M.S. Thesis

EFFECTS OF GRAPHIC NOVELS AND DIGITALMOTION COMICS IN RELATION TO VISUAL TENDENCY IN ENGLISH LANGUAGE COMPREHENSION

By

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ABSTRACT

This research focuses on determining the differential effect of graphic novels and digital motion comics across learner's visualization tendency level on English language comprehension. The experiment was conducted in a university located in South Korea. To collect data from the participants, a visualization tendency test was administered to determine those with high visualization tendency level and those with low. Each of those groups was further divided into two. This makes two main groups. Each of these two main groups consists of two subgroups, high and low visualization tendency level subgroups. The graphic novel and digital motion comics were the teaching mediums tested and assigned to the two main groups. The data were analyzed by two-way ANOVA to analyze the comparative effects of graphic novels and digital motion comics across visualization tendency. The result shows that there is a differential effect of graphic novels and digital motion comics across learners' visualization tendency level on English language comprehension (F=6.181, p=0.016). Students with high visualization tendency level performed better using graphic novel than using digital motion comics, but students with low visualization tendency level performed better using digital motion comics better than using graphic novels. Which visual medium is preferable for English comprehension exercise depends on

whether the student has high or low visualization tendency level. The main effect of the mediums for facilitating comprehension is not meaningful because of this interaction. Digital motion comics may appear more effective than graphic novels, but this is not the case. This study shows that digital motion comics are only favorable for students with low visual tendency level, and graphic novels for students with high visualization tendency level. The differential effect of the mediums across visual tendency level on comprehension is attributed to the differences in cognitive load experienced by each group.

Key words: graphic novels, digital motion comics, visualization tendency, language acquisition

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CHAPTER I: INTRODUCTION

Innovative teaching techniques are constantly being sought, especially for those who are learning English as their second language. English is without doubt one of the most difficult language to learn, and students may vary in their learning needs and styles. This is why it is important to make learning as fun as possible. This is to engage the learners more into the learning process. Graphic novels and digital motion comics are part of today's popular culture. Graphic novels' popularity is evidenced by successful film adaptations. Though widely criticized, the digital motion comic has been swiftly gaining the attention of those in the education arena as a viable option for a learning medium. Digital motion comics combine visual and auditory sensory stimulation. For the purpose of learning, such features can have positive effects on developing comprehension and retention. There are studies (Velez, 2006) that suggest that the combination of sensory stimulation allows the brain to make more connections with the information being presented in order to retain the knowledge and easily retrieve it later. Comic strips and cartoons have been used in education for many years, capturing the attention of the students as no textbook can (Lim, 2011). Simple text can be hard to process for the average person, most especially among those with learning difficulties (Stein and Talcott, 1999). Those are the reasons that inspired this research. This research explores the effectiveness of graphic novels and digital motion comics to facilitate reading comprehension in an ESL/EFL classroom. In addition to this, another

variable is taken into consideration: visualization tendency level. This research seeks to determine the effectiveness of these visual mediums and whether or not a learner's visualization tendency level is a contributing factor to the effectiveness of each medium.

Graphic novels and digital motion comics have effects in ESL students. In short, they can be used as pedagogical tools for teaching language. This paper aims to determine which of these is more effective as instructional material for ESL settings. Before venturing into an experiment that will provide the answer, this paper explores the studies attesting to the effectiveness of graphic novels and digital motion comics as instructional materials in ESL classrooms. In other words, this paper must first prove that graphic novels and digital motion comics are indeed proven by empirical evidences obtained from existing literature on the topic to be true. Th again, one may ask for a as to why it makes sense to determine which of the two is better. A reason might be that today's students gravitate towards technology.

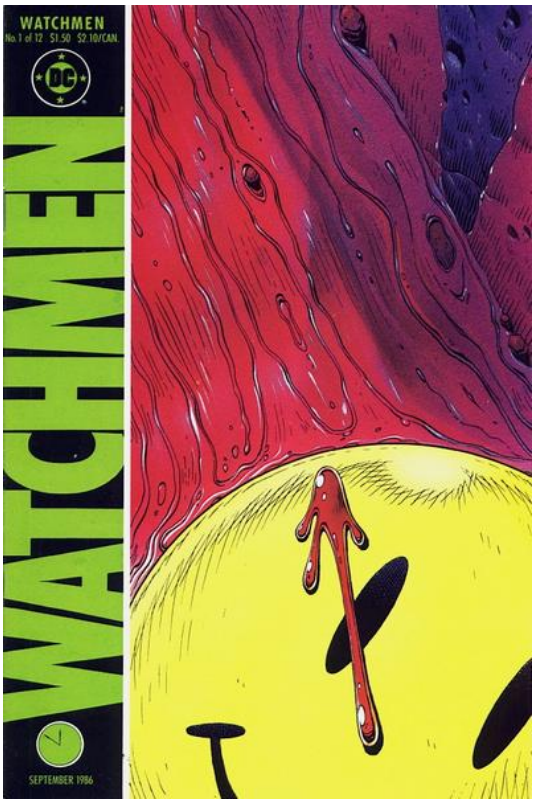

*Figure 1.*Watchmen cover

On the one hand, graphic novels and digital motion comics share similarities. On the other hand, they are also different some aspects. The differences between the two mediums are where the reason lies on why learners may prefer learning through watching and listening to a digital motion comic than reading a graphic novel. Many students today prefer a multimedia presentation of information as they are more engaging, and there are numerous studies showing that the use of multimedia learning tools such as digital motion comics shows better output compared to graphic novels. In addition, there are learners who rely more on visual elements than auditory elements, and there are also those who rely more on auditory elements (Kozhenvikov, Hegarty, & Mayer, 2002). Given the diversity of a classroom environment, using digital motion comics may be beneficial for learners who rely on visual elements and learners who rely more on auditory elements. Another reason why more and more people prefer multimedia learning over traditional methods is because the experience is interactive. Interactivity promotes learning. Graphics promotes interactive learning in such a way that the learner is engaged instead of just sitting and passively listening to a lecture (Sims, 1997). For example, there's a research showing that learners comprehend the animated version of a storybook compared to reading the story book itself (Seyit, 2011). The research findings suggest that learners recall information using animation better than using mediums with none. In fact, there are already efforts in the technological industry to create applications that can be downloaded in computers that aims to encourage learning through providing the learners with multimedia learning mediums (Anderson, 2003; Doty, Popplewell, & Byers, 2011; Pearman, 2008).

Background

The first question that needs to be answered is the following:

- Why is there a need to bother researching the feasibility of using graphic novels and digital motion comics as instructional mediums for reading comprehension in ESL classrooms?

Graphic novels gain more and more popularity among people today. They are cheap, normally inexpensive and still a very popular medium, especially among the young populations. The proof of their popularity is the success of Hollywood film adaptations of graphic novels into movie formats. For example, *The Avengers* set a record on ticket sales on its release, becoming the top-grossing blockbuster hit beating book adaptations like *The Harry Potter Series* (Barnes, 2012).

Digital motion comics have the features of graphic novels plus more: that is, animation and sounds are involved. They are also popular among comic book fans around the world. Digital motion comics are one of the products of collaboration between graphic novel artists and digital technology.

Therefore, the answer to the first question: There is a need to research on the feasibility of graphic novels and digital motion comics as instructional mediums for reading comprehension in ESL classrooms because of the following reasons:

Graphic novels and digital motion comics are very popular. They are popular because people find them entertaining. Their being entertaining and popular means that these mediums have the capacity to attract and hold the attention of its readers. This also means that they are engaging. Their being engaging makes them

potential instructional mediums, as studies suggest that the more engaging an instructional medium is, the more it is effective to facilitate learning.

Educators continue to find ways to improve teaching techniques. Today, with the wonders of the information age, digital technology is utilized to serve the purpose of educational institutions to make individuals learn with the kind of efficiency that defines the information age. Digital technology creates environments where creativity is encouraged enticing the participation of all members of society. Note that the element of fun is crucial here to somehow "deviate" the individual from entertaining the thought that performing the assigned task is mentally or physically taxing. This principle also applies to learning: Learning should be fun. Popular culture is the product of cultural industry whose aim is to make people have fun. Comic books, graphic novels, and digital motion comics are some artifacts in the popular culture that can be used to make learning fun (Frey & Douglas, 2004).

The second question that needs to be asked is:

- Why are graphic novels and digital motion comics popular? In other words, what makes them popular

The first and obvious answer is provided above. They are popular because they are entertaining. They are entertaining because of the themes these texts discuss. However, there are more profound reasons why this is so. For instance, individuals today are conditioned to prefer mediums that are easy to read.

Visualization is a crucial factor on determining the effectiveness of graphic novels and digital motion comics to facilitate reading comprehension in an ESL classroom setting. According to Rha et. al. (2009), "Visualization refers to a mental

process for explaining, expecting, operating, and creating objects, processes or events through imagery formats." Individuals differ in their visualization skills. The visual tendency test used as instrumentation in this research measures the visual tendency level of the participants. This paper believes that the differences in visual tendency level are a crucial factor that may affect the effectiveness of the mediums to individual learners.

This research is structured in such a way that the reader will understand the nature of graphic novels and digital motion comics. By "nature", this paper means characteristics similar to all published and released products that are claimed to be "graphic novels" or "digital motion comics". The discussion will then proceed to a short history of graphic novels and digital motion comics. This is to provide a background of the mediums used for this study.

The discussion proceeds to discuss how the characteristics of graphic novels and digital motion comics relate to these theories. In other words, how the characteristics of graphic novels and digital motion comics can also function "to guide" an individual to understand (i.e., to read) the content of the mediums. That is to prove that those characteristics are not there merely to look good in the eyes, but are also strategically used by the artist to convey a message in the clearest possible way. "Strategically used" means that the artist arranged all the visual and auditory elements in the text in the most effective arrangement to make the message clear. This process includes choosing from the graphic devices that are available to the artist. Graphic devices refer to the manipulation of visual elements to convey

meaning. Some examples of graphic devices include arrows, motion lines, and overlapping multiples. This paper returns to the topic of graphic devices later.

This involves a review of related literatures. The literatures cover studies that attempted to use graphic novels and animations as learning tools. The studies were not limited to those that used such mediums for ESL classrooms, but also for teaching other disciplines such as history, science, and the arts. This is to explore how the characteristics of graphic novels and animations play significant functions to facilitate learning. These studies were based on theories of learning, which were in turn based on cognitive science.

The role of theories in these studies needs further discussion. These theories were guides on how the mind of the learner processes the characteristics or features of the mediums to come up with meaning. The goal, of course, is for the learner to grasp the intended meaning of the work. This means that there is an interaction between the learner and the given material or text. On the one hand, the learner has a mind that is wired to process input information and come up with meaning. For this study, the input information is provided by the mediums or texts. On the other hand, the mediums (i.e., graphic novels and digital motion comics) have limited resources or devices that it can use to communicate certain messages.

A theoretical and conceptual framework is then developed from the reviewed literature. As the theoretical and conceptual frameworks show, the cognitive factors are still the primary emphasis of this study. That is to say, the effectiveness of graphic novels and digital motion comics depends on how these mediums input information on the mind of the learner. The differences on how

these mediums communicate to the learner's mind. In other words, the mediums should be structured in such a way that they will appeal (or be compatible) to the structure of the mind.

This is where a learner's visual tendency level plays a significant role determining the efficiency of an individual to process the information from graphic novels and digital motion comics.

Purpose

This research has the following objective:

- To determine if there is a differential effect of graphic novels and digital motion comics across learner's visualization tendency level on English language comprehension

As will be shown later, there are numerous studies that explored the effectiveness of graphic novels and animation in the classroom. The findings of these studies differ. Some of them show that these mediums indeed work. There are comparative studies that suggest that graphic novels are more effective than animation. However, there are also studies that attest that the latter is more effective than the former. This study contends that there is another contributing factor that significantly affects the effectiveness of the mediums in learning. This factor is visualization, measured via visual tendency level tests.

This study is significant as it explores the effectiveness and appropriateness of multimedia instructional mediums in relation to the fact that schools are increasingly becoming heterogeneous, multiracial, and multicultural. This point is further discussed in the theoretical framework of this study.

Also, graphic novels and digital motion comics are products of the culture industry. Culture industry, a term coined by critical theorist Theodore Adorno and Max Horkheimer (1944), have the aim of making individuals think that everything is alright [through making the experience' of reading and watching them exciting or fun by using visually appealing elements] despite the social reality that inequality is present in almost all aspects of modern society. For instance, graphic novels like *Watchmen* make the reader feel that, despite the political and economic tensions that cause wars, everything is and will always be alright because there will always be the superheroes who will save the day.

By using these texts, i.e. Graphic novels and digital motion comics, as pedagogical tools, they are used in a subversive way. It is subversive because they are used, not in the way that the culture industry expects them to be used (i.e., to make oneself feel that everything is fine despite all the inequalities). If proven that they can be effective texts that can aid in language learning compared to using traditional teaching/learning tools, educators will be motivated to discover how the products of the culture industry, specifically popular culture, can be used as teaching tools that can "engage" the learner more in the learning process.

In other words, this study is significant because the findings can be used to improve education curriculum in order to make learning, and language learning in particular, less "intimidating". Learning a new language can at times be intimidating for some people as it involves learning all the rules in order to learn how to speak and use it properly. By making the task more fun, the learners will be encouraged,

as if a form of motivation, to pursue studying it, precisely because it is fun and “less” laborious.

The researcher admits that this research is an ambitious pursuit. This is because it attempts to incorporate theories of cognitive science, popular culture (cultural criticism), and teaching and learning. Lines need to be drawn to avoid encountering questions that will mean traversing other disciplines to provide answers. However, encountering some of such questions may be inevitable. In that case, they will be saved as a recommendation for the other researcher interested to contribute to the knowledge of the topic.

This paper will only cover theories in cognitive science that can explain how the human mind grasps the graphic and auditory devices graphic novels and digital motion comics use to convey meaning. In addition to this, this research will only incorporate theories of popular culture (cultural criticism) that conditioned the mind of the individual to process visual and auditory input in certain ways. This research will only utilize theories of teaching and learning that explain reading comprehension in ESL classroom settings.

Definition

1. Visual Mediums

Conceptual definition

Visual mediums refer to means of communication where visual perception is used.

Operational definition

Graphic novel: A visual medium where there are cartoon drawings that tell a story and are published as a book.

Digital motion comics: Visual mediums that retain the comic strip essentials of serialized narrative with text balloons and captions and have other feature such as cinematic effects and audio book style voice-over

2. Visualization Tendency

Conceptual definition

Visualization tendency refers to the inclination of individuals towards the utilization of visualization in their daily lives. Visualization is "a mental process for explaining, expecting, operating, and creating objects, processes or events through imagery formats (Rha et. al., 2009; Rha & Sonyoung, 2010).

Operational definition

High visualization tendency level: High visualization tendency means high inclination to utilize visual modalities (Rha et. al., 2009; Rha & Sonyoung, 2010). High visualization tendency means reliance to visual modalities than other modalities (e.g. auditory, kinesthetic, etc.) to understand an idea. Students with high

visualization tendency are expected use more visual modalities than students with low visualization tendency level.

Low visualization tendency level: Low visualization tendency means low inclination to utilize visual modalities. Low visualization tendency means reliance to other modalities than other visual modalities to understand an idea.

CHAPTER II: REVIEW OF THE LITERATURE

Graphic Novels and Digital Motion Comics as Visual Mediums

The graphic novel is a collection of comic strips that are combined and bounded. In Merriam-Webster's Learner's Dictionary, it is defined as "cartoon drawings that tell a story and are published as a book". This comes across as very simplistic and light; however, it clearly demonstrates the relationship between the two forms – that of the cartoon in strip form and that of the graphic novel.

There really is no clear delineation that differentiates comic strips from graphic novels. The graphic novel maintains the principles of the comic strip with a clear narrative and still uses text balloons and captions to drive the storyline. An exciting development of this format has emerged over recent years and is very much in its infancy – the digital motion comic. These take the graphic novel; some, like the graphic novel, retain the comic strip essentials of serialized narrative with text balloons and captions; and move it into an exciting future with cinematic effects and audio book style voice-over. This is a medium that has not yet found its ultimate look, its voice or its proper place in the story of the comic. Geoffrey Long (2008) in his not entirely flattering article on the digital motion comics points out "while [digital motion comics] are certainly interesting experiments, they seem to be fumbling blindly for a market that may simply not exist". Below is the cover for the *Watchmen* motion comics:

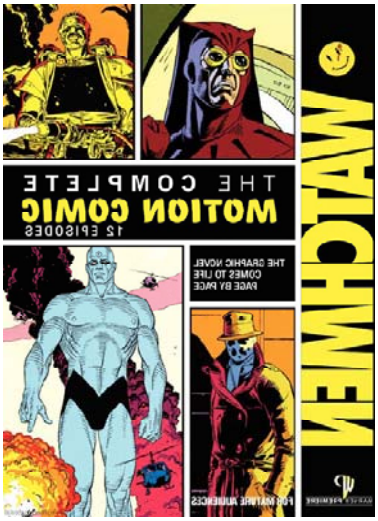

Figure 2. Watchman digital motion comics cover

Using graphic novels and digital motion comics as teaching mediums can have positive impacts on teaching English language. The introduction of reading matter where pictures, cartoons or comic strips dominate are a standard and perfectly acceptable form of course medium within language schools for students studying English as Second (ESL) or Foreign (EFL) Language. Kohii and Forouzeh consider that these media make "reading more enjoyable and comprehensible" (Page 10). The elevated enjoyment while learning, as well as total comprehension of the learning mediums, has proven to be most effective in educational settings.

Other forms of the comic strip have carved a significant niche for themselves in the education field and are used successfully in an EFL environment. The success of these as teaching tools to assist the learning process can be seen from the wide range of papers and texts on the subject; for instance Linda Starr writes "graphic novels…can be an effective means of teaching struggling adolescent readers" (2004). There is an abundance of research available including

Mayer and Moreno; and Kohii and Forouzeh; and Chun who used a graphic novel, in this case *Maus* by Spiegelman, in a secondary high school classroom for ESL students. She concluded that the novel aided learning as one way of implementing a multi-literacy approach that deepened student engagement.

As the digital motion comics has not yet evolved into a single format, this thesis suggests the use of a specific story that is available as both digital motion comics and graphic novel, the works of Alan Moore and Dave Gibbons story. The animated series consists of twelve 25 to 30 minute episodes. Each of these episodes is based on the chapters in the graphic novel. Although they are available in complementary formats, this particular digital motion comics version of the story retains all of the aforementioned essential characteristics of graphic novels; that is, serialized narrative with text balloons and captions and, in addition has some cinematic motion within the frames of the cartoon, a single actor voice-over and sound and other aural effects. Many may consider the DMC a hybrid of animation and static images.

The visual aspect of the digital motion comics learning method creates a connection for those learners who gain the most knowledge from visual stimulation. In addition, visual stimulation allows the observer to be more engaged in the action, creating an emotional connection between the learning medium and the learner (Chu, n.d.). Audio-speech narration during the digital motion comic's presentation accesses the audio senses of the learner, creating an even more effective learning method that doesn't just stimulate one of the senses. The speed of the digital motion comic is controlled through the narration and animation of the product.

Media players, software applications that can be downloaded for free, have features that allow the user to control the speed, pacing etc. of a movie being played. The user can pause certain parts, have it in slow-motion, fast forward, and backwards. This study contends that the learner will experience less difficulty in to keeping up with a fast dialog or falling behind, trying to read and reread sections that don't make sense. The combination of the audio and visual stimulation allows the learner to hear and see what is being talked about. This way, the meaning is clear, and there is no confusion to stagnate the learning process or frustrate the learner.

***Figure 3*. Comics use graphic devices, such as arrows, to convey a movement, the direction it is taking, as well as where it began**

This thesis is a presentation of the hypothesis, research requirement to identify whether there is an advantage in using digital motion comics over the accepted format of the graphic novel. Taking the accepted value of the graphic novel as an educational tool in the ESL/EFL classroom as a starting point, the relative Visual literacy scores' relation to each of these media was tested and compared through analysis of first hand research. Further, the current literatures

available to the researcher on all aspects of the study were briefly reviewed in order to guide and focus the present study.

Graphic Novels and Digital Motion Comics as Instructional Mediums

There are two questions that one can ask in the idea of using graphic novels as pedagogical tools in the ESL classroom. First, "Why use graphic novels in the ESL classroom; second, "Are graphic novels curriculum fit?". Christopher Dony's study (2009) helps in answering these questions as he ventured in the past on how to use comics in the ESL classroom, asking why they should be used and if they are fit in the curriculum. Dony maintains that comics can help a learner explore a variety of topics, "constitute the starting point of a debate or class discussion, engender useful grammar and vocabulary exercises, provide a humorous and familiar escape for pupils and help them improve their reading and writing skills, contribute to reflect on authentic language and culture-social commentary, human idiosyncrasies, stereotypes, life conflicts, etc., facilitate character and plot analysis, lead to easy and funny situation-simulation games, and stimulate story-writing exercises" (Dony, 2009).

Comic strips have positive effects in the learning process. There are studies (Khoii & Forouzesh, 2010) whose findings show that there are no significant differences in using texts with comic strips and using texts with no comic strips; however, there are also numerous research (Liu, 2004) proving that comic strips indeed help in language learning. Jun Liu (2004) of University of Arizona explores in his study the effects of comic strips in learners in ESL classroom, specifically

their reading comprehension. The experiments began by determining the proficiency level of the participants, and divide them into two groups: low levels, and high levels. The participants are then exposed to high level or low level texts. Some of the texts were accompanied by comic strips, while others are not. The research findings suggest that the participants who belong to the low-level proficiency group exposed to high-level texts that feature comic strips performed significantly better than those in the high level proficiency group exposed to low-level tests that have no comic strips.

Digital motion picture uses certain techniques that signify particular movement and/or direction of movement. Jose de Souza and Mary Dyson (2008) discussed the basic elements used in static images that render movement. There devices that designers use to communicate trajectory, displacement, direction, and other aspects related to motion. Trajectory refers to the imaginary path that a moving object is taking. Direction refers to the course of action taken. Displacement refers to the distance a moving object made from its original position. In relation to using motion digital comics as teaching medium, there are four basic approaches for selection and organization of instructionally significant images. These include composite image, synoptic image, images of before, during, and after an action, and significant moment (de Souza & Dyson, 2008). Composite images are a series of panel showing instants and moments. Synoptic images are a panel that frames a set of instants or moments in one unit. Images of before, during, and after an action shows a single action but segmented into three essential moments. Significant images are images showing the whole action happening.

Figure 4. **A scene in Watchmen digital motion comics**

There are graphic devices designers use to communicate motions clearly (de Souza & Dyson, 2008). These devices have visual characteristics and expressive capabilities that make them effective in communicating movements. Some examples of graphic devices include arrows, motion lines, and overlapping multiples. Arrows can convey the directionality, displacement of motion and origin of the motion. Motion lines are lines of variable thickness added to an element in an image. A reader can have an idea of how fast an object is moving through how the motion lines are drawn. Motion lines can also serve as a guide to indicate the origin of the movement. It can also be used to depict a moving object as if it is tracing blurred lines in space. In addition, motion lines can indicate that a moving object is vibrating or trembling. Overlapping multiples is the device that can convey displacement clearly as it displays in a panel or frame overlapping images of a moving object as the action unfolds.

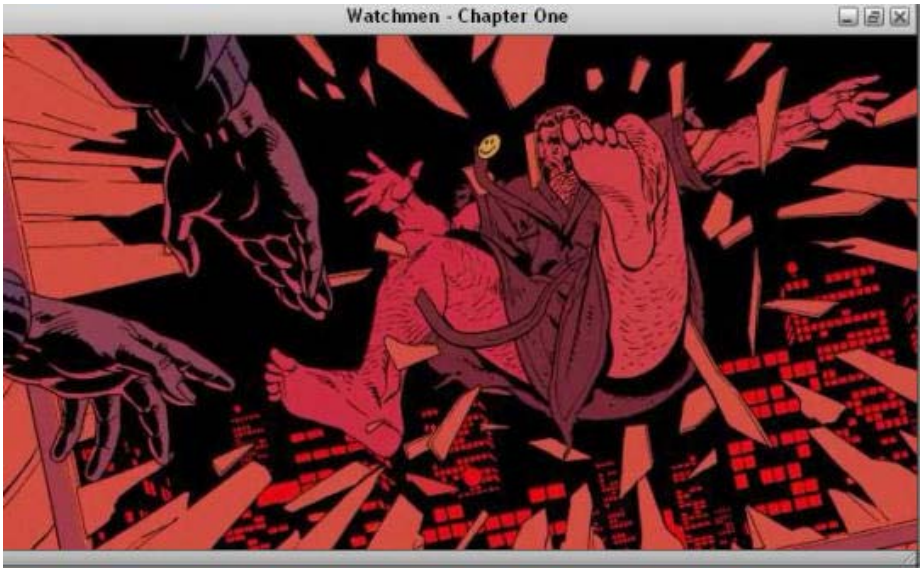

***Figure 5*. A scene where devices are used to convey motion, where it began and the direction of the moving object, as well as the cause of the motion**

There are theoretical principles tested by a number of studies that provide support for the effectiveness of digital motion comics for learning due to its use of both visual and auditory elements. For instance, Richard Mayer and Roxana Moreno (2007) explored how cognitive theory of multimedia learning works in actual situations. The researchers maintain that conveying information is better when the message is delivered through visual and auditory channels simultaneously than delivering it through visual channels alone. This is the multiple representation principle. In addition, it is preferable to deliver both words and images contagiously instead of separately. This follows the principle of contiguity. Another principle that supports the claim that digital motion comics are more effective than graphic novels is the split-attention theory. This principle maintains that it is more effective for learning to present them as auditory narration. Other equally important principles

that may provide theoretical weight to the claims of this study are the coherence principle that maintains it is more effective few extraneous words and pictures when conveying multimedia presentations.

How the mind is able to comprehend the meaning embedded in images, is explained by theories of visual literacy and visual tendency.

Visual Tendency

Visual literacy is important in learning because as the educational system is becoming more and more aware of the significance of using technology as a tool for learning (e.g. PowerPoint presentation, film viewing, etc.), images and visual presentations are also becoming more and more integrated with the curriculum (Stokes, 2002). There are two principles of visual literacy (Ausburn & Ausburn, 1978). The first principle that is basic to the idea of visual literacy is that visuals are language; second, a visually literate person should be able to read and write visual language. Moreover, there are different types of visual language (Ausburn & Ausburn, 1978). These are abstract language elements, body language, and object language, and symbol language. Abstract language elements are those that can be used to convey visual statements. An example is the use of color red to signify passion or violence. Body language is the message conveyed through the facial expression and the manner of movement. Object language refers to using objects to convey a message. For instance, when one puts one's personal belonging in proximity to another person, the latter might feel that his or her privacy is being invaded. Symbol language refers to the use of certain objects to convey a message, such as the raising of a white flag to signal surrender. Visual literacy involves the

comprehension of what these visual elements convey. In addition, there are two basic properties of visual language that makes it comprehensible. These properties are the analogical connections existing among the images and the concepts these images represents and the implicitness of these relationships established through syntax. These properties are what designers use to convey ideas clearly through manipulations of visual images (Messaris, 1998).

The theories on visual literacy and visual tendency – the capacity of an individual to use visual abilities in problem solving – and their role on learning can be tied up with principles of constructivism (Stokes, 2002) learning and cognitive theory on multimedia learning (Mayer and Moreno, 1998). This is because of the highly digitalized age (Information age) where people are becoming exposed increasingly to other stimuli aside from visual elements. In other words, individuals are now more exposed and, therefore, more conditioned to multisensory experience. As digital technology is used in educational institutions, educators can use the multisensory experience that can be derived by using digital motion comics. The features of digital comics and its effect on learning are supported by the cognitive theory on multimedia learning. Cognitive theory on multimedia maintains that information is better remembered when accompanied by visual and auditory activities (Paivio, 1971). Digital motion comics can provide visual and auditory activities.

The significance of visual literacy is related to the theory of constructivism. The theory of constructivism contends "individuals acquire knowledge by building it from innate capabilities interacting with the environment" (Stokes, 2002). In other

words, learning happens through accommodation and assimilation. Constructivism is an "active learning" process which is why it can support the suggestion of using graphic novels and digital motion pictures because such mediums are entertaining that their being entertaining can serve as a motivation for individuals to learn and actively take part. By catching the attention of the learners/readers, the learner/reader will interact with the text.

In relation to this, there are studies that suggest that multisensory teaching is effective, as shown in a research by Stein and Talcott (1999). The research findings suggest that it is possible, for some instances, that a learner can experience difficulties in reading, such as a difficulty in tracking. Stein and Talcott's study show that if a learner experiences difficulties in visual processing, the learner can cope up with listening activities. In relation to the objectives of this study, this paper hypothesizes that learning can be less difficult if digital motion comics are used because of their features (i.e., Cinematic effects and audio book style voice-over) where the student can learn through using visual processing (through reading the text balloons) and listening activities (the audiobook style voice-over).

Lasisi Ayaji (2009) of San Diego State University explored the principles used by junior high school students use visual representations to convey their understanding of a text. Ayaji's experiment shows how social and cultural factors have a significant impact on how the students understand a text. In other words, their interpretation of the texts reflects their personal identities that have been in turn shaped by their socio-cultural background and personal history.

The findings also show that the use of "multimodal" instructional mediums can be effective tools for language and literacy learning in such a way that each student is involved in the learning process because the student's socio-cultural identity is integrated (Ajayi, 2009). Also, the findings show that multimodal mediums allow students to compose texts from various modal channels. Lastly, the findings attest that multimodal mediums opens up opportunities for learners to assert their own identities through challenging discursive practices that marginalize them and also to create new identities; thereby fostering an environment that encourages development of critical literacy practices.

There are basic learning channels or modalities that learners have. These modalities are visual, auditory, kinesthetic, and tactile (Reid, 1987). The visual channel is used for learning activities such as reading and studying charts; the auditory channel is for listening to lectures and for audiotape; kinesthetic channel for experiential learning where there is a total physical involvement in a learning situation; and tactile channel for "hands-on" learning like doing laboratory experiments. Note that there are studies, some of which will be described later, showing how visual, auditory, and gestural elements are significant factors in language learning and teaching (Reid, 1987).

Studies show that language does not develop as an isolated mode of consolidation (Britsch, 2010). The reality of a word, studies attest, derives from its perceptual experience. Therefore, a word such as "dog" becomes a linguistic act only when visual, kinesthetic, and auditory experiences "are automatically associated with the image" it refers. Moreover, images are tied to the full range of

human experience and expression. Froebel (as cited in French, 2007) also pointed out that both visual and auditory are innate in every child. This is the reason why educators integrate visual factors (e.g., picture books, moving images, etc.) in creating a learning environment for children.

The principles described above are also important in language learning and teaching. This is because both visual and perceptual elements play significant roles in English language acquisition. This process of language development in an individual should be seen as modal rather than essentially purely linguistic (Britsch, 2009). Multimodal learning environments provides learners with a setting that promotes "deeper understanding and retention of medium" (Peregoy and Boyle as quoted in Britch, 2009). Studies also show that learning environments that integrate visual elements are more effective than those where only verbal instructions are used. Moreover, no matter what a child's preferred learning modality, learners at the intermediate level should require visual elements.

Multimodal learning is seen to be an effective and appropriate technique in language learning as it provides the learners the opportunity to learn in an environment where their own perspectives, prior learning experiences, identities are integrated (Ajayi, 2009). According to a study, "multimodal… pedagogy has the potential to provide students in culturally plural classrooms with a more representative platform for meaning-making" (Ajayi, 2009). Multimodal pedagogy aims at explaining the interconnections coexisting between the different modes in multimodal texts. In addition, this pedagogy also seeks to understand how diverse modes provide different affordances and constraints in the process of

communication. (Affordances refer to the different kinds of possibilities of human expression and human's relationship to the world where process of communication continues to evolve due to rapid technological advancements (Ajayi, 2009).)

Furthermore, multimodal learning provides language learners the opportunity to explore different text types in ways that enhance the expansion of interpretation of texts (Ajayi, 2009). The learners are then allowed to understand a text through various points: "…students can start reading from language; they can start from interpretations of visuals, read the typography, or examine the layout first."

Using these principles, an English language instructor can use graphic media (e.g., graphic novels and digital moving comics) as teaching mediums with content objectives as well as language and visual literacy objectives. In achieving the content objective, the learners are encouraged to visually, actionally, and verbally explore directionality and chronology (Britsch, 2010). Language objectives include making the learners improve their use of language in describing what they see in the medium through using prepositions, adverbials, and temporal connectiveness. Visual literacy objectives include gaining the ability to practice and notice vantage point to express, document, and understand temporal and locational meanings related to the images set before them (Britsch, 2010).

Note also that graphic novels and motion digital comics are involved in multimedia learning. There are several multimedia learning theories that support the claim that graphic novels and motion digital comics can be effective tools for language learning. In an experiment conducted by Nadaleen Templeman-Kluit

(2006), streaming audio and narration is proven to be an effective teaching technique. The streaming media tutorial that Templeman-Kluit used as instructional medium supports the principles of modality effect. Modality effect maintains that meaningful learning occur as the learner is able to make a meaningful connection between information that are presented both visually and verbally.

Theoretical Framework

Dual Coding Theory

Alan Paivio's Dual Coding Theory suggests that learned mediums can be enhanced via two different ways. These are via verbal associations and visual imagery. The dual coding theory was used by Mayer and his colleagues in studying multimedia as a tool for instruction. The findings of their experiments attest that learning is enhanced for students exposed to instructional multimedia mediums that incorporate animation and narration. These mediums are more effective compared to learning to use animation and text-based mediums.

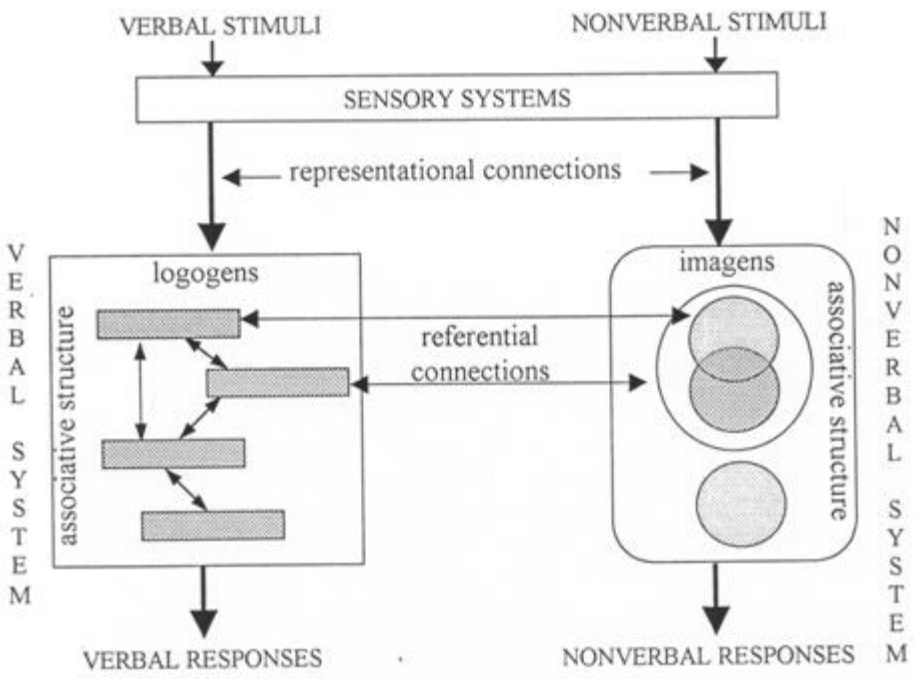

Figure 6. **Dual Coding Theory model for processing animation and speech (Adapted from Paivio, 1960)**

Using multimedia instructional medium involves the principles of dual-coding theory. Dual coding theory maintains that humans have the unique ability to process both verbal and non-verbal information at the same time. According to him, "Human cognition is unique in that it has become specialized for dealing simultaneously with language and with nonverbal objects and events. Moreover, the language system is peculiar in that it deals directly with linguistic input and output (in the form of speech or writing) while at the same time serving a symbolic function with respect to nonverbal objects, events, and behaviors" (1968). This makes us, as humans, well suited to processing information in very efficient ways. Hence, drawing from Dual Coding Theory's principles, the combination of pictures

and text in graphic novels may increase cognition and memory retention. The features of digital motion comics embody the principles of dual coding theory in relation to this medium's possible effects on learning because digital motion comics incorporated both voice over [as the listening activity] and visual features; these features can make digital motion comics as an effective tool for increasing understanding, memory retention, and control.

The principles of contiguity temporal and spatial theory are also employed in using multimedia mediums as teaching tools. They are employed because narration and animation are presented simultaneously. However, the multimedia medium that Templeman-Kluit used does not employ on-screen texts unlike motion digital comics that have on-screen texts (the speech bubbles) along with the spoken words.

Multimedia Psychology

Multimodal perception refers to the perception when an individual uses multiple senses. Crossmodal perception refers to the process when information is transferred across the senses. For example, if a person sees something, that person what may know what that thing feels like. Crossmodal and multimodal perceptions have various effects. These effects may enhance learning and performance. These effects may also change perception. In general, individuals combine stimuli in multiple modalities to enhance learning or performance in multimedia. This is already discussed in the previous sections on the various modalities or channels individuals use in order to learn.

According to a study, “People remember only about ten percent of what they hear and about 30 percent of what they read. However, they remember about 80 percent of what they [both] see and do (Tennenbaum, 1998). This is due to the differences in the reaction times. In relation to the mediums tested in this research, digital motion comics may facilitate memory retention more effective than graphic novels. This is because students use both their auditory and visual channels in the former.

Concurrent presentation of stimuli in both modalities can speed up the reaction times to either a visual or an auditory stimulus (Andreassi and Greco, 1975; Bernstein et al., 1969; Gielen et al., 1983; Morrell, 1968). When narration and animation are combined, retention of information is more enhanced than using narration or animation alone. As an experiment confirms, “students who listened to a narration explaining how a bicycle tire pump works while also viewing a corresponding animation twice generated as many useful solutions to subsequent problem- solving transfer questions than did students who listened to the same narration without viewing any animation” (Moreno and Anderson as cited in Mayer and Moreno, 1998). According to another study, students who read a text containing captioned illustrations placed near the corresponding words generated about 65% more useful solutions on a subsequent problem-solving transfer test than did students who simply read the text” (Mayer, 1989; Mayer & Gallini, 1990 as cited in Mayer and Moreno, 1998)

Note that there are various multimedia design principles for multimedia instruction. For this study, the emphasis is on the cognitive theory of multimedia

learning by Richard E. Meyer. This theory maintains that mediums, which present both verbal and graphical information, should present the verbal information in an auditory format instead of a written text. Drawing from this theory, it can be assumed that digital motion comics are more effective than graphic novels. This is because the former presents the verbal information in an auditory format, instead of a written text.

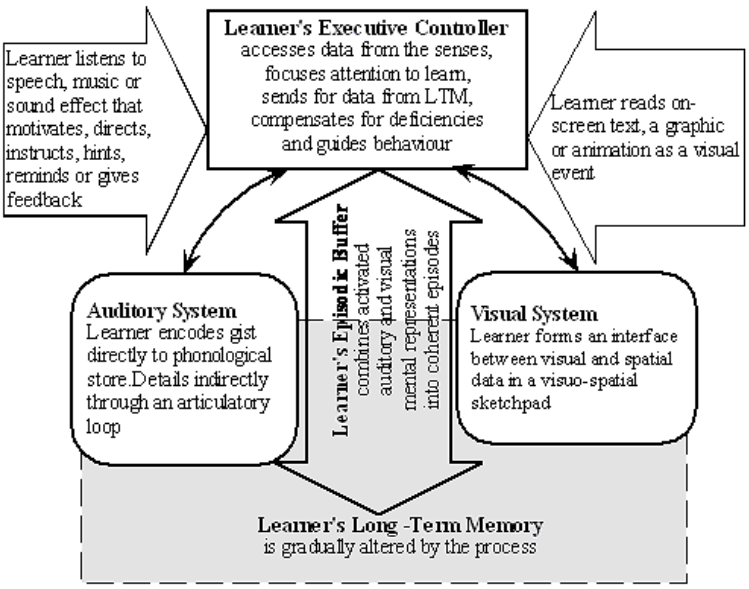

***Figure 7*. Illustration of the cognitive structure of learning from multimedia**

Allan Baddeley and Hitch's theory on working memory is the basis of Mayer's cognitive theory of multimedia learning. According to the theory of working memory, there are two independent subcomponents that make up the working memory. These subcomponents tend to work in parallel. One of the subcomponents is the visual subcomponent, and the other verbal or acoustic. It is from this theory where the dual coding theory was based. Later on, Meyer re-appropriated the dual coding theory to multimedia. Auditory and visual information

are processed in various channels of the working memory. This means that an individual has more cognitive processing capacities for understanding mediums that combine visual graphic information and auditory verbal information than understanding mediums that printed text with visual graphic information.

Multimedia refers to the presentation of words and pictures. Multimedia learning refers to the development of mental representations of words and pictures. Multimedia instruction refers to the practice of presenting words and pictures that are intended to promote learning.

Cognitive processes are involved in multimedia learning. These processes include selecting words and images, organizing words and images, and integrating. Selecting words and images involve paying attention to relevant words and pictures to create sounds and images in working memory. Working memory refers to the system which actively holds information in mind. This is to perform verbal and nonverbal tasks. Examples of such tasks were reasoning and comprehension. The aim of working memory is to make such information available for further information processing. Organizing words and images involve building connections among selected words and images to create verbal and pictorial models, respectively. Integrating involves building connection between verbal and pictorial models. This involves the use of prior knowledge.

Redundancy Principle

The redundancy principle maintains that "Students learn better from animation and narration than from animation, narration, and on-screen text" (Mayer R. , Multimedia learning, 2001). The redundancy principle is a special case of the split attention effect. The split attention effect refers to an individual's tendency, in a split attention condition, to split his or her attention between instructional mediums in an effort to understand the said mediums. A split attention condition occurs when mediums contain the same modality (for instance, visual and visual) to represent various types of information within the same display (Chandler & Sweller, 1992).

The split attention effect has implications on designing instructional mediums, specifically on arranging graphical medium within a lesson (Chandler & Sweller, 1992). This is because how the graphical mediums were arranged affects how the instructional medium "leads" the eye of the reader's attention. According to studies, poorly arranged graphical mediums will make reading the text difficult. This is because poorly arranged graphical mediums to extraneous cognitive load. Extraneous cognitive load refers to "unnecessary" graphic mediums in a text. They are unnecessary because an individual can understand the text with lesser cognitive difficulties without them. Note that a person has limited cognitive resources to process a text.

An example of a text that has extraneous cognitive load is a text that uses two possible ways to describe something. For example, there are two possible ways to describe a square. A person can either describe it in words, or show a picture of a

square. The latter is, obviously, easier to do for the teacher and easier to understand for the student than the former. This is because the latter do not load the student's mind with a set of information that is unnecessarily complicated. The former, on the other hand, contains unnecessary information unnecessary cognitive load (Chandler & Sweller, Cognitive load theory and the format of instruction, 1991)

In other words, the principle suggests that redundant mediums should be eliminated in mediums. This is because an individual's learning processes may be negatively affected when the individual simultaneously hear and see the same verbal message in the medium.

According to an experiment, music and environmental sounds can be extraneous cognitive load (Moreno & Mayer, 2000). Therefore, these sounds can hinder learning as the individual needs more time to process all the unnecessary information than when such information are eliminated. Moreno's (2000) experiment also shows that the student experience difficulty in learning an environment that contains extraneous cognitive load.

There are other principles of multimedia learning. The spatial contiguity principle suggests that learning is facilitated better "when corresponding words and pictures are presented near rather than far from each other on the page or screen" (Mayer R. , Multimedia learning, 2001). The temporal contiguity principle suggests that individuals can learn better "when corresponding words and pictures are presented simultaneously rather than successively" (Mayer R. , Multimedia learning, 2001). Coherence principle maintains that individuals can learn better "when extraneous medium is excluded rather than included." Individual differences

principle argues that “Design effects are stronger for low-knowledge learners than for high knowledge learners, and for high-spatial learners rather than for low-spatial learners” (Mayer R. , Multimedia learning, 2001).

Visualization and Visualization Tendency Level

Visualization tendency refers to the inclination of individuals towards the utilization of visualization in their daily lives. Visualization is “a mental process for explaining, expecting, operating, and creating objects, processes or events through imagery formats. Visualization tendency involves five factors. These factors, as identified by Rha and colleagues (2009), were the following: Generative visualization, space-motor visualization, instrumental visualization, proactive visualization, and representational visualization. These are the factors that make up human visual intelligence. Individuals differ in visualization tendency level. This means that individuals with high visualization tendency level use visual modes differently during the learning process compared to individuals with low visualization tendency level.

CHAPTER III: RESEARCH METHODOLOGY

Research Design

The research design is developed to emphasize visual tendency level as a significant factor that affects the effectiveness of graphic novels and digital motion comics as mediums to facilitate reading comprehension in an ESL classroom setting.

The experiment was designed with two factors across the in two variables. Independent variables are the different modalities of a graphic medium (graphic novel and digital motion comics) and students' visualization tendency level. The dependent variable is the scores of the students, since their scores are dependent on the mediums used and their visual tendency level.

Participants

The target respondents are young adult English as Foreign Language (EFL) learners. These will come from within a group of students studying English as a foreign language. The students are all within the age range 18-29 and are, therefore, roughly between high school and undergraduate level at a Korean University. The selected participants will be studying English at an intermediate up to advanced level. It was necessary to ensure that none of the respondents are familiar with the 'Watchmen franchise in order to have a single starting point for all students. It is a re-imagination of the western society's role in the social tensions, such as Vietnam War) in the mid-20th century where a group of superheroes tries to intervene with the activities of the US government with global issues such as war.

Instruments

There are four instruments used for this research. These instruments are the visual tendency test, pre-test, posttest and satisfaction survey questionnaire.

Methods of Validating the Mediums and Instrumentation

The content of the mediums and the instrumentation are validated based on how appropriate those contents are in relation to the aim of this research; that is, as teaching/learning tool that EFL learners in intermediate level.

The instrumentation is designed for EFL students in intermediate level. The PET (UCLES, 2009) vocabulary list is that basis of deciding whether the textual contents (i.e., words) of the mediums and instrumentation are appropriate for participants who are in the intermediate level of EFL learning. This list, originally developed by Cambridge ESOL, covers receptive and productive vocabulary. Receptive vocabulary refers to terms a person is expected to understand but which is not the focus of a question. Productive vocabulary refers to words a person needs to know in order to answer the question. The PET vocabulary list is validated through using a corpus-based approach. The Cambridge Learner Corpus and the British are the main corpora used to validate the contents of the PET vocabulary list. The items in the instrumentation were developed and revised by the researcher and two high school English language teachers. The final test items were validated by three high school English language teachers.

The mediums used were chosen through examining their form and content and determine whether they can be considered as graphic novels and digital motion

comics. According to the *Classification and Shelflisting Manual* (n.d.), a graphic novel has the following characteristics:

- Characters and action are portrayed in a succession of panel drawings
- A series of panels advances a fictional narrative line
- The dialogue is generally presented in "balloons," or their equivalent
- In some cases, the narrative is advanced with no dialogue or written medium at all, or with written medium at the bottom of the panels

Furthermore, there are also ways to recognize comic books, graphic novels, and nonfictions written in graphic novel styles:

1. Anything with the characteristics included in the above definitions.
2. Nonfiction written in graphic novel style will have classification appropriate to the subject matter.
3. Subject headings with subdivision |v Comic books, strips, etc.
4. Subject or genre heading: Graphic novels.

The mediums used to represent digital motion comics were analyzed to see if they possess the characteristics of motion comics. These characteristics are the following (digitalmotioncomics.com):

1. Starts with the basic medium that is the comics:
    a. A story told with an artwork
    b. Story telling enhanced with artworks
2. Enhanced by digital technology in terms of having motions added

3. There is sound
4. There are voices
5. There is music
6. The final product is presented as a video
7. The video can be interactive or not

Watchman in Graphic Novel Format and Digital Motion Comic Format

Two versions of chapter one of *Watchman* were used for this research. These mediums were selected utilizing the guidelines discussed in the previous sections. That is, these mediums should have the characteristics graphic novels and digital motion comics.

Two PhD students validated the mediums. Both mediums have an average of 4.6 out of 5 points on a 5-point Likert scale. Also, three high school teachers validated the post-test and pre-test instrumentation to ensure that the overall contents were appropriate for the participants of this research. According to the result of the validation, the instrumentation were, indeed, appropriate.

Data Collection

The participants were assigned to the pre-test and visual tendency level test. The aim of the pretest is to verify the participants' homogeneity in terms of their prior knowledge.

The visual tendency level test is administered to group the participants into 40% high and 40% low visual tendency level. The high visualization tendency level group is further randomly divided into two groups. The low visualization tendency level group is also further randomly divided into two groups. There will then be four separate groups: two high visual tendency level groups, and two low visual tendency level groups. These groups were assigned to use graphic novels and digital motion comics.

Two separate groups were exposed to graphic novels. This was also the case for digital motion comics. In other words, a high visual tendency level group and a low visual tendency level group were exposed to graphic novels. In the same way, a high visual tendency level group and a low visual tendency level group was exposed to digital motion comics. The experimental design is presented in the table below:

Table 1. ***Experimental Design***

Group	Pre-Test	Visualization Tendency Test	Treatment	Post-Test
G1	O1	O2	X1	O3
G2	O1	O2	X2	O3
G3	O1	O2	X1	O3
G4	O1	O2	X2	O3

O1: Pre-Test

O2: Visualization Tendency Test

X1: Digital Motion Comics Graphic Novel

X2: Graphic Novel

O3: Post-Test

The experiment was conducted at a Korean University on January 22, 2012. Both classes were undergraduate level Educational Technology classes. The students in the first class were asked to complete a visual tendency test within 10 minutes. Then the students had to fill out the pretest based on the Watchmen franchise. The pre-test was to make sure everyone was on the same level of prior knowledge before attempting the post-test. After giving the participants directions on how to read the graphic novel, each student was handed a copy of chapter 1 of the Watchmen graphic novel series. Students were given roughly 25 minutes to read the graphic novel. Afterwards, the comprehension posttest questionnaire was

administered. This took the students approximately 15 minutes. The first class comprised of a total of 49 students.

Almost the same procedure as the first class was administered for the second class. The visual medium utilized was the digital motion comic of *Watchmen*. The visualization tendency test was then administered. Each participant took approximately 15 minutes to finish the survey. The students took the same pre-test as the first class. Since, everyone did not have their own computers the professor and the researcher agreed that it would be fine to conduct it on the overhead projector since it was large enough with clear sound. A total of 60 students participated in the experiment.

During the experiment, students looked pleased that they were going to watch a film. Another observation is that the students looked eager for the digital motion comics. When the digital motion comic ended, the students were handed post-test comprehension questions based on chapter 1 of *Watchmen.* The number of students comprised of 60 total. A total of 109 students participated in the experiment.

After analyzing the student's test data, 43 student's data sets were omitted on the premise of unreliable data, which consisted of either they failed to complete it or some information were missing. The reason for so many unreliable data sets can be attributed to several inferences such as time, difficulty of the content, lack of English vocabulary etc. If student's pre-test and post-test scores were the same, or if the post-test scores were to lower than the pre-test scores provided, the researcher used considered them to be unreliable data since their performance makes their

actual eagerness to engagement in the experiment questionable. In addition, some students did participate eagerly as it can be shown on the results and those that did not.

One of the main reasons for the difficult completion of the tasks was due to language barrier, difficult content, and capital lettering. It is obvious that their acquired English level were not at the level to read contemporary American comic books, which undoubtedly is one of the reasons for the many incomplete surveys or low surveys. This all follows in the same category as the difficult content is concerned. Despite the reading challenges, an additional crucial element is time. If more time was given to complete the comprehension questions the results and the number of attributed participants may differ. There might be a possibility that if they had read something that they were more familiar with, the data results could very well be diverse along with more contributable participants. Therefore, the participants were not omitted arbitrarily rather based on principles of working with trustworthy data.

Data Analysis

All the tests were scored accordingly. The raw data obtained from the performance of the participants were used for the analysis. The raw data were analyzed through 2-Way ANOVA. This is to analyze the comparative effects of the graphic novel and the digital motion comics across visual tendency.

CHAPTER IV: RESULTS

Descriptive Statistics

Prior to the ANOVA test, Levene's test for equality of variances is performed. The table below shows the result of the Levene's test. The result show that at the α = 0.311, there is not enough evidence to conclude that the mediums do not create differential effect across visual tendency on English language comprehension.

Table 2

Levene's Test

Levene's Test of Equality of Error Variances[a]

Dependent Variable:gap

F	df1	df2	Sig.
1.217	3	62	.311

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

In other words, since p>0.05, the variances are assumed to be equal. This means that there is little reason to be concerned that the data violate the

homogeneity of variance assumption. It is then reasonable to use the standard alpha-level of .05.

Table 3

Descriptive Statistics on Reading Comprehension Using Graphic Novels and Digital Motion Comics

Descriptive Statistics

Dependent Variable: Comprehension

Medium	Vhl	Mean	Std. Deviation	N
DMC	High	*3.83*	*1.29*	*18*
	Low	*4.10*	*1.33*	*19*
	Total	*3.97*	*1.30*	*37*
GN	High	*4.67*	*1.91*	*15*
	Low	*3.14*	*1.23*	*14*
	Total	*3.93*	*1.77*	*29*
Total	High	*4.21*	*1.63*	*33*
	Low	*3.70*	*1.36*	*33*
	Total	*3.95*	*1.51*	*66*

The table above presents the descriptive statistics on reading comprehension using graphic novel and digital motion comics. The mean (*M*) and the standard deviation (*SD*) of reading comprehension performance among the participants who used the graphic novel are 3.93 and 1.77, respectively. The mean and standard deviation of reading comprehension performance among the participants who used digital motion comics are 3.97 and 1.30, respectively.

In terms of participants' visualization tendency, the mean and standard deviation of scores of the group with high visualization tendency level who used graphic novels are 4.67 and 1.91, in sequence. The mean and standard deviation of the scores of the group with low visualization tendency who used graphic novels are 3.14 and 1.23, respectively.

The mean and the standard deviation scores of the group with high visualization tendency who used digital motion comics are 3.83 and 1.29, in sequence. The mean and standard deviation of scores of the group with low visualization tendency level who used digital motion comics are 4.10 and 1.32, in sequence.

Visualization Tendency Test Result

The mean, median, and mode of the students' scores in the visualization tendency level test are 72.29, 73, and 74, respectively. Students with high visualization tendency group (those above 40% level of visual tendency) have an average of 78.71 (*SD*=5.80), while students with low visualization tendency level (those below 40% level of visual tendency) have an average of 63.26 (*SD*=4.60). Those who were below 40% make up the low visualization tendency level group. Those above 40% were the high visualization group.

The Comparative Effects of the Graphic Novel and Digital Motion Comics across the Visualization Tendency

ANOVA was used to verify how a text (i.e., *Watchman*) in two different formats or modalities (i.e., graphic novel and digital motion comics) and visualization tendency affect the participants' performance on reading comprehension in an ESL classroom setting.

The Effect of the Mediums (i.e., graphic novel and digital motion comics) on Reading Comprehension in ESL Classroom Setting

The result of the analysis on the effect of the graphic novel and digital motion comics on reading comprehension among the participants in ESL classroom setting is that the participants provided with digital motion comics performed better in their posttest (M= 3.97) compared to the participants provided with the graphic novel (M= 3.09). It is statistically insignificant that the mediums affect students' English comprehension (F=0.032, p>0.05).

The Effect of Visualization Tendency Level on English Comprehension

According to the analysis of the relationship between visualization tendency and performance of the learners on English comprehension (F=3.004, p>05), the learners' visualization tendency does not affect English comprehension performance. Learners with high visualization tendency and learners with low visualization tendency demonstrate no statistically significant difference in terms of English comprehension.

The Mediums and Visualization Tendency

There is an assumption that learners with high visualization tendency will use more visual modalities than learners with low visualization tendency level. Because of this, one can assume that visualization tendency may play a crucial role on how learners comprehend instructional mediums that use visual elements, such as graphic novels and digital motion comics. The data collected is based on whether learners' performance (both learners with high visualization tendency level and learners with low visualization tendency level) performed well in using both the instructional mediums. The interaction between the mediums and the visualization tendency on English language comprehension shows statistically significant result (F=6.181, p=0.016).

Table 4. ANOVA Result on English Language Comprehension Performance

Tests of Between-Subjects Effects

Dependent Variable: Comprehension

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	*17.527*[a]	*3*	*5.842*	*2.758*	*.050*
Intercept	*1006.988*	*1*	*1006.988*	*475.366*	*.000*
medium	*.068*	*1*	*.068*	*.032*	*.859*
VHL	*6.363*	*1*	*6.363*	*3.004*	*.088*
Medium * VTHL	*13.093*	*1*	*13.093*	*6.181*	*.016*
Error	*131.337*	*62*	*2.118*		
Total	*1181.000*	*66*			
Corrected Total	*148.864*	*65*			

a. R Squared = .118 (Adjusted R Squared = .075)

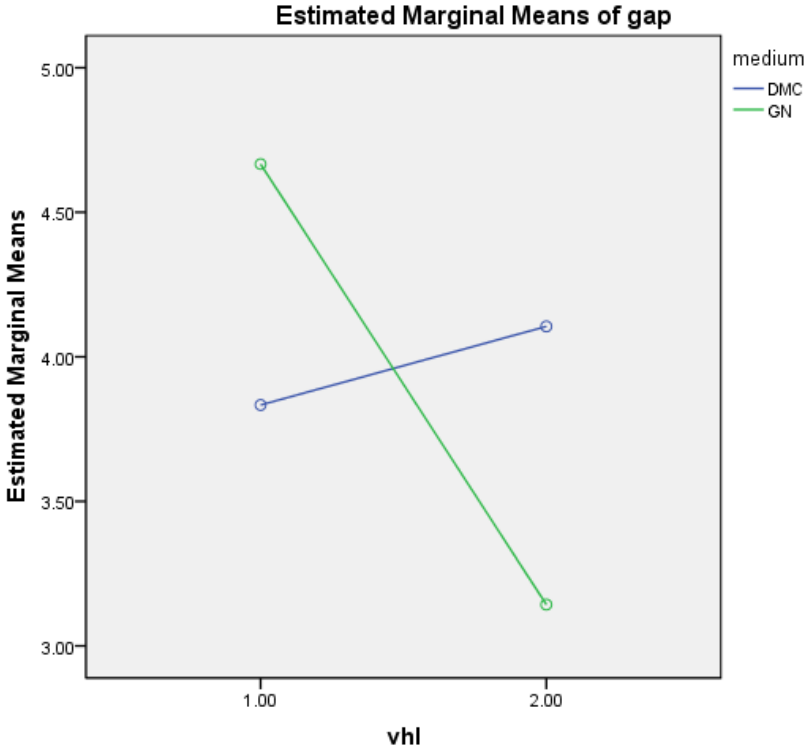

Figure 8. **Shows the estimated marginal means gap between VTHL * GN/DMC**

The graph above illustrates the plot of the results. This plot shows the marginal means of comprehension test scores of students with high visual tendency level and students with low visual tendency level. The lines show that there is an interaction between the mediums and the visual tendency.

CHAPTER V: DISCUSSION AND CONCLUSION

Discussion

The result of this study shows that digital motion comics and graphic novels have no effect over the performance of the learners in English comprehension performance. However, the statistics show that there is an interaction between the mediums and visual tendency. This chapter will then explore the possible reasons behind this interaction between the mediums and visualization tendency.

Visualization Tendency Level as a Contributing Factor to the use of Graphic Novels and Digital Motion Comics as Instructional Mediums

The result of the analysis brings about some questions. For instance, what may be the factors that made it possible for participants with low visualization tendency level to outperform the participants with high visualization tendency level in using digital motion comics? What are the factors that may explain the reason why the participants with low visualization level performed better when they were provided with digital motion comics than when graphic novels were used? What are the factors that made the participants with high visualization level perform better using graphic novels than using digital motion comics?

To ask why learners with low visualization tendency performed better than those with high visualization tendency level means understanding the differences of how their cognitive processes differ from each other.

This research hypothesize that there is a difference on how each group processes the cognitive load from the mediums used. Note that individuals with high visualization tendency level are expected to use visual modalities compared to those with low visualization tendency level.

Visualization tendency level may only concern with visual elements. The visual tendency test does not take into account the auditory factor or motion that is present in digital motion comics. Rha et al. (2009) writes that there is a dearth of studies regarding measuring learners' visualization tendency. This is the reason why examining the differences on how learners with high visualization tendency level cognitively process medium that use multiple modalities, where visual elements predominate. The available and accessible resources, such that of Rha et. al., only says that learners with high visualization tendency level is expected to use more visual modalities than those with low visualization tendency level. From such limited information, it is possible to draw inferences. This is explored in the next sections.

Differences between the High Visualization Tendency Group and Low Visualization Tendency Group in Terms of Processing Cognitive Load from Graphic Novels and Digital Motion Comics

Following the dual coding theory, both high and low visualization tendency level groups process the input from the mediums after a dual-processing model of working memory consisting of separate visual and auditory model. Both groups performed well using both the mediums. This research argues that the dexterity to process visual elements of learners with high visualization tendency level makes

this group perform better in understanding graphic novels than the other group. In addition, this research contends that both groups experience different degree of cognitive loads from digital motion comic. The tendency of learners with high visualization tendency level to use more visual modalities than those with low tendency level makes the former experience more cognitive load than the latter. Therefore, the low visualization tendency group performed better than the other group is using digital motion comics.

One can argue that digital motion comics are also graphic mediums. Therefore, learners with high visualization tendency level should also perform better in digital motion comics. Of course, that is a plausible argument since digital motion comics are also highly visual in nature. However, there are still differences between graphic novels and digital motion comics. These differences are a crucial factor that may affect how both groups process the cognitive load from both mediums.

Graphic novels are more effective than digital motion comics for those with high visual tendency level students because graphic novels are visual in nature. That is, visualization is important in order to understand how the graphic devices convey meaning. In accordance with this principle, learners with high visualization tendency level are expected to comprehend a graphic medium more efficiently that those with low visualization tendency level. In other words, it is easier for learners with high visualization tendency level to process the cognitive load from a graphic medium than those with low visualization tendency level.

Therefore, this research suggests that students with high visualization tendency level experience lesser cognitive load from graphic novels than from digital motion comics. This hypothesis is drawn from cognitive science's view that students may experience difficulty in learning when they are exposed to extraneous cognitive load. Graphic novels, as mentioned, only use graphic devices. Individuals with high visualization tendency level are expected to use visual modalities than low visualization tendency level. This means that the participants with high visualization tendency level can process visual input (the graphic modalities used) and retain information more efficiently than those with low visualization tendency level.

Again, the concept of high visualization tendency level only concerns a learner's tendency to use visual modalities. The concept and existing literatures regarding the concept does not take into account auditory elements that may accompany visual elements. However, this does not mean that auditory elements cannot make a difference between the learning performances between high and low visualization tendency groups. Both high and low visualization tendency groups were exposed to the auditory devices used by digital motion comics. In addition to this, both groups' cognition will process the cinematic techniques used. On the other hand, the students with low visualization tendency level will use lesser visual modalities. Their viewing experience can be guided by the auditory devices (narration, dubbing, sound effects, etc.). Hence, one can say that those with low visualization tendency level will not be burdened by the plethora of visual or graphic devices flooding their mind, demanding to be processed all at once.

Digital motion comics are more effective for those with low visual tendency level than those with high visual tendency level because the latter experience more cognitive load than the former. The group with high visual tendency performed less efficiently using digital motion comics because digital motion comics force more ways of conveying an information or message to the student than graphic novels. (More of this will be discussed later.) Accordingly, they retain less information from digital motion comics that are needed to answer correctly the reading comprehension posttest questions. The students with high visualization tendency level will use visual modalities than those with low visualization tendency. This means that, when presented with the mediums, their cognition will rely more on processing visual codes than verbal codes. The cognition of those with high visualization tendency level will then process all the graphic devices used by digital motion comics, graphic devices that were similar to those used by graphic novels.

Moreover, it is important to consider the many similarities of graphic novels and digital motion comics. Digital motion comics are like a slide show of static pictures, with smoothed out animated movement. The images were very similar to the graphic novel version. The difference is that the digital motion comics guide the eye of the viewer more explicitly than graphic novel. For instance, there is a panel showing the two detectives in The Comedian's apartment. The two detectives are speaking to each other, and this happens in a single frame. In the digital motion comics, the camera zooms in to frame in a close up shot the detective that first speaks, and pans to the other detective as he responds. In the graphic novel, the arrangement of the elements in that single frame is arranged in such a way that

the graphic devices used tell the reader who spoke first. This brings the analysis to a speculation that redundancy is happening in digital motion comics.

Figure 9. **A page from the graphic novel**

***Figure 10*. Scenes from the digital motion comics**

The very close resemblance between the two mediums needs to be analyzed closer. Digital motion comics aren't exactly cartoon programs. The characteristics of digital motion comics are still predominantly that of graphic novels. The visuals from the graphic novels make up the majority of the medium that digital motion comics use. Perhaps it is helpful to imagine it in the following way to understand the aforementioned point: An ESL/EFL classroom that shows digital motion comics before a group of students is like a story-telling session. The instructional medium is a graphic novel. All the students were staring at the story-teller. The story teller is the screen before the students. The story-teller narrates (the auditory elements) in an interesting manner to hold the attention of its audience. The story-teller is holding the graphic novel before the audience and directs [via the cinematic techniques] the eyes of the audience to the visual elements in the medium.

The analogy presented above should be compared to an ESL/EFL classroom where graphic novels are used. One can argue, based on dual coding theory, that digital motion comics should always be more effective than graphic novels because the former appeals to the dual-processing model of working memory. However, this may not be the case when a learner's visualization tendency level is taken into account.

(To compare and contrast its effect to that of graphic novels based on the fact that the former is a dynamic media and latter a static media will lead to conclusions that are questionable. Such analysis, to be well-founded, should establish that it is because of the fact that they are completely different kinds of

media (i.e., as static and dynamic media) that one is more effective as a learning tool than the other. Both mediums were static media. Digital motion comics have a lot more static images than animations. In other words, static media graphic devices used in graphic novels were predominantly used as far as using visual codes is concerned.)

There is the tendency for redundancy in digital motion comics in terms of using static image and devices of a graphic novel and cinematic techniques. It may be redundant to convey information using the modes used by graphic novels (e.g., graphic devices) and the modes used by animation (cinematic techniques, sounds, etc.). As discussed in the preceding paragraph, it is difficult to categorize digital motion comics as a dynamic media. For a learner with high visualization tendency level, the auditory elements and the cinematic techniques used to accompany the visual elements may be treated as redundancy. This may then create a split-attention environment where the learner with high visualization tendency level experiences extraneous cognitive load. In the case of those with low visualization tendency level, such split attention environment may also be experienced. However, learners with high visualization tendency level may experience more cognitive load because learners with high visualization tendency levels are expected to use more visual modalities than those with low visualization tendency level.

Again, according to the dual-code theory, information can be retained and retrieved more efficiently if the information is stored in two distinct functional locations in the human brain. Both graphic novels and digital motion comics use two distinct classes of mental representations and hence require the human brain to

use its verbal memory and visual memory. The graphic devices were the visual codes and the texts the verbal codes. Digital motion comics, aside from the texts, use auditory devices and cinematic techniques such as camera angle, zoom in and zoom out, etc. This may play a crucial role on why the effectiveness of the mediums differs between those with high and those with low visualization tendency level. In other words, the dual-code theory and cognitive load theory explains the difference of the effectiveness of the mediums on learners with high visualization tendency level and learners with low visualization tendency level.

Conclusion

This study focused on the differential effect of graphic novels and digital motion comics across learner's visualization tendency level on English language comprehension. Students with high visualization tendency level performed better using graphic novel than using digital motion comics, but students with low visualization tendency level performed better using digital motion comics better than using graphic novels.

This means that there is an interaction between the mediums and the visual tendency. Which material is preferable for English comprehension exercise depends on whether the student has high or low visualization tendency level. The main effect of the mediums for facilitating comprehension is not meaningful because of this interaction. Digital motion comics may appear more effective than graphic novels, but this is not the case. This study shows that digital motion comics are only favorable for students with low visual tendency level, and graphic novels for students with high visualization tendency level. The differential effect of the

mediums across visual tendency level on comprehension is attributed to the differences in cognitive load experienced by each group.

This research has limitations. The fact that the participants didn't have their own digital motion comics in front of them like they did using the graphic novels may have affected their performance. The participants do not have the kind of control over the digital motion comics that they have in using graphic novels. To illustrate, a participant's attention may get side tracked somewhere else while the digital motion comics was playing and may miss some parts. In the case of using a graphic novel, the student can easily re-read those missed parts.

However, the digital motion comics still show potential as an effective instructional tool for ESL/EFL learners. The broader implication of the findings of this study is on creating digital motion comics that can lessen the chance of creating a split-attention environment for learning.

To conclude, this study recommends using a third variable for future researches. This third variable will be purely be written in texts. This variable will serve as a control group and may make the findings and discussion more comprehensive. In addition to this, further research on digital motion comics is needed. This is because the format of digital motion comics are still changing since it is a relatively new technology. There are software applications that can be used to develop these mediums and make them more interactive. Also, the future of this technology is bright. This means that educators can take advantage of these developments to develop digital motion comics that are appropriate for learning.

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APPENDIX

Appendix A. Assessing the Validity of the Digital Motion Comics

This is where I test the validity of the mediums used to know if they can be considered as digital motion comics. For the next several items, please rate each items from 1 to 5 to indicate how much you agree with each item.

1	2	3	4	5
Good				Not so good

	1	**2**	**3**	**4**	**5**
A story told with an artwork					
Story telling enhanced with artworks					
Enhanced by digital technology in terms of having motions added					
There is sound					
There are voices					
There are music					
The final product is presented as a video					

Appendix B. Assessing the Validity of the Graphic Novel

This is where I test the validity of the mediums used to know if they can be considered as graphic novel. For the next several items, please rate each items from 1 to 5 to indicate how much you agree with each item.

1	2	3	4	5
Good				Not so good

	1	**2**	**3**	**4**	**5**
Characters and action are portrayed in a succession of panel drawings					
A series of panels advances a fictional narrative line					
The dialogue is generally presented in “balloons,” or their equivalent					
In some cases, the narrative is advanced with no dialogue or written material at all, or with written material at the bottom of the panels					
Nonfiction written in graphic novel style will have classification appropriate to subject matter.					
Subject headings with subdivision |v Comic books, strips, etc					

Subject or genre heading: Graphic novels.					

Appendix C. Visualization Tendency Test

※ Please check(V) the box which is most relevant to you.

No.	Questions	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	While listening to music or lyrics of a song, I usually hit upon related scenes or images of the music or song.					
2	While reading a book, I tend to picture scenes to myself.					
3	While listening to a story, I tend to let my imagination run.					
4	When touching or reaching a certain					

	item with a hand, I tend to figure out the things in images.					
5	When choosing some clothes, without trying on myself I try to figure it out if they go well with me.					
6	While parking a car, I tend to picture the parking motion of the car.					
7	When playing some sports such as golf, football, and swimming, I imagine my body movement in my head like “image training”.					
8	When spending some free time, I tend to frame and visualize something to myself.					

9	I usually imagine my future with clear picture or images.					
10	In attempting to figure out complicated matter, I tend to draw diagrams or pictures.					
11	I tend to take notes by using visual languages such as symbols, marks, diagrams or pictures.					
12	When taking a note or learning some contents, I tend to reorganize them in a figure, a picture or table.					
13	When I would explain a complicated story or a person's delicate characters, I can describe them by pictures.					

14	When throwing an object, I can easily guess where the object will reach when.					
15	I can envision my movement in the axis of coordinates.					

No.	Questions	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
16	I tend to enjoy visualizing and imaging things and matters.					
17	I tend to infer related or influencing factors when I see things.					
18	I am good at inventing or devising necessary or gadgetry things					

	by using imaginative - reasoning.					
19	I tend to associate things with other things that looks similar.					
20	When looking at objects, I tend to fill the unseen or missing parts of them figuring out the whole look.					

Appendix D. Pre-Test

Pre-test: Choose which one is the best answer.

1. Who is the author of the story?
    a. Neil Gaiman
    b. David Fincher
    c. Alan Moore
    d. Stan Lee
2. Who is the owner of the journal?
    a. Rorschach
    b. The Comedian
    c. Dr. Manhattan
    d. Nite Owl
3. Where is the setting of the story?
    a. Paris
    b. New York
    c. London
    d. Los Angeles
4. Around what decade did the story take place?
    a. 1940s
    b. 1920s

c. 1990s

d. 1980s

5. What is the cause of the Comedian's death?

    a. He fell from a building

    b. Car accident

    c. Suicide

    d. Food poisoning

6. Where did the Comedian previously work?

    a. South America

    b. Asia

    c. Europe

    d. Africa

7. How does Danny feel after Rorschach pays him a visit?

    a. Happy

    b. Angry

    c. Excited

    d. Sad

8. The naked blue character in the story seems to be an expert on which area?
    a. History
    b. Science
    c. Anthropology
    d. Philosophy
9. What did Rorschach do in the bar?
    a. Drink
    b. Socialize
    c. Interrogate people
    d. Meet someone
10. Who met in a restaurant by the end of Chapter 1?
    a. Dr. Manhattan and Miss Jupiter
    b. Miss Jupiter and Danny
    c. Danny and Rorschach
    d. Rorschach and Dr. Manhattan

Appendix E. Post-Test

1. Who's the character thrown from the building?
    a. The Comedian
    b. Dr. Manhattan
    c. Nite Owl
    d. Ozy Mandias

2. Regarding the death of a character at the beginning of the novel, Rorchach thinks that…
    a. The motive is burglary
    b. Someone's picking off costumed heroes
    c. Maybe it was a political killing
    d. None of the above

3. Rorschach visited Veidt, Dreiberg, and the doctor to…
    a. Kill them
    b. Ask them for leads on solving Blake's death
    c. Warn them to watch their backs as a masked-killer is on the loose
    d. Convince them to rebuild the team

4. The Comedian and Dr. Manhattan were the only
    a. Members of Extranormal Operatives currently employed by the government

b. Were the two villains in the story

c. Were the leaders of the Extranormal Operatives

d. Were double agents

5. Rorschach went to a bar…
    a. To warn them that a serial killer is on the prowl

    b. To inform them that Blake is dead

    c. To ask if someone in there knew who killed Blake

    d. To slaughter people

6. The Extra normal Operatives ceased working for the government
    a. Before the Keene Act was passed

    b. After the Keene Act was passed

    c. Because the US government intervened in tensions in Vietnam

    d. Because a new team was formed

7. The investigators assumed that the murdered man was home when the crime happened
    a. Because they saw his name in the log book

    b. Because it looks like someone broke in by busting the door down

    c. Because of the cctv recording showing the occupant arriving at the building

d. Because some people saw him enter the building before the crime took place

8. Rorschach…
    a. Is currently working for the government
    b. Never retired even after his colleagues fell out of grace
    c. Is working for the Soviet
    d. Is a government-sponsored agent

9. Hollis Mason wrote a book and
    a. Wrote bad things about the comedian
    b. Identified the government names of Extranormal Operatives members
    c. Revealed who was behind the murdering of Blake
    d. None of the above

10. Who does Laurie meet for dinner near the end of chapter 1?
    a. Dan Dreiberg
    b. Dr. Manhattan
    c. The police
    d. None of the above

국문초록

시각화 경향성과 관련된 만화 소설 및 만화 영화가 영어 이해력에 미치는 효과

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이 연구는 영어 이해에 있어 'Graphic novels' (이하 '만화 소설') 과 'Digital motion comics (이하 '만화 영화')이 'Visual tendency level' (이하 '시각화 성향 수준')이 다른 학습자들에게 미치는 차별 효과를 결정하는데 초점을 맞추고 있다. 실험은 대한민국에 있는 대학교에서 수행되었으며, 참가자들에게 데이터를 수집하기 위해 '시각화 경향성' 테스트를 실시하고 시각화 경향성 수준이 높은 그룹과 시각화 경향성 수준이 낮은 그룹을 분류하였다. 시각화 경향성 수준이 높은 그룹과 시각화 경향성 수준이 낮은 그룹은 모두 2 개의 하위 그룹으로 이루어져 있으며, 테스트 시 '만화 소설'과 '만화 영화'는 2 개의 그룹에 할당되어 실험에 사용된 교수 매체이다. 연구에 참여한 메인 그룹을 사용된 교육 매체에 따라 하위 그룹으로 분류하였다.

데이터는 시각화 경향성 수준에 따른 ‘만화 소설’과 ‘만화 영화’의 상대적 차이점을 분석하기 위해 양방향 ‘ANOVA’로 분석을 실시하였다.

실험 결과, 영어를 이해할 때 시각화 경향성 수준 따라 ‘만화 소설’과 ‘만화 영화’에 대해 차별 효과가 있는 것으로 나타났다 (F=6181, p=0.016). 시각화 경향성 수준이 높은 학생들은 ‘만화 영화’보다 ‘만화 소설’을 사용할 때 더 나은 수행 능력을 보였으나, 시각화 경향성 수준이 낮은 학생들은 ‘만화 소설’보다 ‘만화 영화’를 사용할 때 더 나은 수행 능력을 보였다. 영어 이해 활동을 수행할 때 영상 매체의 선호도는 학생이 높은 수준의 시각화 경향성을 가지고 있는지 혹은 낮은 수준의 시각화 경향성을 갖고 있는지에 따라 달라진다. 영어 이해도 향상에 있어 각 매체의 주요 효과는 이 상호 작용으로 인해 의미를 찾기 어렵다. ‘만화 영화’가 ‘만화 소설’에 비해 좀 더 효과적이라고 나타날 수 있지만 이번 연구와는 다르다. 이 연구에서는 시각화 경향성 수준이 낮은 학생들에게 오직 ‘만화 영화’가 선호되며, 시각화 경향성 수준이 높은 학생들에게는 ‘만화 소설’이 선호 되는 것으로 나타났다. 이해에 있어 시각화 경향성 수준에 따라 각 매체의 차별 효과는 각 그룹에 의해 경험된 ‘인지 부하’의 차이에 기인한다.

Key words: graphic novels, digital motion comics, visualization tendency, language acquisition
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