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Developing the Preparatory Stage Students' Critical Writing Through a Virtual Reality Environmental Context

Research Submitted for Partial Fulfillment of the Requirements for
Master Degree in Curriculum and Instruction

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ملخص الدراسة باللغة العربية

المقدمة

يعد التطور المستمر للتكنولوجيا بمثابة تحويل التعليم إلى طرق جديدة أكثر جانبية للطلاب بإستخدام أدوات جديدة مبتكرة تبعد عن التقليد، مع الأخذ في الإعتبار تطوير عملية التدريس على نحو مستمر. يحتل نظام الواقع الإفتراضي (VR) مكاناً هاماً في هذا التطور حيث تعددت التعريفات حول الواقع الإفتراضي ولكن جميع هذه التعريفات تشير بشكل عام إلى تجربة غامرة وتفاعلية معتمدة على أساس الصور المتحركة ثلاثية الأبعاد (3D) وبعبارة أخرى هو حاكاة يتم توليدها عن طريق جهاز كمبيوتر لبيئة حقيقة أو مجرد عالم تخيلي. تعريف آخر أكثر تحديدا لنظام الواقع الإفتراضي هو واجهة الكمبيوتر التي تسمح للمستخدم للتفاعل في الوقت الحقيقي، في الفضاء ثلاثي الأبعاد الناتجة عن استخدام جهاز كمبيوتر ويتم في أثناء ذلك استخدام مشاعره و حواسه داخل هذه البيئة من خلال الأجهزة الخاصة (Kirner, 2012). يعتبر (VR Gear Box) أحد تطبيقات الواقع الإفتراضي وهو جهاز يستخدم مع نظارات محمولة على الرأس التي تمكن المستخدم من الاندماج في بيئة تخيلية ثلاثية الأبعاد (3D) عن طريق تصميم مقاطع فيديو خاصة تمكن المستخدم من الاستماع والمشاهدة دون أي تأثير أو إلهاء من البيئة الحقيقة المحيطة التي يتواجد بها المستخدم (Hempel J. 2015).

قام الباحث بتطبيق اختبار لقياس قدرات طلاب المرحلة الإعدادية على الكتابة النقدية و كان عددهم 86 طالبا و طالبة. و من القدرات التي تضمنها الإختبار القدرة على توليد الأفكار، و التعبير عن الرأي، و رفض، و قبول الأفكار، و نقد الأفكار المطروحة، و تكوين موقف منها، و القدرة على الكتابة بصورة صحيحة دون تشتت أو جمود، أو تكرار، في الأفكار، و القدرة على ترابط مكونات الجمل، و توافق الأزمنة، و ملائمة المصطلحات لسياق المتنال. كما أثبتت النتائج أن معظم هؤلاء الطلاب يفتقرن إلى قدرات التفكير النبدي الأساسية، و كان متوسط درجاتهم في الإختبار 39%. أظهرت الأسئلة أن نقاط الضعف الرئيسية لديهم مرتبطة بقدرات النقد، و تكوين وجهة نظر عن الموضوعات البيئية، و الثقافية المطروحة، و التعبير عن وجهة النظر في نص مكتوب بصورة صحيحة و دقيقة.

إجراءات البحث

- 1- إعداد الإطار النظري من خلال الأدبيات المتعلقة بالكتابة النقدية و قراءة الدراسات السابقة.
- 2- إعداد إختبار (قبلي/بعدى) يتضمن الموصفات و القدرات الالزمة للكتابة النقدية لطلاب المرحلة الإعدادية.
- 3- تطبيق الإختبار القبلي و مناقشة النتائج و الإحصاءات.
- 4- إعداد برنامج قائم على إستخدام " الواقع الإفتراضي" لتطوير قدرات الطلاب على الكتابة النقدية.
- 5- قيام الباحث بتطبيق البرنامج.

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- 6- تطبيق الإختبار البعدي للتحقق من مدى نمو قدرات الطلاب على الكتابة النقدية.
 - 7- إعداد مقياس متدرج (Rubric) لتصحيح الإختبار القبلي و الإختبار البعدي.
 - 8- تحليل النتائج التي تم التوصل إليها بما يختص الكتابة النقدية لدى تلاميذ المرحلة الإعدادية.
- نتائج البحث

سيصبح الطالب قادراً على تنمية الأمور التالية:

- الوعي بالبيئة المحيطة بمكوناتها.
- التعرف على البيئة المقدمة في الواقع الإفتراضي بشكل أكثر وضوحاً من خلال المعايشة.
- تكوين معنى واضح لمفردات ما يحياه الطالب.
- تحليل الواقع الإفتراضي و مكوناته استناداً إلى الرؤيه الواضحة و إستكشاف العلاقات بين مكونات هذا الواقع.
- القدرة على التعبير عن وجهة نظر الطالب من خلال الكتابة.
- القدرة على التفاعل مع مكونات البيئة من خلال الخلفية العلمية للطالب.

Abstract

The purpose of the present study was to investigate the effectiveness of using virtual reality to develop the preparatory school students' critical writing abilities. Participants of the present study were 30 preparatory school stage students ($N=30$). The researcher used the instrument of pre and posttest to examine the participating students' critical writing abilities and critical writing abilities checklist. The proposed program was administered to the participating students in the summer vacation of the school year 2017-2019 at El Masria Integrated International School in 10th of Ramadan city, El Sharqia. Results proved that the program was effective in enhancing the participating students' critical writing abilities and writing appropriateness as well. Implications and recommendations, as well as suggestions for further studies were provided.

Key words: Virtual Reality

Introduction

The constant evolution of the technology is taking the education to new ways, much more attractive to the students, making possible the use of new tools, taking to an evolution on the teaching process. The Virtual Reality (VR) takes an important place in this evolution. Several are the definitions about the VR, but in general, they refer to an immersive and interactive experience based on graphic images in 3D generated in real time by computer, in other words, it is a simulation generated by a computer, about a real or just an imaginary world. Another definition, more specific is: virtual reality is a computer interface that permits the user to interact in real time, in a tridimensional space generated by a computer, using their feelings, through special devices (Kimer, 2012). One of the applications of the VR is the VR Gear Box which is platform used with a head mounted goggles that enables the user to merge in a virtual 3D environment by using special designed 3D videos where the user can listen and watch without any surrounding distractions (Hempel, 2015).

Virtual technology systems may have several ways to enhance interaction and immersion. Basically, any Virtual Reality (VR) system can be classified as immersive, semi-immersive, and non-immersive (Bamodu, 2013). An immersive system creates the feeling of being exploring a whole virtual world, a semi-immersive (e.g. by using several projection screens instead of glasses) or a non-immersive system (e.g. computer displays) create some degree of realism, but without a so enhanced feeling of “being there” (Riva, 2006).

Virtual technologies have the potential of making students feel more committed and motivated research on these technologies opens new paths for teaching and learning (Chen & Tsai, 2012).

There are numerous case studies that investigate this area when using virtual technologies in educational environments (Martin-Gutierrez, Saorin, Contero, Alcaniz, Perez-Lopez, & Ortega, 2012 ,Di Serio, Ibañez & Kloos, 2013), but these studies tend to be focused on specific experiences and topics. Thus, it is important to understand effective instructional designs for a better integration of VR (Stefanos & Loizos,

2016) to spot how to integrate these technologies in a stable way into an educational process. These studies in the scientific literature linking virtual technologies with improvements in students' academic performance and motivation (Harris & Reid, 2005, Sotiriou & Bogner, 2008, Di Serio, Ibañez & Kloos, 2013, Martín-Gutiérrez & Meneses, 2014, Bacca, Baldiris, Fabregat, Graf, & Kinshuk, 2014, Holley, Hobbs, & Menown, 2016), students' social and collaborative skills (Kaufmann, Steinbugl, Dünser & Gluck, 2005, Martin-Gutiérrez, Saorín, Contero, Alcaniz, Perez-Lopez, & Ortega, 2010), and students' psychomotor and cognitive skills (Feng & Billinghamst, 2008).

Virtual Reality offers a large number of possibilities in instruction as it helps students to experience directly some physical properties of objects and events and to realise the actual implications of such properties. In addition, VR favours the discovery of features which are often, in traditional educational tools, perceptually 'hidden' because it permits users to look at elements which cannot be seen on the other hand, VR prompts students to conceptualise experience at an abstract level (Ketelhu, 2010).

The foreign language setting was found to be the most needed in the VR world publications analyzed. This is not surprising, given that FL learners often do not have ready access to a suitable environment in which to practice and use the target language. Virtual learning environment can overcome this difficulty by providing an immersive and authentic environment to socially interact with native speakers. This implies that language learning environments are becoming more diverse. The learning settings available in cyberspace as a virtual environment can be a combination of any other environment, in which users are not constrained to their physical locations and they can mingle together without physical frontiers.

Critical writing is how to present an effective argument through written piece (Charnock, 2010). This means learning to present evidences, ideas and point of views in a clear, well-structured manner. Different formats (e.g. essay, report, dissertation, projects etc.) mean that argument is presented in different ways but will always lead to a logical conclusion

which is the main essence of any writing purpose. Critical writing is a process that involves using a range of writing abilities as well as personal qualities that most people find challenging. The writer in this case is positive and not just a machine collecting words together but to add, oppose, support and express his own ideas in an adequate and correct way through writing using English language. Paragraphs are used in critical writing to develop and expand ideas, give a clear and precise account of the relevant evidence and arguments, back up argument with evidence and give reasons for conclusion. (Moore, Neville, Murphy & Connolly, 2010).

World issues and social cases started to rise and itch hard so students should form a positive stance towards these issues such as the environment and culture. As a critical analyst writer, should investigate meanings words like nature (Hansen, 2006) or climate change (Swyngedouw, 2010) that has not left the world at ease until now. Culture and environment are polysomic concepts: they have different meanings in different contexts. Nevertheless, they are key concepts to understand environmental communication (Carbaugh, 2013). Culture refers to patterns of symbols, meanings, values, and rules that belong to the social life shared by a group of people (Cresswell, 2009). The VR goggles using the appropriate virtual reality media eliminate the hindrances that may face learning these concepts such as time, place and boredom.

Context of the Problem

Critical thinking has a great importance in helping the individual to cope with the rapid changes in today's world and deal efficiently with the problems that require abstract thinking skills by being able to control the decision-making ability that rely on providing alternatives, correcting and building a particular view and this is the essence of critical thinking. By having the ability to perform proper critical thinking, learners will know how to ask, when they ask and provide evidences. Critical thinking can be considered as a type of solving problems but it does not follow the usual troubleshooting steps, as it was necessary to subject learner outcomes to criticism, evaluation and comparison (El Halaa', 2010).

Critical thinking changes the operation of knowledge acquisition from a dull procedure to active intellectual process, so the student can add, neglect, support and modify ideas to make them more accurate and effective as well as engaging these ideas in their daily life bases without any bias towards a certain idea or a certain feeling towards an idea (Chaun, 2010).

The students' written fluency in the Egyptian schools is not eligible and it suffers from looseness, weakness and lacking the critical point of view of the writer especially when it comes to environmental and cultural contexts. Students' writings seem to be slow, lifeless and completely away from the targeted context (Marwa & Alexander, 2018). This may be due to that the main concept in the education in Egypt is about explaining the curriculum in the planned time of the academic year without any attention to the effective practice of the language in an appropriate context which is the goal of learning any language (Steffen, 2011). The inability to practice the language sometimes happens because it may cause a conflict with the teaching plan and this is considered a waste of time in the Egyptian teachers' opinion.

When the researcher administered a test for some preparatory students on two optional contexts (the student chooses a topic about the environment or culture) and express about any in a written passage. Most of the students responded: "This question is not in our curriculum course and we are not able to answer it properly". This may be attributed to the strategies applied by the teachers, and because of the absence of the critical thinking concept away from the Egyptian English teachers. There was a lack of training programs on this type of thinking, which was significantly absent in the writings of students of the preparatory stage in Egypt.

Statement of the Problem

Preparatory school students' writing fluency is not eligible, and this could be due to strategies applied by the teachers. There is a need to vary the learning teacher strategies and there is a need to a different environmental and cultural context, so the researcher suggests using some virtual reality goggles to improve the students' writing fluency. In this

regard, there are difficulties like the resistance of traditional learning environments to integrate educational innovations, the opposition of teachers to adopt new technologies out of their comfort zone, and the costs involved to implement and maintain new technologies.

Research Questions

Main Question

How can virtual reality improve the preparatory students' writing fluency in an environmental and cultural context? and this elicits the answers of the following questions:

Sub Questions

- 1- What is the existing situation of the target students?
- 2- What are the activities and VR devices used that can improve the writing fluency?
- 3- What is the effect of using VR on developing the target students' writing fluency?

Hypotheses:

The study verified the following hypotheses:

1. The use of (VR) will increase the English writing fluency of preparatory school students.
2. Students will be more motivated to write using the English language.
3. The preparatory school students' writing appropriateness will be improved.

Delimitations of the Study

1. A group of preparatory stage students and their number is 30 students.
2. Some critical thinking abilities necessary and appropriate for the study participants, which are: accepting and rejecting ideas, forming a point of view about these ideas, self-expressing and understanding the purpose of the target writing context.
3. Some virtual reality devices and activities relevant to the targeted critical thinking abilities, appropriate for the study participants.

In this regard, there are difficulties like the resistance of traditional learning environments to integrate educational innovations, the opposition

of teachers to adopt new technologies out of their comfort zone, and the costs involved to implement and maintain these technologies.

Procedures

The study was done through the following procedures:

1) Defining the basics and principles on which a virtual reality-based program can be designed to develop the preparatory school stage students' critical writing abilities in the environmental and cultural context. This was performed through:

- Reviewing former related studies and literature about virtual reality.
 - Reviewing former related studies and literature about critical writing abilities.
 - Making a list of critical writing skills that preparatory school stage students should be qualified in.
- 2) Examining the status of the preparatory school stage students' critical writing abilities. This was accomplished through the following:
- Preparing a critical writing test based on the previously designed list.
 - Choosing a group of preparatory school stage students.
 - Administering the prepared critical writing test to the chosen group.
- 3) Designing the virtual reality based proposed program according to the results of the pretest and stating the aims of the program.

Results

T test results of the means of the students' results in the pre and posttest of the critical writing abilities as (n=30) and 00000000(df=29)

Ability	mean		Std. Deviation		Value (T)	Sig.	Effect size (η^2)
	pre	post	pre	Post			
Vocabulary appropriateness to context	4.3	8.5	1.35	0.73	17.352	0.000	0.912 Large
Accepting and refusing ideas	2.3	7.8	1.28	1.34	15.028	0.000	0.887 Large
Creating links between ideas	2.9	3.9	2.37	0.99	2.130	0.036	0.138 Medium

Offering alternatives	3.8	4.8	2.80	1.07	2.085	0.046	0.130 Medium
Providing evidences	2.9	7.2	1.36	2.03	10.894	0.000	0.803 Large

Data of table reveal that:

-Significance level for the abilities (vocabulary appropriateness to context, accepting and refusing ideas, creating links between ideas, offering alternatives, and providing evidences) is less than (0.01), which means that there is a statically significant difference between the means of the students' results in the pre and posttest concerning (vocabulary appropriateness to context, accepting and refusing ideas and providing evidences). Significance level concerning (creating links between ideas and offering alternatives) is larger than (0.01) and less than (0.05), which means that there is a statically significant difference between the means of student's results for the posttest at significance level (0.01).

-The data analysis means the rejection of the zero hypothesis and accept the alternative hypothesis which states that there is a statically significant difference between the means of students' results of the pre and posttest of the critical writing abilities in the favor of the posttest.

-To measure the effect size, ETA square test was used. As (**Ezzat, 2016**) stated: the measurement of effect size in the case of T test for two independents of related samples is done through the following equation:

$$\text{Effect size } (\eta^2) = t^2 / (t^2 + df)$$

Df= degrees of freedom

T= t test

η^2 can be explained as follows :

if $(\eta^2) < 0.010$ this means a weak relation or weak effect size

if $0.010 \leq (\eta^2) \leq 0.059$ this means a small effect size

if $0.059 \leq (\eta^2) \leq 0.138$ this means a medium effect size

if $0.138 \leq (\eta^2) \leq 0.232$ this means a big effect size

if $(\eta^2) \geq 0.232$ this means a huge effect size

From table, it is revealed that the value of the effect size which is explained by ETA square test is huge for the abilities (vocabulary appropriateness to context, accepting and refusing ideas and providing evidences) which

means that the proposed program by the researcher has a strong effect on the development of these abilities. The table shows that the effect size was medium concerning the abilities (creating links between ideas and offering alternatives) which means that the proposed program has a medium effect on these abilities.

Testing the second hypothesis

The second zero hypothesis is that there is no statically significant difference between the means of students' results in the pre and posttest of the writing appropriateness. To test this hypothesis the researcher applied T test to two related samples to find out the significance of differences between the means of student's results in the pre and posttest of writing appropriateness as presented in the following table:

Critical writing test	mean		Std. Deviation		Value (T)	sig	Effect size (η^2)
	pre	post	pre	Post			
Writing appropriateness	16.2	32.2	5.62	3.10	14.768	0.000	0.883 Large

The data from the table reveal:

- The significance level is less than (0.01) which means that there is a statistically significant difference between the means of the students' results of writing appropriateness pre and posttest in the favor of the posttest.
- The effect size explained by ETA square η^2 equals (0.883) which means that the program proposed by the researcher has a huge effect size on the development of the critical writing abilities.

From the previous data analysis, the use of virtual reality has developed the critical writing abilities for the preparatory school stage students in the environmental and cultural context which answers the main question of the study 'what is the effect of using the virtual reality on developing the critical writing abilities for the preparatory school stage students in the environmental and cultural context'.

Discussion of results

-The researcher tested the first hypothesis which states “There are no statically significant differences between the means of scores obtained by the participating students in the pre and posttests in the students’ critical writing abilities using virtual reality in the environmental and cultural contexts”. In order to examine this hypothesis, the researcher compared the means of scores of the students in both pre and posttests.

Comparing the T values between the scores of the participating students in the pre and posttest showed that there is a statistically significant difference between the means of the scores of the students at (0.01) significant level in the favor of the posttest. The effect size measured by square ETA (η^2) also showed that there is a huge effect size that occurred to the students’ critical writing abilities after using virtual reality in the environmental and cultural context.

-The researcher tested the second hypothesis which states “there are no statically significant differences between means of scores obtained by participating students in the pre and posttests of writing appropriateness of preparatory school stage students in the environmental and cultural context after using virtual reality”

Comparing the T values between the scores of the participating students in the pre and posttest showed that there is a statistically significant difference between the means of the scores of the students at (0.01) significant level in the favor of the posttest of critical writing appropriateness. The effect size measured by square ETA (η^2) also showed that there is a huge effect size that occurred to the students’ critical writing appropriateness after using virtual reality in the environmental and cultural context.

The results of the study proved that there has been a great development in the students’ critical writing abilities and appropriateness after using the proposed program.

The importance of this study is as follows

- Developing preparatory school stage students’ critical writing abilities.
- Reforming school teachers’ concepts and prospective while teaching as they will reject traditional methods of teaching.

- Appropriate activities to help students develop their critical writing abilities and writing appropriateness.
- Adding up to the body of research on critical writing abilities and writing appropriateness.

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