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# Exploring the Effect of Reading Materials Designed with Augmented Reality on Language Learners' Development of Text Structures Recognition Ability

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**Abstract:** Reading is an important language skill which is most extensively and intensively studied by experts in the field of language teaching and learning. Readers of all ages must be aware of text structures if they are to be most successful. The aim of the present study was to integrate the learning theories and technology to design some materials related to expository text structures to increase students' recognition ability and motivation. Using a mixed-method design, qualitative and quantitative data were collected. Students were instructed during a six-week period in Apadana Language Institute in Malayer city (20 intermediate students were selected based on Oxford quick placement test. A pre-test was conducted to assess the awareness of students related to text structures, summarizing the main ideas, and graphic organizers in expository texts. After six weeks, the post-test was conducted and the researcher investigated the impact of technology on students' recognition ability and motivation in the tests. To collect qualitative data, semi-structured interview and dichotomous form were used and for quantitative data pre- and post-test were used. To analyze the data, a one-way ANOVA was run. Results showed a significant increase in the post-test. The researcher recognized that technology and materials had a significant impact on their recognition ability, understanding, and motivation in expository text structures.

**Key words:** Augmented reality, expository reading, motivation, text structure, word recognition ability

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## 1. Introduction

Today, Computer-Assisted Language Learning (CALL) or Technology-Assisted Language Learning (TALL) possibilities are part of an everyday learning routine of many second language classrooms (Arvanitis, 2012). CALL was first used in the 1960s and comes from United States (Thomas, Reinders, & Rüschoff, as cited in Raiskinmäki, 2017). This utilization is reached by implementing CALL which has changed the traditional way of teaching the English language. One of the emerging and popular technologies in CALL is Augmented Reality (AR) (Ramya, 2017). AR with a great possibility along with technological devices can help students understand and realize abstract knowledge by visualizing them in education (Martin et al., as cited in Saidin, Abd Halim, & Yahaya, 2015). AR is a modern technology that is likely to have an impact on education and understanding. This claim is supported by the Horizon Reports from 2004 to 2010 which describe AR as a technology that brings the computer world to the human world (Madden, as cited in Saidin et al., 2015).

Among four language skills, reading is the most important skill among experts; it is the skill which is extensively and intensively studied by experts in the field of language teaching and learning, and perhaps, it is a hard skill to comprehend and learn compared with other skills (Pardede, 2017). For students who are learning second language (SL) and foreign language (FL) reading is the most vital skill to master because of the several reasons. Realizing this, we can see the great importance of developing reading and recognition ability for students (Pardede, 2017). In addition, students must get acquainted with and be aware of text structures provided that they want to be successful in this skill and understand the academic text. (Meyer, as cited in Abd Samad, Akhondi, & AzizMalayeri, 2015). Text structure is defined as the organization

and order of the ideas and their relationship in a text. Readers who cannot realize the text structures and are not familiar with them are at disadvantage because they do not approach reading with any type of reading plan (Meyer, Brandt, & Bluth, as cited in Abd Samad, Akhondi, AzizMalayeri, 2015). On the other hand, readers who are aware of text structures expect the information to unfold in certain ways (Akhondi & AzizMalayeri, 2010).

### **1.1 Purpose and Significance of the Study**

Based on the different theories of reading that have been conducted, especially cognitive theory of multimedia learning (CTML), an important issue here is that humans' brain consists of different features, intelligent, and memories that do the process of learning. Cognitive theories state that humans' brain processes learning with inputs that enters our sensory memories, such as eyes and ears. After that, other actions go to the working memory in our mind and the learning process occurs. Finally, it enters the long term memory where our learning is stable. Accordingly, if we develop our materials and change them to a specific and interesting way with the help of technological system and computer, we might be able to improve and increase students' efficiency and performance. With the help of technology like AR, we can make some new materials that can engage all of the memories and sensory memories that are used in the process of learning. For example, with slide presentation we are able to engage students' memories better than traditional ways.

Students cannot truly utilize traditional expository texts which are designed in abstract ways and are hard to realize and recognize. Teachers are still mainly relying on older methods of teaching to instruct students and teach different materials, as they lack training on how to use and integrate these digital tools into teaching and learning. In addition, they do not have enough creativity to make the materials understandable and easy for students. Therefore, this important issue can affect different aspects of students' learning and recognition ability. Technology is often the tool selected to support didactic teaching in the use of slide presentations. In addition, they may not have enough motivation, engagement, and good recognition of the texts in classrooms. Because our students are not interested in the boring texts and abstract texts/words and have some difficulties recognizing text structures, we augmented them and changed them to the pictorial slide presentation form which is designed with AR system to improve their ability of recognition of text structures. On the other hand, English teachers are keen to change their ways and techniques in their teaching. Accordingly with the AR system we will be able to change the teaching methods to the creative and visual ways. Moreover, using AR system will enable us to facilitate students' learning and increase their motivation, confidence, and improving their familiarity with different text structures. Little research exists on providing digital scaffolding and visual reading aids in conjunction with printed materials through AR for higher education students, so it seems vital to investigate the issue to find better information in the technology and education. This study made an attempt to investigate the following research questions:

Does the Augmented Reality (AR) system affect learners' recognition ability in Expository Texts and improve their understanding of text structures?

Does the Augmented Reality (AR) system affect learners' motivation, engagement, and understanding in classrooms?

## **2. Review of the Related Literature**

### **2.1 Theoretical Background**

#### **2.1.1 What is Expository Reading?**

As mentioned in the previous chapter Expository or "informational" texts convey communicate factual information. These texts contain more unfamiliar vocabulary and concepts, and fewer ideas related to here-and-now, and less information directly related to personal experience (Halletal, as cited in Akhondi & AzizMalayeri, 2010). Both narrative and expository texts have hierarchical structures (Meyer and Poon, as cited in Akhondi & AzizMalayeri, 2010). However, narrative texts tend to follow one structural pattern (story grammar), whereas multiple text structures are used in expository texts (Akhondi & AzizMalayeri, 2010). Students learn to read some simple genres of the texts for example narrative text structures which are almost story-like structures that help them improve their learning (Akhondi, Aziz Malayeri, & Abd Samad, 2015). As a result, students already have a sense of narrative structures as they appear in texts when they enter school (Akhondi, Aziz Malayeri, & Abd Samad, 2015). During the years of school, students must increase their awareness of text structures as they progressively change from reading story-like structures or casual texts to reading for information in hard texts like academic texts. (Lorch & Lorch, as cited in Akhondi, Aziz Malayeri, & Abd Samad, 2015). Because students in the third grade and obviously in the fourth grade are more engaged with the Expository reading, there is a noticeable change to reading texts for information- information that is often full of abstract and hard knowledge as well as written in long passages (Gillet, Temple, & Crawford, 2004). There are five main text structures in the expository reading which contain cause and effect, compare and contrast, problem and solution, sequence, and description (Meyer, 1985).

### 2.1.2 Motivational Theory (Intrinsic and Extrinsic)

Deci (1975, as cited in Huisinga, 2017) divides motivation into two separate categories, intrinsic motivation and extrinsic motivation. Intrinsic motivation is based on enjoyment and performing a task for the sake of the task itself (Huisinga, 2017). Extrinsic motivation originates from obtaining a desired result or avoiding a consequence, for example, to be externally motivated to read homework to obtain good grades (Huisinga, 2017). Research has shown that students enjoy using AR and find the use of the technology motivating and enjoyable (Huisinga, 2017). Their article examined AR experiences in educational settings (elementary and high school) to research how AR can enhance traditional learning models and pinpoint obstacles to broader adoption of AR in the classroom (Billinghurst & Denser, as cited in Huisinga, 2017). According to Huisinga (2017), students perceived change in motivation. The change in perceived motivation could be internal, external or a combination of both (Huisinga, 2017). For instance, a student may be internally motivated to use the augmented reading supports because they enjoy using their smartphones or tablets (Huisinga, 2017). The student may also be internally motivated to use the augmented reading support because they feel increased confidence in their comprehension, but externally motivated by acquiring a good grade (Huisinga, 2017). With the use of the Instructional Material Motivational Survey (IMMS), it was possible to measure the motivational impact of the augmented reading activity (Huisinga, 2017).

### 2.1.3 Augmented Reality (AR)

Augmented Reality (AR) with the different possibilities and powerful potential has emerged for utilization in education (Saidin et al., 2015). Due to the novelty of the AR in education, few studies has been carried out in this field (Saidin et al., 2015). The number of studies on AR is gradually growing because it shows its usefulness in education in recent years (Saidin et al., 2015). Different fields in education use AR to facilitate the learning in particular; AR provides an efficient way to represent some knowledge which need visualization (Saidin et al., 2015). Connecting the real world and virtual environments is a really easy way with AR. AR supports the connection between real world and virtual environment. (Singhal et al., as cited in Saidin et al., 2015). To sum up, users of AR technology can use this interesting features to see the real world in which superimposed or compound objects combine with reality (González, Vallejo, Albusac, & Castro, as cited in Barroso & Cabero, 2016). According to Barroso and Cabero (2016), mixing real elements with other further elements for the purpose of creating a new environment require a powerful technology like AR.

## 3. Methodology

### 3.1 Participants

The Participants for the current study were selected based on the quick placement test who were at the intermediate level studying English at Apadana Language Institute. The students were chosen based on the willingness of the classroom instructor to allow the researcher to conduct the study. There were 50 students at the beginning of the study, but 20 of them were able to complete the process of training. These students were all in the experimental group. The type of sampling was non-probability purposive sampling because the researcher was interested in training the students who were majoring in English and had already some considerable amount of exposure to academic reading texts. These students were mostly female aged between 19 and 27 years. Of course, age and gender were not the variables of interest in the present research. At the beginning of the research, a reading proficiency test was administered to identify the high- and the low-achiever students for the researcher's further observation during students' strategy use. Students' proficiency scores were not entered into statistical analysis in the quantitative measurement but for the qualitative description of the students' behavior during and after the intervention.

### 3.2 Materials

Based on the aim of this study the researcher used two important and practical windows version application which were called "Power Edit" and "Power Point". For designing the texts the researcher used the relevant sound which read the texts, and based on the texts, the researcher used appropriate and relevant pictures which were provided from Google. After sound and pictures were provided, the researcher used them in the application and made a video for each text which were taught to the students. The duration of each texts were approximately 4-5 minutes. In order to explain and practice the text structures, graphic organizer, discourse words, and key words of each text, Power Point was used in the class; the researcher added the graphic organizer and showed them using a special graphical form. In addition, the researcher provided an educational pack which included all the texts which were used in the class, dichotomous forms, and a questionnaire.

### 3.3 Instruments

#### 3.3.1 Questionnaire (dichotomous form)

In order to reach to a meaningful and trustful conclusion, researchers used questionnaires and conducted interviews. Socially desirable responding is the tendency for participants to present a favorable image of themselves (Johnson & Fendrich, 2005). Dichotomous questions give two options to respondents – yes or no, to choose from. It is the easiest form of questionnaire for the respondent in terms of responding. In this study, the researcher, using a dichotomous form, tried to measure the amount of students' motivation, their satisfaction of the way materials were designed, teaching method and

more importantly cover the qualitative.

### **3.3.2 Reflective teaching questionnaire**

The interview is an important data gathering technique involving verbal communication between the researcher and the subject. Interviews are commonly used in survey designs and in exploratory and descriptive studies. There are a range of approaches to interviewing, from completely unstructured in which the subject is allowed to talk freely about whatever they wish, to highly structured forms in which the subject responses are limited to answering direct questions (Mathers, Fox, & Hunn, 2002). The interview design and question phrasing will influence the depth and freedom with which a subject can respond. Some interviews encourage lengthy and detailed replies while others are designed to elicit short and specific responses. According to Mathers, Fox, and Hunn (2002), there are three main methods of interviewing, which are structured, semi-structured, and unstructured. In this study the researcher used the semi-structured methods to cover the qualitative method.

### **3.3.3 Semi-structured method in interview**

According to Mathers, Fox, and Hunn (2002), semi-structured interviews involve some open-ended questions based on the topic areas and goals that the researcher wants to cover. The open-ended nature of the question defines the topic under investigation but provides opportunities for both interviewer and interviewee to discuss some topics in more detail. If the interviewee has difficulty answering a question or provides only a brief response, the interviewer can use cues or prompts to encourage the interviewee to consider the question further (Mathers, Fox, Hunn, 2002). In a semi-structured interview, the interviewer also has the freedom to probe the interviewee to elaborate on the original response or to follow a line of inquiry introduced by the interviewee. Semi-structured interviews are useful when collecting attitudinal information on a large scale, or when the research is exploratory, and it is not possible to draw up a list of possible pre-codes because little is known about the subject area (Mathers, Fox, & Hunn, 2002). However, analyzing the interview data from open questions is more problematic than when closed questions are used as work must be done before often diverse responses from subjects are compared. Well planned and conducted semi-structured interviews are the result of rigorous preparation. The development of the interview schedule, conducting the interview and analyzing the interview data all require careful consideration and preparation.

### **3.3.4 Reading Comprehension Test**

In order to test reading comprehension, for each session of test taking, an expository reading passage of 700-900 words was selected from the "Active Reading 2" textbook in which all of the passages are informational. The selected passages contained paragraphs consisting of almost 100 words for each paragraph. The researcher assumed that the participants would be able to read and answer questions on the passage comfortably within 90 minutes because they were at the intermediate level and they were some students who were exposed to informational texts. Thus, the text passage conforms to the level of the students' required reading.

## **3.4 Procedure**

The procedure had three phases as below:

Phase 1: the researcher attended in the class and started discussing and shared the purposes of the study with students. Moreover, the researcher discussed the pros and cons of technology in education and the importance of knowing the different types of text structures in expository reading. In addition, researcher tried to introduce AR system and digital materials which were designed to teach text structures and signal words to the students. In this level the researcher gave educational packs to each student which included 15 texts having graphic organizers, signal words, and a dichotomous form.

Phase 2: the researcher told the students that it is better to have technological devices with themselves; however, it was not possible for the students to have technological devices in the class, so the researcher provided printed pages and worksheets related to that session and used them in the class.

Phase 3: after that our students were informed about the features and the tools which were used in the class, the researcher started teaching which involved three important steps. In this study because we had six sets (three sets for pre-test and three sets for post-test) of scores which were obtained from a group of people in pre-test and post-test and, in addition, because three types of test were given, the researcher used a one-way ANOVA to analyze the data. In line with most research in the social and human sciences, the probability level selected for this study is  $p = .05$  (that is a 95% level of confidence). The Statistical Package for the Social Sciences (SPSS) version 22 was used for tests of significance in the present study.

### **3.4.1. Before Reading**

Every session the researcher tried to teach a special kind of text structure for the expository reading. First of all, we introduced the type of the text structure and signal words which were worked in that session. Second, we introduced the new words of the text and then we discussed a summary of that text with students. Third, we asked our students to take a look at signal words and prepare for watching and listening to the whole of the text which were prepared in the video format.

### 3.4.2 During Reading

In this part, there are two important issues: one refers to students and the other one refers to researcher.

*Students' roles:* After that students identified the signal words, we asked the students to find these clues in the text and tried to highlight and emphasize the signal words and phrases in the texts and elaborate on a series of signal words for text structure while they were watching the videos. In addition, students should understand the main idea and the purposes of the text and realize what the text is going to convey. Furthermore, students should be able to identify the meaning and the type of text structure.

*Researcher's role:* while students were reading the text, the researcher monitored them and in every part or situation which students needed help, the researcher assisted them. Monitoring in this case was really important.

### 3.4.3. After Reading

After that students became familiar with the text structure and signal words, we used technological devices (Power-Point) to practice the text and text structures with graphic organizers. The researcher intended to use the graphic forms and practice the text and text structures with them. The researcher gave them an incomplete graphic organizer and then ask them to complete them based on the text. At this stage, the students would independently elicit the idea from the text, and demonstrate the hierarchy of the ideas in a graphic organizer. Pair working in this stage was really important and we asked students to do their tasks with each other. After all the mentioned steps the researchers gave the students feedback and correct their answers. In addition, after all of the mentioned steps, the researcher tested the students, and after that he asked the students to complete the dichotomous test. He also interviewed all of the students and asked some questions about the designed materials, teaching method, and the class.

## 4. Results and Discussion

### 4.1 Profile of the Students before the Intervention

The researcher conducted two tests in his study as the pre-test and post-test. The homogenized participants took the pretest that was designed to test the participants' reading ability before receiving the treatments of study. The descriptive statistics of participants' performance on the pretest is provided in the table below. For the pre-test, the results from descriptive statistic showed that the mean scores of the tests were different.

Table 4.1

*Descriptive Statistics of Participants' Scores on the Pretest*

	N	Minimum	Maximum	Mean	Std. Deviation
Graphic Organizer(Pretest)	20	1.00	6.00	3.8000	1.32188
Summarizing (Pretest)	20	1.00	6.00	3.7500	1.58529
Text Structure(Pretest)	20	2.00	5.00	3.7000	1.03110
Valid N (listwise)	20				

In order to ensure that there is no significant difference between the three types of the tests, a one-way ANOVA was performed among the pretest scores of the three groups. The results are provided in the table below.

Table 4.2

*One-Way ANOVA on the Pretest*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.100	2	.050	.028	.972
Within Groups	101.150	57	1.775		
Total	101.250	59			

As indicated in Table 4.2, F value is .02 and p value is .97; it was higher than the assumed level of significance (i.e., .05). It shows that there is not any significant difference ( $F = .02, p > .05$ ) among the pretest scores of the participants. However, the researcher has conducted another one-way ANOVA in order to compare the pretest of the participant with their performance in the post test after receiving the treatment or the intervention. The results are reported in the following section of this research report.

#### 4.2 Profile of the Students after the Intervention

After the six weeks of the treatment for how to recognize the text structures and use the graphic organizers and summarizing the main ideas to recognize and comprehend texts better, along with materials which were designed based on Augmented Reality in a group of students, the researcher was interested in revealing the difference between pre-test and post-test and answer the first research question. The first research question was as follows:

1. Does the Augmented Reality system affect learners' recognition ability in expository texts and improve their understanding of text structures?

A one-way ANOVA was conducted for the group of students to prove the effectiveness of the treatment and confirm the progress for the intervention group. The results of the statistical analysis are reported in the following section. Table 4.3 shows descriptive analysis after the treatment. In the post-test, we witnessed an increase in their mean scores. The results showed that the mean of the performance on the comprehension and recognition ability of the text structures is significantly different from that of the pre-test. The descriptive statistics of the three tests are shown in the table below.

Table 4.3

*Descriptive Statistics of Participants' Performance on the Posttest*

	N	Minimum	Maximum	Mean	Std. Deviation
Graphic Organizer (Posttest)	20	9.00	17.00	12.5000	2.23607
Summarizing (Posttest)	20	10.00	16.00	13.3000	2.07998
Text Structure (Posttest)	20	14.00	20.00	17.1500	1.98083
Valid N (listwise)	20				

In order to find the difference among the three tests of reading scores, a one-way ANOVA was performed between the scores of the participants on the post-test. The results are shown in Table 4.4.

Table 4.4

*One-Way ANOVA on the Post-test*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	247.233	2	123.617	27.989	.000
Within Groups	251.750	57	4.417		
Total	498.983	59			

The results showed that, F value is 27.98 ( $p < .05$ ); it was lower than the assumed level of significance. Thus, there is a statistical significant difference among the three types of post-test scores ( $F = 81.69, p < 0.05$ ).

#### 4.3 Qualitative Data for the Second Research Question

The second research question was as follows:

2. Does the Augmented Reality system affect learners' motivation, engagement, and understanding in the classrooms?

Two qualitative instruments were used to gather with the data collected in this research, namely semi-structured interview, and the dichotomous form. In addition, the researcher gathered some information by observing the class during the intervention.

##### 4.3.1. Results from Interviews and Observation

An assessment technique that can be used at any time or in any situation in the classroom is observation. Essentially, observations are the teacher's personal awareness of what students are doing at any given point during the day and can include student's facial expressions, behavior, concentration level, and responses to instruction or assignments. The researcher spent a total six weeks at the research class under the treatment collecting observational data. During the observation of the students' reading, the researcher walked around the class and watched students and investigated that in what way students had a better understanding and which parts of the materials were interesting for them. The answers of the questions were gathered during the teaching process and the researcher realized that when he taught the new words and introduced the signal words to the students, they were more motivated to learn and recognize the text and text structures. On the other hand, based on the researcher's investigation and observation, he realized that the most common learning channel in the students was visualizing abstract knowledge. So, the researcher concluded that if teachers use their creativity and flexibility in designing materials, the produced materials can help students to understand the text better. Besides, the researcher conducted a semi-structured interview (questions about the technology which was used in the class, teaching method, and materials which were designed) with all of the students and these interviews were written by the students on a piece of a paper. The data which were collected from the interviews show that technology and materials which were designed with AR had a significant effect on the students' satisfaction. In addition, based on the interviews, they were really satisfied with the

teaching methods and they mentioned this important issue that the teaching method makes the texts easy to understand so we understand it better and completely. However, in some items which were not in the control of researcher they had some negative ideas such as light, the size of the class, and so on.

Another qualitative instrument which was used in the class was the dichotomous form. From dichotomous form we could realize three important criteria. The first one was that the materials were good or not? Based on the researcher's observation and information which were collected from dichotomous form, almost all of the students chose 'yes' and in their opinion, materials were good, and they could engage students in the lesson. Other criteria which were used in the form, such as teaching method and technological devices, were perceived to be positive for the students.

## 5. Conclusion

In this study the researcher tried to run his study on the two important theories, namely cognitive theory and cognitive theory of multimedia learning (CTML). Based on the theories which are selected for the current study, the teaching method was selected. Scaffolding was the method that was matched with the current study and enabled the teacher to investigate the aims of the study. Other theories such as motivational theories were conducted to investigate the motivation of the students. Intrinsic and extrinsic motivation are the most common motivation in human beings that have a really important effect on learning. The use of Augmented Reality in the classroom has repeatedly been shown to increase students' motivation (Billinghurst & Duenser, 2012; Johnson et al., 2010; Tarnig & Ou, as cited in Bower et al., 2014). Intertwining the materials which were designed based on the technology (AR) with the learning theories (Cognitive theory and CTML) and an appropriate method (Scaffolding) to teach the materials were found to help students to learn better. Students were motivated to continue their ways and never give up because of the hardness of the informational texts.

In this research, all the materials were designed using a windows application called "Power Edit" because the Augmented Reality application was so expensive and was not accessible for the researcher to buy. However, for the future research, it will be more amazing and interesting to use a special kind of AR application to design materials and use them in classrooms. In addition, it can be possible to work on the other techniques in reading for example, skimming, scanning, and prediction. In addition, it will be really important to intertwine the technological devices which are related to AR in the classroom.

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