsible manner.
- 6) Manage digital information in a technology space (hardware and software components; troubleshooting).
- 7) Ethically use information and media (copyright).
- 8) Apply information to design own representations to effectively communicate knowledge to others.
- 9) Develop problem solving skills and the ability to reflect on own technology

skills.

10) Use a variety of technology tools to create digital information.

In addition to the general development of digital literacy, the evidence suggested that each digital story project supported different aspects of digital literacy. In Project One, *Pourquoi* Story (narrative genre), images were provided that allowed the students to develop and improve aspects 1—Determine the nature of the information and media needed, 2—Locate information, 4—Analyse, interpret and use a range of information and media to communicate meanings through multimodal text (viewing), 6—Manage digital information in a technology space (hardware and software components; troubleshooting) and 8—Apply information to design own representations to effectively communicate knowledge to others.

Project Two, Story Review (response genre), included scaffolding to provide opportunities for students to develop and improve aspects 3—Evaluate reliability of information and media content, 5—Use digital technologies in a safe and socially responsible manner, 7—Ethically use information and media (©) and 8—Apply information to design own representations to effectively communicate knowledge to others.

Project Three, Show-and-Tell (a personal story with no predefined genre), aimed to develop, improve and consolidate all the aspects of digital literacy, particularly 9—Problem-solving and ability to reflect on own technology skills: manage technology (hardware and software components, troubleshooting, connectivity between devices, connectivity with network) and 10—Use a variety of technology tools to create digital information.

Each project enabled the students to build on their skills while learning new digital literacy skills. However, it is important to emphasise that digital literacy

learning is not necessarily a linear process. The notion of “logical progression from the more fundamental skills towards the higher, more transformative levels” is important, as digital literacy development is “not necessarily a sequential process” and it “much depends on the needs of individual users: (Canada’s Centre for Digital and Media Literacy, 2009).

Thus, the rubric developed in this study was used as a means of identifying the levels of digital literacy (Use, Understand and Create) within each project, rather than as an indicator of a hierarchy of development. Although it is interesting to note that by Project Three, all three students were either at the level of ‘Understand’ or ‘Create’ (apart from one instance in which Jane had not used Aspect 3 prior to the third project).

### **6.2.3 SQ2. What are the factors that inhibit the effective implementation of digital storytelling?**

The implementation of digital storytelling in the classroom was mediated by a range of issues that were affected by both curricular and extracurricular constraints:

- 1) *Limited focus on digital text*: Limited emphasis on digital literacy and lack of multimedia resources affected teacher preparation time and effort but did not detract from the learning about digital literacy that took place through the storytelling activities.
- 2) *Pedagogical factors*: Effective digital literacy learning is enhanced by student-centred pedagogical practices, as authentic learning outcomes are less likely to be achieved by more traditional approaches to learning such as direct instruction and rote memorisation. For students who come from a more traditional approach to learning such as direct instruction and rote memorisation, it may be harder for them to adjust to student-centred pedagogical practices, which enhance digital literacy learning.

3) *The assessment of projects was not used for final student scores:*

Assessment influenced the three students' levels of effort and thought given to digital storytelling projects. As the assessment was not being used as part of final student scores, this potentially devalued the projects.

4) *Students' perceptions of their own language proficiency:* Initially, one student felt inhibited because of his low level of English-language proficiency. In a classroom with mixed English-language-proficiency students (e.g., native and non-native speakers), building student confidence through the provision of scaffolding was very important to effective digital literacy learning.

5) *School logistics (availability of computer laboratories, timetabling constraints and lesson interruptions):* Although lack of resources, timetabling constraints and lesson interruptions did not cause a problem for the researcher, who was equipped with digital literacy skills, this was identified as a possible inhibiting factor. One of the most important factors seemed to be related to school logistics, as lesson interruptions (e.g., due to a fire drill or hardware problems) affected the project's schedule. As a result, it was necessary to book extra computer laboratory sessions (which was not always an easy task) and to help students save their work into the designated folders in a short period, before their next lesson with another subject teacher.

## **6.3 Recommendations**

### **6.3.1 Recommendation 1.**

Upper-primary English-language teachers use digital storytelling as a means of supporting digital literacy learning. Teachers and curriculum designers who want to

integrate digital storytelling into the school curriculum may find the descriptions of the three digital storytelling activities useful, as well as the way each of them targeted the development of a number of aspects of digital literacy. ‘Digital literacy’ in the context of this study was defined as a set of skills that enable an individual to use technologies to work with information. It builds on the traditional literacies of reading, writing, listening and speaking and includes elements of information literacy, media literacy and technology skills (AASL, 1995; ALA, 1989; Australia and New Zealand Information Literacy Framework, 2004; Chauvin, 2003; Hobbs, 1997, 2008; Jewitt, 2006; Kress, 2003; McClure, 1994; Martinec & Leeuwen, 2009; UNESCO, 2008; Webber & Johnston, 2000). The study demonstrated that digital storytelling has the potential to become an effective strategy for digital literacy learning in schools.

### **6.3.2 Recommendation 2.**

Upper-primary English-language teachers use digital storytelling as a means of supporting students who speak English as an additional language. The results of the study may also guide the decision-making process of a school’s management team when developing strategies to support ESL learners. One of the participants in this study had started learning English only one year prior to his engagement with the project. He showed significant improvement in his perception of his own ability with regard to expressing himself through a digital story. Technology-infused projects provide opportunities for ESL students to draw on their strengths and experiences. Creative projects, such as digital storytelling, may help “address different learning styles and modalities” (PREL, 2013).

As students construct knowledge, they become active learners and take pride in their creations. However, when planning digital storytelling activities in an ESL or mixed ability classroom, a teacher might need to conduct a series of digital storytelling

activities, with scaffolding in form of storyboards, to help the students develop confidence and overcome the challenges caused by their lack of language proficiency.

### **6.3.3 Recommendation 3.**

Upper-primary English-language teachers use digital storytelling as a means of creating an effective digital literacy learning environment. This study identified a number of benefits of the use of digital storytelling in a Primary 6 English-language classroom, such as student engagement, meaningful context, structure to work with media, creative expression in multimedia format, working with technology tools, researching, critical thinking and problem solving, and traditional literacy. These benefits of digital storytelling in a Primary 6 language lesson may be applicable to other contexts and other subject areas (e.g., science) and other levels (e.g., lower and upper primary, as well as secondary school).

### **6.3.4 Recommendation 4.**

Upper-primary English-language teachers may find the assessment rubric a useful means of identifying students' levels of digital literacy and assessing their developing skills. The rubric contains a comprehensive list of digital literacy aspects and three levels of attainment. It is relatively easy to use and gives an overall picture of student attainment.

### **6.3.5 Recommendation 5.**

Upper-primary English-language teachers may find the identification of 'Technical Master', 'Creative Presenter' and 'Critical Analyser' a useful way of synthesising student skills and using these as a basis for assessing further development. When integrating digital storytelling activities into language lessons, identifying patterns as early as possible enables teachers to plan how to accommodate the students' needs.

### **6.3.6 Recommendation 6.**

The assessment of digital storytelling projects should be used as part of the students' assessment results. In this study, one student devalued her digital storytelling work when she discovered that it did not count towards her final assessment. Research suggests that what is assessed is valued and therefore it is important to use the assessment of digital literacy learning as part of the students' overall assessment score.

## **6.4 Study Limitations**

This section discusses the limitations of the study so that teachers and future researchers can better interpret the findings and recommendations of this study. The first limitation is related to the lack of a planned collaborative learning environment, which could include factors such as group and pair work, online chat for the students and teacher to discuss the projects, and sharing of the digital stories online with enabled online comments. As the researcher in this study intended to examine the way the three participating students' digital literacy skills developed during only one semester, it would have been challenging to identify the individual student's contribution towards the task completion in the classroom setting of the study.

The second limitation was the role undertaken by the researcher in this study. The literature suggests that it is crucial for a researcher who utilises qualitative methodology to clearly distinguish between the roles of the researcher and his or her "insider" role (Adler & Adler, 1994). Being an 'insider-researcher' has certain advantages (Bonner & Tolhurst, 2002): a greater understanding of the studied culture and institution, as well as a natural social interaction that puts the participants at ease. The latter was especially important, as the participants in this study were Primary 6 children. However, detailed knowledge of the students and their abilities might have



led to a loss of objectivity, as the researcher, who was also the teacher of the participating students, at times struggled to balance the two roles.

## **6.5 Further Research**

The following areas for further research have been identified:

- 1) Research into the application of digital storytelling and the digital literacy rubric in other classroom settings (local, national and international), age-ranges and subjects is needed. This would help identify the extent to which digital storytelling and the rubric could be utilised for effective teaching and learning in a range of different contexts.
- 2) The use of digital storytelling by teachers with limited digital literacy also needs to be researched, to ascertain the level of support and professional development that is needed.
- 3) Ways of further supporting students also needs to be researched. Awareness of the target audience remained an issue for all three participants in this study (e.g., image resolution, clarity of voice projection and attractiveness of content) and this affected the viewers' appreciation of their digital stories. Development of appropriate self-evaluation rubrics might be required to help students, who are digital story creators, to evaluate their own work.
- 4) Ways to effectively enable students to use the fifth aspect (Use of digital technology in a safe and socially responsible manner) needs to be investigated. There was very little evidence of this in the students' projects for this study. It is possible that the nature of the activities planned by the researcher and her short lecture about the importance of the use of digital technologies in a safe and socially responsible manner did not help students

to achieve this aspect.

- 5) Further research into the effectiveness of teaching and learning digital literacy through student-centred pedagogical practices needs to be undertaken. This is particularly pertinent for students coming from education systems that use traditional approaches to teaching and learning, in which students are passive recipients of knowledge.
- 6) Communication and collaboration using technology are important aspects of digital literacy that go beyond the information aspects, and were not examined in the initial study because the conditions for the use of digital media environments at the time when the study was conducted were limited. Nevertheless, there were accidental instances of these aspects appearing in the data collected in the study. It is recommended to conduct further research into this area to assess the impact of these aspects on the development of digital literacies of students who engage in digital storytelling in the classroom.
- 7) Technologies are constantly changing, so further research into the “push” aspects of Web 2.0 tools and their use by students who are engaged in digital storytelling in a classroom is recommended. When the study was conducted, the “push” aspects of Web 2.0 tools were not as developed as they are nowadays. Rather, the “pull” aspects of the older technologies available when the study was conducted dominated the technology in education scene across the globe. This is the nature of technology that constantly changes. Should this study be conducted in the current technological settings, the availability of Web 2.0 tools potentially could have been beneficial in order to examine how students’ digital literacies

would develop.

In conclusion, the three case study students not only developed their digital literacy skills but as a teacher-researcher, I also gained a great deal from this study. I believe my own knowledge, understanding and practices about effective teaching and learning have been enhanced through my ongoing data collocation, analysis and reflection. I intend to continue to reflect and involve my students in self-evaluation in their ongoing journey towards becoming digital literacy citizens for the twenty-first century.

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# Annex A

## Pre-study questionnaire template

### QUESTIONNAIRE ONE (December 2008)

Student's Name: \_\_\_\_\_

*On the scale from 1 to 5 identify how well you know the skills listed below. 1 – least familiar, 5 – most familiar. Put a tick in the relevant cell.*

			Not Sure What it mean s	1	2	3	4	5
<b>Hardware</b>		I know how to turn on and turn off a computer						
		I know how to connect a microphone to my computer						
		I know how to adjust microphone settings						
		I know how to connect headphones to my computer						
<b>Software</b>		I know how to create a Microsoft Word document						
		I know how to create a PPT document						
		I know how to use Photostory 3 for Windows						
		I know how to use iMovie						
		I know how to store my files where I want to						
		I know how to use Google search engine						
<b>Texts</b>		I know how to change font style						
		I know how to change font colour						
		I know how to change font size						
		I know how to position a text on the PPT screen						
		I know how to make effective colour and size choices when creating a text						
<b>Images</b>		I know how to use ClipArt						
		I know how to search for images in the Internet						
		I know how to acknowledge Copyright when downloading images from the Internet						
		I know how to download and save images						
		I know how to edit image size						
		I know how to insert an image in Microsoft Word and PPT						
		I know how what an image resolution is						
		I know how to crop an image						
		I know how to combine images						
		I know how to add effects to an image						
<b>Music</b>		I know how to import music in a PPT						
		I know how to select music that would enhance the content						
		I know how to identify the size of a music file						
		I know where to find music in the Internet						

		I know how to acknowledge Copyright when downloading music from the Internet							
		I know how to adjust music volume in a PPT							
Narration		I know how to record my voice in a PPT							
		I know how to adjust the volume of my narration in a PPT							
		I know what to say for each PPT slide							
		I know how to create scripts to support my narration in PPT							
Information									
		I know how to find information for my homework in the Internet							
		I know how to identify reliable web sites							
		I often use Wikipedia for information							
		I use <a href="http://www.flickr.com/creativecommons">www.flickr.com/creativecommons</a>							
		I know the difference between a search engine, a directory and a web site							

*Provide answers to the questions below by ticking in the relevant cells.*

English Language			Yes	No	I am not sure/ Sometimes
		I would like to use computers in my English lessons for creating writing pieces			
		I would like to work by myself			
		I prefer working with a partner			
		I speak English at home			
		I can create a story with the use of ICT			
		I am a confident writer			
		I am a confident speaker			
		I am a confident reader			
		I am a confident speaker			
		I know how to create storyboards			
		I like to draw pictures to illustrate my stories			
		I don't like my handwriting so I prefer typewriting			
		I like English language subject			
		My English teachers in P1-5 brought the class to a computer lab before to work on the English language related tasks	Once a week Once every two weeks Once a month		
		I type-wrote my stories before using the following applications (you may choose more than one)	Microsoft Word PPT iMovie Photostory3		

## Annex B

### Observation notes for Jane in Project One

Coded note	Field note
B-O:P1:J:1	Jane asked whether she could use the Internet to search for some <i>pourquoi</i> stories. The teacher allowed this. Jane accessed YouTube and typed ' <i>pourquoi</i> stories' in the search window. She then started viewing the different stories.
B-O:P1:J:2	Jane accessed YouTube and typed ' <i>pourquoi stories</i> '. She seemed to know what information she needed. She was able to locate it on the Internet.
B-O:P1:J:3	Jane watched attentively the teacher's demonstration on the screen. She located the photographs in the designated folder. She imported them into Photo Story 2. She saved the project onto the desktop
B-O:P1:J:4	The teacher instructed the students to add a title to their story to emphasise the key ideas relevant to the individual slides. Jane typed the text for the first slide only (the introduction). She changed the colour to blue and positioned it at the bottom of the image. She explained that she did not want the text to cover the image.
B-O:P1:J:5	Before engaging in creating her digital story, Jane viewed several stories online and then examined the images in the teacher's folder. This informed her decision about selecting a particular set of images
B-O:P1:J:6	She customised motion and transitions.
B-O:P1:J:7	She saved the folder containing photographs on the desktop and manipulated the photographs. She repositioned the images in the timeline of the Photo Story2 application.
B-O:P1:J:8	Teacher told the students to write their narration in the notes window. Jane opened a Microsoft Word document and wrote the script there. She explained that she felt more comfortable typing the whole story on one page.
B-O:P1:J:9	Jane succeeded in exporting the project on her first attempt. She viewed it and mentioned that she realised that she had accidentally swapped two slides. She wanted to edit it but kept opening the 'jane.wmv' file.
B-O:P1:J:10	The teacher suggested exploring the 'Save the story' screen in Photo Story 2. Jane clicked 'Learn more about the selected activity' on the screen, as suggested by the teacher. After a few minutes, she opened her Photo Story 2 project, edited it and rendered the story again. Jane then opened her folder in the Pupils Drive and dragged both her Photo Story 2 project and the WMV file into it. Then she saved both files onto her USB drive.

## Annex C

### Reflections by Andrew after Project One

Coded note	Written reflection
C-R:P1:A:1	<p>When my computer does not work, I was too nervous. I do not know how to do. My friends all do it well because they are good in english but I am bad in english. I think teacher will help but I ask so many questions and I had a lot of questions after. I don't know computers good too. I know power point and I know other one that we wrote about two people. But this is not same. It has speaking and it has sound and pictures move. Also I think writing is easy but making movies is not. If I make movie stories I do not know if it is good or not. I need my teacher to tell me and my friends cannot help because I don't want talk in lesson. But I like my friend movies because they are like real movies!!!!</p>



## Annex D

### Discussion transcripts for Andrew in Project One

Coded note	Field note
D-D:P1:A:1	Andrew located the media rather randomly, without putting much thought into the process of selecting the images provided by the teacher in the five different folders because e mentioned during the class discussion, “Since I did not know what story I needed to make, I just chose the folder with nice pictures.”
D-D:P1:A:2	Andrew spent 20 minutes of the first lesson examining the photographs. He could not decide which story he wanted to create. He explained that he was not sure how to put the photographs together to make a sensible storyline. He said, “I don’t understand how to start. They [pointing to the photographs] do not make sense. I like the photographs of jelly fishes and alligator, so I want to use them”. He selected folder 5.
D-D:P1:A:3	He compared digital storytelling to creating a PPT presentation, “Like, for example, when I make PowerPoint, I put much words in every screen [slide], but here is not much space. I cannot type everything I want in one screen. So I don’t want to do it at all.”
D-D:P1:A:4	Andrew asked whether he could record his narrations first, “Can I say the story first?” He obtained the teacher’s approval to do so. Andrew typed the texts after recording his narrations. The teacher observed that Andrew spent a lot of time listening to his voice and typing
D-D:P1:A:5	Andrew chose not to customise the motion and duration of each slide. He said, “If this is not the must. I will not do it. The computer already make it.”
D-D:P1:A:6	During the discussion after the completion of this project, the teacher asked the students whether they used the ‘Customise motion’ and ‘Transition’ functions in their projects. Andrew said that he did not use these functions because he did not quite understand why it was necessary.
D-D:P1:A:7	Andrew did not add background music to the story. He said that he did not like any of the music provided in the application. He said he wanted to use his own music from YouTube, but he did not know how to import it into the project. He asked, “How I import the music? I want Justin Timberlake but I don’t know how to put him in my story”. The teacher advised him to bring a CD with the songs by that singer, as downloading YouTube music would infringe copyright, but Andrew did not do it, mentioning that the CD was too expensive to bring to school because someone might steal it. The teacher suggested exploring the function of creating his own music in Photo Story 2, but Andrew did not do it
D-D:P1:A:8	The students were required to write a <i>pourquoi</i> story of 200 words. After writing his story, Andrew commented that it was easy for him to do it because he already had a plan in his head, “I can write <i>pourquoi</i> story easy, because I already have a plan in my head. I remember how

	I did narration for the computer project.”
D-D:P1:A:9	Andrew opened the Photo Story 2 application as instructed by the teacher, but he could not work out how to import the photographs. He asked his friend to demonstrate how to do it but even after the demonstration, he could not cope with the task. He said, “I don’t understand why there is no slides like in PowerPoint. How I make slides?”
D-D:P1:A:10	The teacher asked the students whether they had viewed and edited their final stories after rendering. Andrew indicated that he did not know that he could edit his project. He said, “I did not know that I can edit the story. I already saved it, so I did not know how to do it”. He did not see the difference between the raw Photo Story 2 file and the WMP file. The teacher showed two files to Andrew: the file called ‘andrew.wp3’ (which was the raw Photo Story file that could be edited) and the file called ‘andrew.wmv’ (which was a Windows Media file). The teacher inquired whether Andrew had noticed the difference in the files’ extensions, but Andrew said that he did not know what extension meant or how two files were different.
D-D:P1:A:11	He did not display an understanding of the way different media could complement each other and he tried to avoid using some of them, because he explained that he did not add background music because he could not see how the music could complement his story.

### Discussion transcripts for Ian in Project Two

Coded note	Field note
D-D:P2:I:1	Ian read the story and conducted Internet research on the topic, accessing a number of different websites about William Tell and the history of Switzerland and searching for images based on his information research. In the discussion with the teacher during the lesson, Ian said, “I collected more information that I needed, but this was because I could find so much relevant information that at first I was not sure which to use.”
D-D:P2:I:2	Ian was able to use research and technology skills to navigate and access information and to explain why this information was needed. For example, in the discussion with the teacher during the lesson, Ian said, “I collected more information that I needed, but this was because I could find so much relevant information that at first I was not sure which to use.”
D-D:P2:I:3	He added titles to each slide and provided meaningful key words to support the images and narration. He explained during a discussion with the teacher that consistency in colours was important.
D-D:P2:I:4	Ian did not use background music. He explained that this was because it was a story review and therefore different from <i>pourquoi</i> , which is a folk tale. Ian said that as the story review was a serious genre, there was no need for music.
D-D:P2:I:5	When the teacher inquired whether Ian was satisfied with the quality of all of the images, Ian said that he did the best he could considering there were not many images related to the topic.

D-D:P2:I:6	<p>The discussion of Ian's planning document revealed that Ian made notes in bulleted form in a blank PPT slide. He explained that it helped him organise his ideas.</p> <p>Also, he created a folder on the computer desktop in which he saved all the images he found online. He typewrote the scripts in a Microsoft Word document first and then copied and pasted chunks of text into the script window for each slide in Photo Story2.</p>
D-D:P2:I:7	<p>He used only copyright-free images from Flickr and listed the names of the authors who had uploaded these images to Flickr. When the teacher asked him to show how he searched for the images, he typed the key words in a search engine and was able to show the process of finding the image.</p>
D-D:P2:I:8	<p>During the class discussion in the second project, he shared that he created his own storyboards in his Microsoft Word document and justified this by saying, "When it is time to type the scripts in Photo Story, I will just copy and paste the text."</p>

## Annex E

### Evaluation by peers for Andrew in Project One

Coded note	Field note
E-E:P1:A:1	After viewing Andrew's video, his classmates commented that the story was clear to them. For example, his classmate Beatrice, whose English-language proficiency was high, commented, "Andrew's narration does not always make sense to me, but I can see the images that go with his talking and can understand what he wanted to say. If I were him, I would edit the narration, as his voice is sometimes too loud and sometimes too soft. I think he did a relatively good job, but he needed to edit the story. I don't understand why he did not use any music. It was so much fun experimenting with different melodies!"

### Evaluation by peers for Ian in Project Three

Coded note	Field note
E-E:P3:I:1	Ina created a well structured but not engaging digital story based on a textbook math concept. Then he asked a classmate to view it and check whether the information made sense. The classmate commented that the information was correct but the images were "too dull" and did not contain any pictures. Ian disregarded this comment by saying that that was a math concept, which did not require pictures. Ian added that he did not add titles to his slides, because they are self-explanatory.
E-E:P3:I:2	Although Ian attempted to apply information to design his own representations to effectively communicate knowledge to others, he showed little awareness of the target audience, as he selected a topic and images that were considered by his peers not appealing.

## Annex F

### Artefacts (digital artefacts and planning documents): Andrew's digital story in Project One

Coded note	Field note
F-A:P1:A:1	Andrew's first digital story did not make much sense to the viewer because the first image with the introduction to the story ended up at the end of the storyline.
F-A:P1:A:2	Andrew typed the texts after recording his narrations, but the type-written words did not completely convey what he had said.
F-A:P1:A:3	He re-recorded the narration but accidentally changed the sequence of the slides in the timeline, which moved the first image to the end. He did not realise this until during the demonstration and class discussion of the finished projects
F-A:P1:A:4	There was no clear flow of ideas and the story contained many grammatical errors. The title of Andrew's story was in the last slide because he had accidentally moved it towards the end of the timeline in Photo Story 2. The font was black, which hampered its viewing against the image of two children in the canoe.
F-A:P1:A:5	Andrew was able to create an integrated multimedia product from template. He created a digital <i>pourquoi</i> story using Photo Story 2 for Windows. He did not change the default functions of the computer application

## Annex G

### Artefacts (digital artefacts and planning documents): Jane's story map for Project Two

Name: \_\_\_\_\_ ( )

### Story review map

Title: William Tell

**Introduction** This story takes place in Switzerland many centuries ago when it was still ruled by Austria, and revolves around William Tell.

**Summary of the story** When this story took place, a cruel man named Gessler ruled Switzerland. To humiliate the Swiss, he put a hat on a pole in the middle of the marketplace in Altdorf. He made every Swiss who came in to the square bow to this hat. William Tell did not bow to the hat, so he and his son were arrested by the soldiers. As his punishment, William Tell had to shoot an apple off his son's head and if he missed both he and his son would be killed. Luckily, he managed to shoot the apple perfectly and both he and his son lived.

**Comparison to other stories** I think this story is similar to Robin Hood, because both have archers as the main characters, and show bravery.

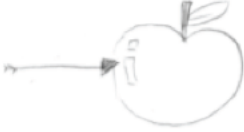


**Brief excerpt from the story** "That was very good shooting," said Gessler. "But tell me, why did you take out this bolt and put one under your belt?" "I R I had misse d with my first bolt and killed my boy," said Tell, "I would have sent the second bolt straight through your wicked heart."

**Why the story was enjoyable** I liked the story because it shows love for your country, bravery, and standing up for what you believe in.

slide 9 → credits.

## Annex H

### Artefacts (digital artefacts and planning documents): Jane's storyboard for Project Two

Storyboards for my digital story review		
Slide 1	Slide 2	Slide 3
<b>Description</b> (what part of review this is) Title ✓	<b>Description</b> (what part of review this is) ✓ Introduction	<b>Description</b> (what part of review this is) Summary Part 1 ✓
<b>Picture</b> (you will search Flickr.com or Microsoft Clipart to find an image) 	<b>Picture</b> (you will search Flickr.com or Microsoft Clipart to find an image) <sup>Swiss flag</sup> 	<b>Picture</b> (you will search Flickr.com or Microsoft Clipart to find an image) <sup>hat on a pole...</sup> 
<b>Text</b> (will appear on the screen to support your narration) William Tell: Story Review	<b>Text</b> (will appear on the screen to support your narration) <sup>→ Switzerland</sup> <sup>→ Gessler</sup> <sup>→ William Tell.</sup>	<b>Text</b> (will appear on the screen to support your narration) Humiliate the Swiss
<b>Narration</b> (what you will say in the microphone) Hi, this is a story review about 'William Tell', by ...	<b>Narration</b> (what you will say in the microphone) This story takes place in Switzerland many centuries ago when it was ruled by the cruel Austrian governor Gessler. It is about William Tell and the fatherly love he shows towards his son.	<b>Narration</b> (what you will say in the microphone) To show how insignificant the Swiss were, Gessler placed his hat on a pole in the marketplace in Altdorf and made every Swiss who walked through the marketplace bow down to his hat.

## Annex I

### Interview with Jane (semi-structured) during and after completion of the study

Coded note	Field note
I-I:P3:J:1	<p><b>Q: I noticed that you did not provide references to websites from which you downloaded images. Can you explain why?</b></p> <p>A: The names of the photographers were not printed on the websites, so I thought it was OK to just save the images</p>
I-I:P3:J:2	<p><b>Q: Can you make a picture look smaller or bigger?</b></p> <p>A: No</p>
I-I:P3:J:3	<p><b>Q: Why are there no picture on slides 10 of your power point presentation?</b></p> <p>A: You cannot really illustrate credits.</p> <p><b>Q: What about slide 7?</b></p> <p>A: This slide is about God. No one has ever seen God so there are no pictures of God in the Internet, obviously.</p>
I-I:P3:J:4	<p><b>Q: Have you noticed that the fonts in the table template and you font in the MS Word table are different?</b></p> <p>A: I like the fonts in my table. I think they look cool.</p>
I-I:P3:J:5	<p><b>Q: What guided your decision to name the slide the way you did?</b></p> <p>A: I once made a very important document and could not find it later on. I asked my friend on Facebook a question how to find it. My friend told me that if I named my document in a way that makes sense I would be able to find the document. So I had to redo the whole thing. That was unfair, but at least I learn my lesson.</p>
I-I:P3:J:6	<p><b>Q: Why did you not provide references to all websites that you used?</b></p> <p>A: I did not copy and paste everything not everything and it is OK to copy and paste a little bit of text, not all of it.</p>
I-I:P3:J:7	<p><b>Q: Why do you think you had difficulty opening your presentation in the computer lab? What did you think when that happened?</b></p> <p>A: I was very stressed as I did not know what to do. I don't understand why I could view my presentation in the computer lab when I finished</p>



	working on I, but it let me down today.
I-I:P3:J:8	<p><b>Q: When you had problems connecting to the Internet, how did you solve the problem?</b></p> <p>A: I observed how you helped Andrew, so I learnt from it.</p>
I-I:P3:J:9	<p><b>Q: What guided your choice of storyline for the <i>pourquoi</i> story?</b></p> <p>A: There is a tale in YouTube that I liked. So, it kind of inspired me. It is about a lion becoming the king of the jungle.</p>
I-I:P3:J:10	<p><b>Q: I noticed that you edited a picture of a lion. Why and how did you do it?</b></p> <p>A: I needed one more image of the lion but there was only one in the folder. So, since the task was to use only those images in the folder, I reused the same image. I changed the zooming so that in the first picture the lion stopped moving. I also changed the shading a little bit, so it became a bit grey, or black and white, something like that. This is like a cover page of the book.</p>
I-I:P3:J:11	<p><b>Q: How did you succeed to have a clear voice quality in your narration?</b></p> <p>A: I had to record each slide at least twice to make the speech perfect.</p>
I-I:P3:J:12	<p><b>Q: I noticed that you used transitions in your first digital story. Why did you do it and how?</b></p> <p>A: It was fun seeing how different my presentation looked if I selected different transitions. I changed the zooming so that in the first picture the lion stopped moving.</p>
I-I:P3:J:13	<p><b>Q: Why did you decide not to use a background music in your first digital story?</b></p> <p>A: Photo Story is like a PowerPoint presentation, but without the presenter standing in front of the audience. I know that it is important for my voice to be clear, we learn it in speech and drama lessons. So, when I experimented with music, it sounded too loud, louder than my voice. Therefore, I decided not to confuse the audience.</p>
I-I:P3:J:14	<p><b>Q: After creating your digital <i>pourquoi</i> story, you handwrote the same story. Was it easy or difficult writing it?</b></p> <p>A: I can write <i>pourquoi</i> story easy, because I already have a plan in my head. I remember how I did narration for the computer project.</p>
I-I:P3:J:15	<p><b>Q: Is it important to add key words to each slide and why?</b></p>

	<p>A: I am confident that I speak clearly, so I don't think this was necessary, although a couple of classmates said they did not understand some parts. I think they just said it without meaning it.</p>
I-I:P3:J:16	<p><b>Q: Why did you write your script for the narration in a MS Word document?</b></p> <p>A: It's more comfortable typing the whole story on one page. Besides, it underlines in red if you make spelling mistakes.</p>
I-I:P3:J:17	<p><b>Q: For the second project, you used photographs that she found on the Internet to create her digital story review. Where did you get them?</b></p> <p>A: I found four of them on Flickr and five through Google. I was desperately looking for a picture of a heart and a bow, for example, and I just could not find it in Flickr.</p>
I-I:P3:J:18	<p><b>Q (pointing at the photograph of a man with an angry face): Why did you choose this particular photograph?</b></p> <p>A: Since Gessler was very mean, I tried to find a picture of a mean man. It doesn't matter that it actually is not Gessler. I just tried to solve the problem: there are no photographs of him on the Internet. I searched up the Internet and it appears that photography was not invented at those times yet. So, I am thinking of drawing my own pictures. I did that already but I do not know how to make them photographs and I do not really have time.</p>
I-I:P3:J:19	<p><b>Q: Can you explain why you added titles to all of the slides, changed colours and used key words for each one?</b></p> <p>A: I like colours, so that's why I changed them. When I first made them black they were no fun.</p>
I-I:P3:J:20	<p><b>Q: Did you provide references to the images that you downloaded from Flickr?</b></p> <p>A: Well, they [authors] knew that they shared their photo in Flickr, so I don't see why I need to still give them credit.</p>
I-I:P3:J:21	<p><b>Q: I noticed that you wrote the text then drew some pictures on paper. Why did you do that?</b></p> <p>A: I love drawing so I might as well draw my own images.</p>
I-I:P3:J:22	<p><b>Q: How did you come up with the idea to use an image of a boxing ring to show the rivals such as Facebook and Myspace?</b></p> <p>A: My dad has recently watched a boxing competition, which I</p>

	<p>happened to see too. So I thought that boxers are rivals in a way. Well, they are opponents actually, but when I typed ‘opponents’ in my script, I right-clicked that word and one of the words that popped up was ‘rivals’. So I thought ‘rivals’ is a much better word because Facebook and Myspace don’t literally fight.</p>
I-I:P3:J:23	<p><b>Q: You said that you like using computers to make stories.</b></p> <p>A: If a person knows exactly what she wants to do, then there is always Internet to find any information you need. Digital stories are great: the final product looks very pro. I wish we had more projects done with Photo Story 2. I am also interested in learning to use iMovie. I know that a couple of classmates used it at they reckon it is easier to use than Photo Story 2. I also realised that even in PowerPoint, there is an option to record the voice and add sounds!</p>
I-I:P3:J:24	<p><b>Q: Why did you use Wikipedia to do the search?</b></p> <p>A: This project will not be assessed and so I did not have enough time to search ... websites other than Wikipedia to find information. Also, there were no guidelines as to what exactly should be included in the project, so I just did what was interesting to me. I still think that the first project was great because the images were already given to us, and the second was easy to make because the teacher guided us through the project.</p>
I-I:P3:J:25	<p><b>Q: Do you know now, after completing the three projects how to tell if a website is reliable, that the information is true?</b></p> <p>A: I am not sure. I do not know how to explain. I know it has something to do with a date and the author.</p>
I-I:P3:J:26	<p><b>Q: I love the image that you created in ArtRage. Can you tell me more about it?</b></p> <p>A: Well. I am very proud of it. I put the [jpeg] images of the banners into her ArtRage project and drew the rest of it using tools in ArtRage. Then I exported and imported it into my Photostory. Facebook and Myspace are rivals because Facebook and Myspace are really alike and they are competing with each other to see which website has more users and of course, Facebook has more users at the moment. I could sort of see the picture in my head, so I knew what I needed to do.”</p>
I-I:P3:J:27	<p><b>Q: Can you describe how you worked with images when working on the third digital story?</b></p> <p>A: I tried to make the images match the narration. I had to double the image of the Facebook like this. I want to use the same image but so that the two look not the same.</p>

I-I:P3:J:28	<p><b>Q: Why did you not add titles to the slides?</b></p> <p>A: Well, I guess the banners of Facebook and Myspace speak for themselves. Every literate person knows who Mark Zuckerberg is, so his photo speaks for itself too. The rest of the images also did not require texts. I know very well how to add texts to the slides. I even tried to add some to my slides. They did not make sense so I deleted them. I really think any more text would be redundant.</p>
I-I:P3:J:29	<p><b>Q: How did you find and import the music?</b></p> <p>A: I worked out how to do it at home. I had to Google for the instruction just to realise that it was easy. I just had to examine attentively the part of ... Photo Story 2 where background music is added.</p>
I-I:P3:J:30	<p><b>Q: Are you aware that children below the age of 14 should not be using Facebook?</b></p> <p>A: Yes but my parents know what I do there.</p>
I-I:P3:J:31	<p><b>Q: Was it difficult to import images into your third story?</b></p> <p>A: No. I have done it so many times already that I can write a manual with step-by-step instructions.</p>
I-I:P3:J:32	<p><b>Q: Why do you think there is an age limitation for the Youtube accounts?</b></p> <p>A: I can see why it is so. Some people type silly comment, for sure. I think that's why this rule exists.</p>
I-I:P3:J:33	<p><b>Q: Why did you not handwrite your third story?</b></p> <p>A: Since writing with the use of a pen is not required, I want to just give you my script. I am sure it doesn't have any spelling mistakes as I used the spell check in ... Microsoft Word.</p>
I-I:P3:J:34	<p><b>Q: Now that you finished three digital stories, what have you learned about Copyright?</b></p> <p>A: I learned quite a bit. For example, you need to give credit to the 'borrowed' images and songs. But I still prefer to create my own images.</p>
I-I:P3:J:35	<p><b>Q: How did you make your narration sound so clear?</b></p> <p>A: I rehearsed a few times before I finally liked it.</p>
I-I:P3:J:36	<p><b>Q: How did you create your last slide in the third story?</b></p>

	<p>A: I used ArtRage. I wanted to make it look like it is handwritten. So I took the photo of the Facebook founder.</p>
I-I:P3:J:37	<p><b>Q: What helped you to make your narration sound good?</b></p> <p>A: I did a few rehearsals before I actually recorded my voice. I read the whole text at least three times aloud.</p>
I-I:P3:J:38	<p><b>Q: You did not add background music to the first and second digital stories. Why did you add it to the third?</b></p> <p>A: Since my first two projects did not have any background music and I notice that most of my classmates' stories had it, I thought it would be cool to import music into it. But it took me a while to work out how to upload one of my favourite songs.</p>
I-I:P3:J:39	<p><b>Q: How did you add the song that you selected?</b></p> <p>A: Well, I sort of tried to work out how to upload it by myself.</p>
I-I:P3:J:40	<p><b>Q: Would you like to learn how to use other computer programmes that can be used in your schooling?</b></p> <p>A: I am interested in learning to use iMovie.</p>
I-I:P3:J:41	<p><b>Q: Can you recall all the technology or computer programmes that you used when working on the three projects?</b></p> <p>A: Yes. They are ArtRage, Photo Story 2 and Microsoft Word.</p>
I-I:P3:J:42	<p><b>Q: Why did you decide not to create story boards for the third project?</b></p> <p>A: I know how to use Photo Story. I made two projects with it already and I even downloaded it and installed it at home to experiment with importing the music. So, I think I am sort of a pro now making digital stories.</p>
I-I:P3:J:43	<p><b>Q: Do you think typewriting can help you improve your spelling?</b></p> <p>A: I am glad that I used the spell check when I worked on the scripts for my narrations in Photo Story because when I wrote the story review in pen and paper, I remembered the spelling of all tricky words. So it's kind of cool.</p>

