

 IARJ INTERNATIONAL ACADEMIC RESEARCH JOURNAL OF SOCIAL SCIENCE INTERNATIONAL ACADEMIC RESEARCH JOURNAL www.iajournal.com	 INTERNATIONAL ACADEMIC RESEARCH JOURNAL
	ISSN :2289-8441
	International Academic Research Journal of Social Science Journal homepage: www.iajournal.com

Unleashing Engineering Students' Creativity with Digital Storytelling: Stories of A Duo Get Told

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Article Information

Keywords

Digital storytelling, creative
processes, creativity,
engineering students

Abstract

Employees are expected to be highly skilled and creative in the 21st century global market. Yet, engineering graduates are being criticized that they lack creativity skills which are deemed important in the working environment. Thus, there is a need for them to be exposed to a learning means that can unleash their creative potentials. Since digital storytelling (DST) has been a promising platform for creativity as claimed by previous literature, the study aimed to understand the creative processes of two engineering students in their DST development in the English reading class. Both, one being an above-average, while the other a below-average, were selected based on their reading results in an English reading placement test. The span for the DST project was three weeks. The case study research method was employed. Data were obtained from observational field notes, documents, interview transcripts and digital stories. Results showed that both had well displayed the classic creative process outlined by Wallas (1926). Since previous literature has noted that people with higher cognitive abilities would produce better creative processes than ones with lower cognitive abilities, the former's creative performance was expected. Nevertheless, being focused, interested, resilient and self-disciplined, the latter proved himself praiseworthy. It is thus recommended that students who are enthusiastic will benefit from DST since they will go to the distance to be creative.

INTRODUCTION

The 21st century global market demands highly skilled and creative workforce (Spence & Liu, 2013). However, Malaysian employers have criticized that engineering graduates lack creativity skills (Norlida Buniyamin, Nur Syahira Rahmat, & Zainuddin Mohamad, 2010). This is a cause for concern because creativity is an important trait in innovation for engineers (Constantino, Kellam, Cramond, & Crowder, 2010). With the industrial globalization, the Malaysian university academics have been demanded by the Malaysian Ministry of Higher Education to provide a system that can foster and enhance creativity among engineering students to prepare them for the global marketplace (Norhayati M. Nor, Noraini Rajab, & Kamsiah Ismail, 2008). To promote creativity, O'Brien (2001) recommended that educators include in their lessons a multimedia project like digital storytelling which has been argued effective in allowing students to display their creativity (Genereux & Thompson, 2008; Robin, 2008; Stuart, 2010). However, the creative processes that students may showcase

while preparing their digital stories have not been extensively researched into. The purpose of this study was to explore the creative processes of two engineering students in their development of digital stories in the English reading class. Understanding the creative processes is necessary as creativity is the byproduct of these processes.

DIGITAL STORYTELLING AND CREATIVE PROCESSES

Digital storytelling is described as the art of telling stories or presenting main ideas in the visual form incorporating multimedia tools such as images, graphics, photographs, audio and animation (Dupain & Maguire, 2007; Robin, 2008; Rofiza Aboo Bakar, & Hanani Ahmad Zubir, 2014). It is like a film but requires simplicity and not the skills of a great film director (Kajder, 2006). Although it has been initially used to empower people with little or no experience to share their stories (Lambert, 2003), its usage has been extended to the teaching and learning environment for its potential benefits (Robin, 2008).

There have been studies that claim digital storytelling is a means that can stimulate creativity among students. In a study by Dupain and Maguire (2007), students were asked to develop digital storytelling on health topics and were found to showcase their creativity. In another study by Genereux and Thompson (2008), undergraduates in biology were reported to be highly creative by sharing their thoughts and feelings with their peers, and reflective with the development of digital storytelling. Jenkins and Lonsdale (2007) administered digital storytelling with different groups of undergraduate students in student induction activity, landscape design, accountancy, and sports development. Students were found to be independent learners and to highly reflect on their learning besides having positive experiences and exhibiting creativity. Di Blas, Garzotto, Paolini and Sabiescu (2009) examined digital stories of Italian learners between the ages of four to eighteen years old. Their digital stories were developed based on either real-life practices, such as going on trips, helping old folks, visiting museums and doing research and science experiments, or subjects like history and science. These students were said to be highly creative. Digital storytelling has thus been regarded by the researchers as a means that can develop creativity. However, what is lacking is that the aspect of creativity is mentioned in brief with no explanation on how these students had been creative with the development of digital storytelling.

According to Torrance (1963), creativity is “the process of sensing problems or gaps in information, forming ideas or hypotheses, testing and modifying these hypotheses, and communicating the results” (p. 4). The process, he explains, then leads to many kinds of products such as verbal, non-verbal, concrete and abstract, the production of something new or original, a new way of looking at problems, a different point of view, and seeing new combination of ideas. Other researchers defined creativity as the act of exploring and discovering (Mitchell, 1998) which usually results in producing material that is artistic and pleasing (Galbraith & Jones, 2003). Creativity is also defined as the combination of analyzing, synthesizing, imagining and valuing (Adair, 1990).

In the above definition by Torrance (1963) and other researchers of creativity, it could be understood that creativity is a process since productions or creations requires a process of imagining, exploring, discovering, refining and valuing. Torrance (1988) later on defined creative processes as sensing problems or difficulties, making hypotheses about the problems, evaluate and revise the hypotheses, convey the results and doing something about the idea. He also acknowledged Wallas’ Creative Process Model (1926) as “the basis for almost all the systematic, discipline methods of training in existence throughout the world today” (p. 47). A framework used in this study was the Wallas’ Creative Process Model (1926).

In Wallas’ Creative Process Model (1926), there are four steps in the creative process: preparation, incubation, illumination and verification. The description is listed below:

- a. *Preparation*— during this stage, the creator is exploring a situation and thinking about the problem, gathering as much information as he can, becoming acquainted with innuendos and even unsuccessful answers, analyzing available materials and resources, and coming up with many possible ideas.
- b. *Incubation*—during this stage, the creator does not consciously think about the problem and goes about doing other activities. At some level, however, the creator’s mind continues to consider the problem which is referred to as the unconscious or preconscious processing.
- c. *Illumination*—during this period, the creator feels that his ideas suddenly fit together and the solution to meet the requirements of the problem becomes clearer.
- d. *Verification*—during this period, the creator evaluates the solution for practicality, effectiveness and appropriateness. The solution may be elaborated and improved if necessary.

Such process flow may find embodiment in the development of digital storytelling by engineering students in the English reading classroom.

In this study, digital storytelling referred to the making of a story or presentation in the multimedia form containing textual contents, images and songs based on the understanding of expository texts. In developing digital storytelling, a student may follow the seven elements of digital storytelling that are proposed by Lambert (2003). Following the elements, the student needs to firstly summarize, synthesize and make connections between the facts found in the expository texts that he reads. Secondly, he needs to pose questions in order to attract the audience's attention, and answer those questions by evaluating carefully the details to be inserted in his subsequent slides. Thirdly, he needs to insert an emotional content to portray specific theme chosen and this can be strengthened through the smart use of music and pictures, which are the fourth and fifth elements in the digital storytelling. For the sixth and seventh elements of digital storytelling, the student needs to carefully evaluate that the digital storytelling is not too overloaded with details and that his story pace is steady.

Usually, the student needs to reproduce what he has read using his imagination, to elaborate and to go beyond what has been read. Using imagination, elaborating and going beyond something are all creative processes (Adair, 1990). In developing a digital story, the student or the reader cum creator needs a lot of imagination to attract the audience's attention to watch his digital story with enthusiasm and curiosity. By doing this, he is hoped to be exercising the creative process for always experimenting and evaluating which theme to emphasize, which textual content, images and songs to use and whether all of them suit each other.

METHODOLOGY

This study employed a qualitative case study research method (Bogdan & Biklen, 1992; Creswell, 2007; Merriam, 2009). It sought to explore the creative processes of two engineering students in their development of digital stories in the English reading class. The selection of the respondents was based on two criteria. The first criterion was that participants were the opposite of average students (Maxwell, 2005). Since the engineering diploma students were reported by the participating university's Academy of Language Studies (2012) to be the least proficient in the English for Academic Purposes course in comparison to students from other faculties (such as Pharmacy, Health Sciences and Hotel and Management), a class of twenty-eight engineering students were chosen to participate in this study. However, only the above-average and below-average readers identified through a Reading placement test were selected to be studied closely as they were the opposite of the average readers that usually represent the average students. The second criterion proposed by Maxwell (2005) in purposive sampling is establishing comparisons between individuals. Therefore, in this study, the above-average and below-average readers were both chosen so as to provide clarity about their similarities and differences in creative processes while developing digital stories. Their consent to participate in the study was sought. Both respondents were nineteen year-old, Malay males.

The placement test used was the university's October 2009 official English for Academic Purposes final exam for the reading component. It was categorized as a criterion-referenced standardized test because it compelled each student's score to be compared to a cutoff score set by the test authors (Wolf, 1993, as cited in Caldwell, 2002). The English language lecturers marking the reading test were expected to follow all directions for scoring the test without adapting or changing any of the procedures set. The total mark for the reading test component was set at twenty and the mean grade equivalent reading scores for the total population sitting for the paper was 11.3 marks (Academy of Language Studies, UiTM Penang, 2009). Block (1986), Levin (1973) and Paris and Myers (1981) defined good or above-average readers as those with reading comprehension test scores were at or above the mean score for the total population, and poor or below-average readers as those with reading comprehension test scores below the mean score for the total population. Therefore, in this study, the above-average reader scored 17 marks in the placement test, where as the below-average reader scored 8 marks. Data were drawn from observational field notes, interview transcripts and respondents' digital stories in three weeks of the digital storytelling project. There were three two-hour classes in each week. Prior to the project, all the students were introduced to digital storytelling, the significance of the seven elements of digital storytelling in developing a digital story, the Windows Movie Maker tutorial (a software needed to build a digital story), and some hands-on practice on Windows Movie Maker. The project sequence was planned as follows:

- Week 1: Mete out reading placement test and identify the above-average and below-average readers.
- Week 2 and 3 (six two-hour classes): Introduce students on how to utilize the seven elements of digital storytelling and Windows Movie Maker.
- Week 4 to 6 (nine two-hour classes): The students prepare and make their own digital stories.

The title of the digital story was 'Plastic surgery: the reasons, the risks and a lesson learned'. The respondents and their classmates were given two expository texts on plastic surgery from which they could find ideas for their digital stories. However, they could find other reading texts and videos to help them develop their digital stories.

FINDINGS

Case Study One: Fikri

Fikri (pseudonym), whose age was nineteen years old at the time when the study was administered, was an above-average reader. He had scored 17 marks in the placement test. He scored all As for the English paper for the Malaysian Certificate of Education, and the UiTM Semesters I and II English papers. He was selected for case study in order to understand what creative processes an above-average reader would produce while developing a digital story.

a. Preparation

In his preparation, Fikri was seen as a disciplined student. He prepared his reading logs and digital storytelling elements worksheet, drafted the storyboard, and tried finding suitable pictures and videos for his digital story. He reported about this action in his student journal. Also, he was seen taking down notes from the reading articles, and searching for pictures and videos from the internet (Class Observation, July 18, 2013). Fikri was also sociable. Often, he was seen going and talking to his friends, and helping them out with their work. A student in the class told the researcher that Fikri was never condescending and was always helpful that he could even give other students ideas for their digital stories while they were driving from campus to their hostel. It could be that Fikri developed ideas while discussing and collaborating with his friends. In an interview, he said, *"I discussed with my fellow friends about plastic surgery and I asked so many questions to them. ... What do I put in my digital story, the pictures, the points and ... how to make the video more interesting?"* (Fikri's Interview Session, August 21, 2013). He also asserted that his discussions normally took place in classes and at the hostel (Fikri's Interview Session, August 21, 2013). From the evidence, it could be assumed that in his preparatory process, Fikri was disciplined and collaborative in his work.

b. Incubation

In his student journal, Fikri wrote that at first, he felt nervous at the thought of having to develop a digital story but reassured himself that "nothing is impossible in this world," (Fikri's Student Journal, August 2, 2013). However, he added that he felt guilty and thought that he was procrastinating when he needed to finish other assignments first before working on his digital story. He reported doing his digital story late at night when the *"... surrounding is very silent"* and *"... the ideas came by and I did what crossed my mind,"* (Fikri's Interview Session, August 21, 2013).

c. Illumination

To make the topic of plastic surgery clear to him, Fikri reported that he surfed a lot of pictures that were related to the topic on the internet. He wrote in his journal that *"... in the making of this video (digital story) ... I browsed all the pictures that are related to this topic"* (Fikri's Student Journal, August 2, 2013). Then, in his attempt to make his digital story to be more compelling, he discussed his work with his friends. He said, *"I discussed with my fellow friends about plastic surgery and I asked so many questions to them. What do I put in my digital story, the pictures, the points ... how to make the video more interesting,"* (Fikri's Interview Session, August 21, 2013).

d. Verification

In his digital storytelling elements worksheet, Fikri planned that his digital story would last about four minutes and that his digital story "will flow nicely" and contained music that was "relevant to the topic" (Fikri's Digital Storytelling Worksheet, August 2, 2013). His actual digital story lasted for three minutes and thirty-six seconds, and this may give an indication that he had carefully checked his work to not go beyond the five minutes' length as instructed by his lecturer. However, his digital story received both fine and discouraging comments from the examiners who evaluated for the appropriateness of his work. Those who favoured his work wrote notes such as having an *"... impressive introduction with the title and definition ... and the background music is fine"* (Examiner 2), and being *"... different from others"* (Examiner 5) and *"... a great piece of work"* (Examiner 2). The examiners who disfavoured him wrote notes such as *"Music used is fast ... and disturbing the flow of thoughts,"* (Examiner 4) and *"Explanation too long. Digital presentation needs to be short and precise"* (Examiner 3). This comment holds truth because the audience of his digital story was only given about fifteen

seconds to read his long elaboration on each slide. This makes it hard for the audience to read and digest the information at the same time. Fikri could have written his elaboration in the point form or asked his friends to watch and comment about his digital story so that it could be improved. Despite the unfavourable comments received from a few of the examiners, Fikri's digital story was still ranked the best among the other respondents with 23.2 marks over 28. His digital story was graded and averaged out by five examiners using the Digital Storytelling Grading Rubric that was adapted from Dupain and Maguire (2007). This may give an indication that he may have evaluated his work carefully. The Digital Storytelling Grading Rubric is shown in Table 1.

TABLE I
DIGITAL STORYTELLING GRADING RUBRIC

Criterion	Scoring Marks				Marks
	Excellent (4)	Good (3)	Fair (2)	Unsatisfactory (1)	
Summary	Extremely thorough; displays evidence of extensive research with more than three main points for each required component.	Adequate summary of information; demonstrates reasonable research with two or three main points for each required component.	Presents limited amount of information with only one to two main points for each required component.	Limited information; demonstrates little evidence or required evidence is missing.	
Organization Of Information	Material is extremely well-organized; format is logical and easy to follow; ideas flowed from one idea to another.	Shares research through an organized and clear presentation; most parts flow to one another.	Organization lacks in consistency; little continuity.	Required information is extremely unclear.	
Use Of Media Resources	Supporting resources are appropriate to topic; method of utilizing media is very effective.	Appropriate selection and use of media resources.	Selection and use of media resources is very limited	Little use of appropriate media resources.	
Effectiveness Of Message	Captures the interest of the audience with fresh, unexpected, unique and well-developed message.	Presents a clear message for the audience.	Message is difficult to decipher.	The story that is produced is mundane and not well-developed.	
Presentation	Exceptionally appealing delivery of required components.	Clear and adequate display of required information.	Required information was partially fulfilled.	Required information was incomplete, ineffective, and reflected little effort.	
Mechanics	Has no spelling and grammatical errors.	Has 1 to 2 spelling and grammatical errors.	Has 2 to 3 spelling and grammatical errors.	Has 4 or more spelling and grammatical errors.	
References	All important references are present and written accurately.	Adequate references are present and written accurately.	References are made but the correct conventions are not followed.	References are missing altogether.	
Scale:	22-28 Expert; 15-21 Master; 8-14 Apprentice; 1-7 Novice			Total Marks	

Case Study Two: Ammar

Ammar (pseudonym), was also nineteen years old when the study was administered. He was a below-average reader. He had only scored 8 marks in the placement test. He scored B for the English paper for the Malaysian Certificate of Education, and B- for the UiTM Semester I and C+ for the UiTM Semester II English papers. He was selected for case study in order to understand what creative processes a below-average reader would produce while developing a digital story.

a. Preparation

Ammar, in his preparatory process, searched for additional reading passages on plastic surgery including one describing plastic surgery from the perspectives of Islam (Class Observation, July 19, 2013). In fact, he had searched for more materials than other students. He saved more than thirty still pictures, some emoticons, a few videos and several songs that could be used in his digital story if he wished to (Class Observation, July 19, 2013). His storyboard and digital storytelling elements worksheet contained his general ideas that he wanted to include in his digital story like examples of and differences between constructive surgery and cosmetic surgery (Ammar's Digital Storytelling Worksheet, August 2, 2013 & Ammar's Storyboard, August 2, 2013). Because Ammar really enjoyed this digital storytelling project which he called a "*happy work*" (Ammar's Interview

Session, August 28, 2013), he confessed that he did not mind finding a lot of videos to watch for his imagination and ideas to flourish (Ammar's Interview Session, August 28, 2013). It seemed that Ammar had happily immersed himself in this digital storytelling project.

b. Incubation

Ammar believed that he could not waste time and tried to do his digital story in and outside of the English class hours (Ammar's Interview Session, August, 28, 2013). However, if he was running out of ideas, Ammar played games to feel refreshed, and prayed the 'sunat' or additional prayers to get ideas. He said, *"Like me, when I want to do my work, if I have no idea, I'd just play games, and I'd play for my body to sweat. Because usually, when I do my work, I'll be sleepy, so I'll do something to activate my body. Then, I have some rest and after that, usually my mind is refreshed because the oxygen is enough. If I keep thinking I will be more stressed out. So, I'll just forget about work for a while and then I'll do my work. Then, when I open it back, God willing the ideas are there,"* and he added *"... after the 'Tarawih' prayer, I'd normally have ideas. Ideas kept pouring in I and I had points to work on. Even when I had to download something, it became easier. So, Allah's help was there,"* (Ammar's Interview Session, August, 28, 2013).

c. Illumination

Ammar did a lot of brainstorming and he put all his ideas in his digital story. He told in the interview, *"First, I brainstormed, I just put all that I had, did trial and error, trial and error,"* (Ammar's Interview Session, August, 28, 2013). Then, he watched some videos from the internet and by doing this, his ideas became clearer. He said, *"Then after I watched some videos, I knew what I wanted to do,"* (Ammar's Interview Session, August, 28, 2013) because *"My ideas come rushing in as I'm finding what I want to insert in my digital storytelling. For example, when I'm watching videos from 'YouTube' and 'Break', ideas will come to me,"* (Class Observation, July 23, 2013).

d. Verification

In his entries in the student journal, Ammar mentioned that he tried to choose some pictures and songs that could attract the audience's attention (Ammar's Student Journal, July 19, 2013) and touch his digital story up (Ammar's Student Journal, July 25, 2013). This careful effort was seen when different songs were used to accompany the different sections in his digital story. For example, when the slides showing the pictures of a Korean pop group 'Girls' Generation' who underwent plastic surgery were shown, their song entitled 'I Got a Boy' was being inserted as the background song. Next, when the slides showing the transformation of Michael Jackson from someone who was dark and had flat nose to someone who was fair and had pointed nose, Michael Jackson's very own song 'Black or White' was inserted to have an impact on the audience. Then, towards the end of Ammar's digital story, he chose Forrest Gump's theme song that is melancholic and slow. In choosing the song, Ammar may have wanted the audience to think that life imperfections should be accepted and ones need not go for plastic surgery to be happy; just as how Forrest Gump in the movie has accepted his imperfections and thus led his life happily. While working on his digital story, his pictures and textual contents went haywire in his digital story because he wanted to insert many songs. However, he reformulated his work by having the songs saved in a different folder from the pictures. This was not taught in class but learnt by him through a few approaches of his own with the software. Anyone working with the digital storytelling would understand that this was a big challenge but he did not give up, and in fact figured out a way to solve his problem. Besides, there were some slides in his digital story that contained linkers and texts that were written in capital letters. The linkers were to show a smooth transition from one point of discussion to another, and the text written in capital letters were used to show the seriousness of the risks of plastic surgery. This gives an indication that he was careful in presenting and evaluating the details in his work. For Ammar's work, the first and second examiners gave him 13 marks, the third examiner 18, the fourth examiner 15 and the last examiner 19. Thus, Ammar's digital story was ranked a master level with 15.6 marks over 28 when assessed with the Digital Storytelling Grading Rubric.

In short, both respondents were found to exhibit the creative processes suggested by Wallas (1926) although Fikri and Ammar were uniquely different in their creative processes. Fikri's best point was being friendly and helpful. His discussion and development of ideas with friends had certainly helped him in developing a unique digital story. Ammar may be a below-average reader before the digital storytelling project started. However, with his digital story, Ammar was ranked a master in his reading comprehension. Most importantly, he had exhibited excellent creative processes. His effort in learning something new, in refining his work and in putting his thought had rewarded him well. Figure 1 shows the summary of the creative processes portrayed by both respondents.

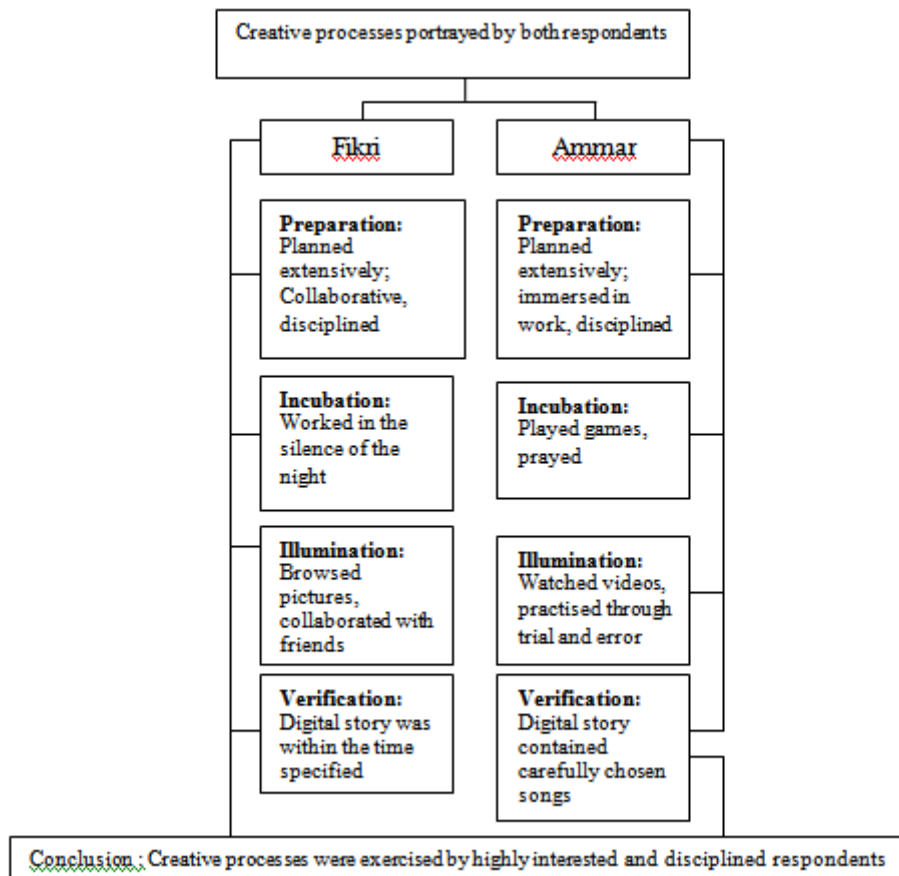


Fig. 1.
Creative processes exercised by both respondents

DISCUSSION AND CONCLUSION

The purpose of this study was to explore the creative processes of two engineering students - an above-average and a below-average readers - in their development of digital stories in the English reading class. The findings indicated that while developing digital stories, both above-average and below-average readers had undergone the creative processes as suggested by Wallas (1926) by preparing extensively, incubating, illuminating and verifying their work well. In this study, both the students were found to explore possible ideas, plan and draft their work, be disciplined, work in the silence of the night, pray, collaborated with friends, practise till perfection, and think carefully about or verify their digital stories so that they could produce something artistic, pleasing, new and original. All these are traits of prominent creative people in their creative processes (Galbraith & Jones, 2003; Piirto, 2010; Torrance, 1963).

This finding was expected from the above-average reader because previous literature has claimed that people with higher cognitive abilities would produce better creative processes than ones with lower cognitive abilities (Kaufman, 2009). Since the above-average reader in this study had proven himself to be better able than the below-average at using cognitive abilities in his Reading placement test, this finding was quite predictable. However, the below-average reader had shown that with a high interest in the work given and high self-discipline, his creative processes were no inferior to the ones exhibited by the above-average reader. Like the above-average reader, the below-average reader was just as disciplined as the former, and had immersed in the work given to him because he was very interested in the digital storytelling which he called "happy work". He had not given up when faced with challenges whereby his textual contents and pictures becoming haywire while experimenting with the insertion of many songs in his digital story. This finding is consistent with Runco and Sakamoto's (1999) explanation that a person's intrinsic motivation will influence his creative process. This finding is also consistent with Nickerson's (1999) explanation that a person would immerse himself in an activity that is enjoyable to him. It is thus implied that it is not necessary for students to have high cognitive abilities alone in order to produce good creative processes. What they need is the high interest and high self-discipline which will direct their energy to become creative. Therefore, for students who are willing to work hard, they will benefit from the development of digital storytelling as they will be exercising the creative process which will lead them to being creative.

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