THE PSYCHOLOGICAL EFFECT OF MOTION INFO GRAPHICS ON READING ABILITY OF PRIMARY SCHOOL STUDENTS

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Abstract

Nowadays, rapid changes in technology have remarkable effect on students' educational life. The technological devices of information and communication are improved to deliver valuable knowledge quickly, regardless of the place and time, novel media demonstration formats emerged. Infographics are examples of this format, which use graphic visual pictures to show the information, knowledge or data effectively. Infographics are utilized in instruction, particularly in instructional design which is more challenging to design an education. Therefore, teaching by infographics helps students to internalize and comprehend visual knowledge and provide a wider body of learning and grasp in teaching and learning. Motion graphics (MGs) are utilized in different venues for the aims of informing and entertaining audiences. Motion infographics are graphic visual representations of information, intended to present information quickly and clearly. Improving reading knowledge has always been an important concern to Primary school learners, so far much attempt, devoted to improve reading knowledge in various methods. Nowadays, it is time to forget the stereotypical methods of reading learning which rarely engage the readers' mind in the learning process and focus their attention on utilizing multimedia and visualizations in form of infographics in reading abilities. The present study was designed to investigate the effect of using motion infographics on reading ability of primary school students. The main objective of this study is to investigate the primary school students' perceptions about using infographics in education. The research is designed as a quantitative study. The total number of students participating in this research was 60. Data were accumulated by the researcher during this study. The gathered data were analysed via the descriptive analysis and inferential statistics approach.

Key words: *Motion, Infographics, Reading comprehension, Reading Ability*

INTRODUCTION

As visual communication devices, MGs are capable of informing or entertaining an audience, or doing a combination of both. For example, The New York Times routinely produces MGs that accompany the digital versions of their feature stories in order to offer visual explanations of the phenomena or subject matter described within the articles (Franchi, 2013). Graphic visualizations are regarded as spatial representations of a linear text in which ideas, concepts, and the connections between them are visibly emphasized by graphic devices such as diagrams, charts and maps. Graphic visualizations vary in appearance even though they all visually represent complex information in simple and meaningful displays.

According to Atkinson, Herrnstein, Lindzey, and Duncan Luce (1988), visual text perceived by the biological processing system is change into linguistic information in the short-term memory and meaning is yielded after repeated transfer of the information between the short and long-term memory systems. Representational graphics have the potential to divide the workload more evenly between the cognitive,

attentive, and perceptual systems (Ware, 2004). An infographic (information graphic) is a representation of information in a graphic format designed to make the data easily understandable at a glance (Tufte, 2001). Informational graphics, or infographics, are one type of data visualizations which are designed and presented to inform readers. They can be every graphics which is intended to show data in a meaningful way such as maps, charts, and graphs.

People use infographics to quickly communicate a message, to simplify the presentation of large amounts of data, to see data patterns and relationships, and to monitor changes in variables over time. Infographics abound in almost any public environment, traffic signs, subway maps, tag clouds, musical scores and weather charts are just a few examples, among a huge number of possibilities. In the enterprise, infographics are used by all levels of management for high-level views of data. Infographics include bar graphs, pie charts, histograms, line charts, tree diagrams, mind maps, and network diagrams. Such tools are often elements of business intelligence software. As the amount of data being amassed in the enterprise and elsewhere increases, infographics are being used more and more frequently to help people understand the information contained in that data. Infographics predate writing as a means of disseminating information, cave drawings are probably the earliest known example. In addition, individuals were creating and using maps before the advent of written language. Through the long history of using infographics, very scarce number of studies have been done in order to measure their effectiveness in promoting learners' learning. The present study gained insights from the previous studies and is going to investigate the effectiveness of infographics instruction on Iranian Primary school students' reading comprehension. Although the positive effects of infographics on learning is indispensable, "there is a lack of research to examine what learner and instructional variables can infographics influence student learning especially in academic settings" (Lim & Morris, 2009, p. 283). Therefore, the aim of this study is to investigate the influence of motion infographics on Iranian Primary school students reading comprehension. The following research question was posed:

RQ: Do motion infographics have any significant effect on improving reading ability of Primary school students?

1 REVIEW OF RELATED LITERATURE

1.1 READING COMPREHENSION

Reading comprehension traditionally relates to a reader's complete understanding or full grasp of meaning in a text. However, according to Yang (2002), it is a broad definition and causes some confusion. Scovel (1998) states that: "comprehension is not an absolute state where language users either fully comprehend or are left completely in the dark; rather, comprehension involves an active, dynamic, and growing process of searching for interrelationships in a text" (as cited in Yang, 2002; p.2).

He also defines comprehension as the reader's understanding of proposition-the basic unit of meaning-in the text. Since the proposition consists of words, sentences, or paragraphs, readers' cognitive levels of comprehension can be graded based on these propositions. That is, one person might only engage in lexical comprehension (words), while another may get involved in syntactic comprehension (sentences), the level of which is obviously higher than the former. According to the reader's purposes in reading and the type of reading used, reading comprehensions are often distinguished.

They are commonly referred to as: “literal comprehension” which is reading in order to understand, remember, or recall the information explicitly contained in a passage; "inferential comprehension" that is reading in order to find information which is not explicitly stated in a passage, using the reader's experience and intuition, and by inferring; “critical or evaluative comprehension” takes place to compare information in a passage with the reader’s own knowledge and values; and reading to gain an emotional or other kind of valued response from a passage which is called “appreciative comprehension” (Richard, Platt, & Platt, 1992).According to Resnick (1984), it is a process in which one uses external information to construct new knowledge. If the process is to occur, comprehension involves a complicated combination of skills in which students utilize their understanding of various elements. As Clark (1982) believed this type of active cognitive process of thinking and learning is accompanied by the reconstruction, interpretation, and evaluation of reading material. Therefore, reading plays a crucial role in all fields of studies and the learners can acquire a great deal of knowledge through reading activities (Carrol & Eisterhold, 1983).

1.2 MOTION INFOGRAPHICS

Before the advent of electronic media, the history of motion infographics were developed. In the 1800s, early presentations through flip books or Zoetrope were by the definition used above, motion infographics. In the 1970s, Whitney was using digital processes, and modern motion infographics were born. Before computers were extensively accessible, motion infographics were time-consuming. However, the availability of desktop programs like Adobe Flash and After Effects have made motion infographics increasingly accessible. The leading program used by motion infographic designers is probably Adobe After Effects, which works a bit like Photoshop. Of course, new products come along every day. What they all have in common is the ability to combine video, text, speech, data visualization, special effects and even 3D to create animations. The goal is to add the elements of time and space into the world of infographics, and to breathe life into otherwise static content. Motion graphics are not only created digitally. Traditional animation can also be used. But web-based data visualization tools are making it easier to build motion graphics and animated infographics cheaper and with less effort than ever. Motion infographics are the types of infographics (graphical videos that integrated with audio and designed for several purposes such as advertisement instrument or even educational purposes) and gives the viewer lots of information through pictures, graphical shapes or statistics, but according to Bertini (2013), we can use video footage or animation to build the illusion of motion.

Unlike interactive data visualizations, which allow users to manipulate the infographic and interact with a dataset, motion graphics tend to transform on their own and usually combined with audio, which makes them closer to film than static infographics. Perhaps “multimedia” might also be an appropriate definition of this term.

1.3 INFOGRAPHICS IN EDUCATION

In education, the infographics are utilized to show the intricate information in a compact form. This feature enables teachers to make ready different learning activities, includes warm-up lectures and summaries of the unit so as to engage learners with the course contents and make more chances for interaction (Vanichvasin, 2013). Moreover, in order to improve student’s visual communication skills, it can be required to design an infographic with respect to their visual knowledge and skills such as thinking, learning,

and expression. Therefore, infographics can be used as an alternative tool and also make students be able to illustrate their highest achievements in education (Schrock, 2014). Thus, instructors are looking for a way of integrating the applications and tools and then satisfy the visual learner's needs, by using infographics in the classroom.

Research on Infographics

Davidson (2014) mentions using infographics in the science classroom. Davidson (2014) also mentions some strategies that she finds useful like showing examples of infographics and discussing them, and also tasking the learners to find the best infographic on a particular topic. She includes three investigations where her environmental chemistry students have created infographics on recycling, water pollution, and air quality. She concludes that many of her students become intrigued with the blending of art with science in their infographics projects.

Matrix and Hodson and Hodson (2014) investigaed the adventages of infographics adoption in the online college classroom by incorporating a research-based graphic design assignment into coursework. Their study showed that teaching with infographics encouraged learners' visual digital literacy competencies which are essential for 21st century learners. They also concluded that the infographic assignment is well-suited for online and blended courses providing a motivating learning experience to today's learning learners, who prefer using digital tools to interact and perform a more active role in their learning process. Kibar and Akkoyunlu (2014) conducted a study to equip students with visual literacy. Their research was conducted with 64 teacher candidates. The aim of their study was to expose the usage of infographics as a learning tool. Teacher candidates designed infographics of instructional design model themed individually within the course. As a result of the rubric evaluation designed by themselves, the scores of "visualization" and "components" dimensions was found lowest; scores of "colors", "fonts" and "information organization" dimensions was found relatively higher.

2 METHODOLOGY

2.1 PARTICIPANTS

The sample of the study was Iranian Primary school students who studied English in language Institutes in Tehran. They were selected by convenience sampling. The participants of this study were 60 Primary school students, males (n = 60), who studied English language in language Institutes located in Tehran, Iran. The participants were divided into two groups: an experimental group and a control group. The experimental group and the control group each consisted of 30 students. The age range of the participants was between 7 and 11. They were native speakers of Persian. Their level of English language proficiency were all at an elementary level.

2.2 INSTRUMENTATION

The instrument was a researcher-made reading comprehension test, which was used both as a pre-test and post-test. In this test, there were 6 passages, each of which was followed by five multiple choice reading comprehension test items. The pre-test and post-test passages were similar to those that have been used to teach the control and the experimental groups during ten sessions. The reliability of this researcher-made reading comprehension test was estimated through running KR-21. The reliability indices of the two tests was 0.89 and 0.92.

2.3 INSTRUCTIONAL MATERIALS

The materials used in this study were (a) ten traditional reading comprehension passages for the control group and (b) the same ten passages, but infographic-based, for the experimental group.

Traditional Reading Comprehension Passages

The researcher prepared ten reading comprehension passages without any colorful picture to teach the control group in ten sessions. All the passages were at an intermediate level that selected in accordance with the level of the learners. In traditional reading method, teachers just relied on context without using any new technology such as Internet, mobile, online website or presentation software. The purpose was just perception of meaning through reading the passage and question and answer. So the researcher in this study read the passage aloud twice before starting work on it and then she gave the learners two minutes to read the passage silently, and after that, she asked a learner to read the passage again and, finally, the researcher asked the learners some questions and discussed the topic. To this end, each traditional passage were broken into sections that were not too long and then these sections were inserted into the related colorful pictures and charts in each slide. The passages were at an intermediate level. The first presentation consisted of an introduction to technology to make the learners familiar with infographics. In the remaining nine sessions, the researcher presented each slide by using Microsoft PowerPoint and read the short texts embedded in it simultaneously. During the presentation, the learners just watched the slides without looking at the passage, and, finally, the researcher asked the learners some questions to see how much information they received from the presentation without just reading the texts directly.

Infographic-Based Reading Comprehension Passages

The researcher converted the same ten traditional reading passages used for the control group into infographics, in the form of slides by using Microsoft PowerPoint to present to the experimental group in ten sessions. According to infographic-based teaching, each slide consists of colorful pictures, graphs, charts, and short texts (Smiciklas, 2012). To this end, each traditional passage were broken into sections that were not too long and then these sections were inserted into the related colorful pictures and charts in each slide. The passages were at an intermediate level. The first presentation consisted of an introduction to technology to make the learners familiar with infographics. In the remaining nine sessions, the researcher presented each slide by using Microsoft PowerPoint and read the short texts embedded in it simultaneously. During the presentation, the learners just watched the slides without looking at the passage, and, finally, the researcher asked the learners some questions to see how much information they received from the presentation without just reading the texts directly.

2.4 DATA COLLECTION PROCEDURES

The experiment was done at language Institutes in Tehran in 2020. To make certain that the experimental group and the control group were equivalent in language proficiency, a Placement test was administered before starting the instruction, and those who were at an elementary level were selected for this study. The instruction began by administering the pre-test to both the control and the experimental groups. The participants were given 35 minutes to read six reading comprehension passages with five multiple choice items. Then, the researcher selected and prepared the

appropriate forms of infographics in accordance with reading passages to teach the experimental group during each session. As explained in the instructional materials section above, an infographic-based teaching technique of reading was used in the experimental group and the traditional method of reading was used in the control group. All sessions were conducted at 4:00 pm in odd and even days for the control group and the experimental group respectively. At the end of the course, after ten sessions of instruction, a post-test which was the same as the pre-test was given to the participants to determine the effect of infographic-based teaching and the traditional method on the reading comprehension ability of primary school students. Finally, the collected data from pre-test and post-test were analyzed to answer the research question.

2.5 DATA ANALYSIS

Item analysis was performed on the pre-test and post- test in order to recognize weak items and adjust them if necessary. In addition, The data collected were analyzed in the following ways to test the research hypotheses. The null hypothesis was that Infographic-based teaching does not have any significant effect on the reading comprehension ability of Iranian Primary school students. To test this hypothesis, an independent-samples t-test was used.

3 RESULTS AND DISCUSSION

This study aimed at investigating the effects of motion infographics on enhancing reading ability of Iranian Primary school students. The data collection procedure was carefully performed and the raw data was entered into SPSS (version 21) to compute the required statistical analyses and deal with the research question and hypothesis of the study.

3.1 ANALYSIS OF THE RESEARCH QUESTION

The research question of this study sought to find out whether infographics affect reading ability of Iranian primary school students. In order to answer this null-hypothesis stating that “motion infographics do not have any significant effect on improving reading comprehension of Iranian Primary school students”, two independent sample t-tests were conducted on both pre-test and post-test. Before presenting the results of the first t-test, the related descriptive statistics are given in Table 1.

Group	N	Mean	SD
Experimental	30	8.9	3.85
Control	30	3.28	2.11

Table 1 Descriptive Statistics of Two Group's Gain Scores on the Pre-test and Post test

As it is shown in Table 1, the mean scores of the experimental group was 8.9 and the SD was 3.85, but the mean score of the control group was 3.28 and the SD was 2.11. It can be seen that the experimental group outperformed the control group. However,

to see whether the means were significantly different or not, an independent-samples t-test was run. The results are presented in Table 2.

	Levene's Test for Variances		*T*-test for Means			
Factor	*F*	*Sig.*	*t*	*df*	*Sig.* (2-tailed)	Mean Diff.
Equal variances assumed	16.720	.001	-10.3	118	.001	-5.65
Equal variances not assumed			-10.3	94.50	.001	-5.65

Table 2 Independent-Samples T-test for Comparing the Means of the Control and the Experimental Groups' Gain Scores on the Pre-test and Post-test

As Table 2 shows, the variances of the two groups were not equal (F=16.72, p=0.001<0.05). Therefore, the data in the second row are reported. The results show that the means of the two groups were significantly different (t= -10.3, df=94.5, p=0.001< 0.05) and the mean difference was -5.65. Therefore, it could be argued that the null hypothesis was rejected, which shows that the infographic-based teaching has a significant effect on the reading comprehension ability of Primary learners.

3.2 DISCUSSION

The findings of this study are consistent with the findings of several studies (e.g., Huang & Tan, 2007; Diakopoulos et al, 2011). The findings of all these studies show that the use of infographics has a positive effect on the quality of learning due to their potential to enhance learners' comprehension and memory retention. The findings of this study confirmed the results of a study by Cifci (2016), who revealed that using infographics in geography lessons increases academic achievement of the learners. The results of the present study also confirm those of Hegarty (2004), who argued that creating documents that allow learners to browse the information in any order was more useful than being constrained by the linear ordering of information in printed books.

The findings of this study are in line with a number of related studies undertaken by Hasler et al. (2007), Mayer and Moreno (2003), who asserted the superiority of animation over static graphics and indicated that if additional supporting strategies are incorporated into animations, animations will become more effective. The findings of the present study also support those of Ghaderi and Afshinfar (2014), who investigated the effect of using animated versus static funny pictures on Iranian students intake and retention of English idioms. They found that using animated funny pictures could enhance intermediate learners' intake and retention of idioms.

4 CONCLUSION

This study aimed at investigating the effect of infographic-based teaching on the reading comprehension ability of Iranian Primary school students. As the findings of this study imply, infographic-based teaching has a significant effect on the reading comprehension ability of Iranian Primary school students. It means the reading ability

of learners improves through infographics. Moreover, the findings showed a significant improvement in the reading comprehension ability of high and low proficiency learners, the high proficiency experimental group outperformed the low proficiency experimental group but there was no significant differences between the performance of male and female learners in the experimental group. According to the literature review and the results of this study, it can be concluded that teaching reading comprehension through infographics is beneficial. The fact that infographic-based teaching did not have different effect on male and female learners. They indicate that male and female language learners can equally benefit this technique to reading comprehension. Therefore, by providing opportunities and encouragement to read passages in the classes with various forms of infographics, the reading quality of learners will improve and they will be more eager to attend their English classes.

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