IREAL: INFORMATION REINFORCEMENT WITH THE USE OF AUGMENTED REALITY IN LEARNING

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ABSTRACT

Augmented reality (AR) can be a valuable tool in enhancing modular distance learning experiences. Modular distance learning often involves self-paced, independent study, where learners complete their modules at their own learning pace. AR can transform static content in modules into interactive and engaging experiences. Also, AR can provide context to theoretical concepts by overlaying digital information on the real world. For example, learners studying geography can use AR to explore geographical features, historical sites, and more by simply pointing their device at a map or a geographical reference. For instance, textbooks and modules can come to life with 3D models, videos, and animations triggered by a mobile app or AR headset, making the learning process more engaging and memorable. In fields such as science, AR can simulate experiments and lab work, allowing students to practice hands-on skills and conduct experiments safely from their own homes.

The study iREAL: Augmented Reality for Enhanced Learning" provided students with the opportunity to be engaged in educational experiences enriched by augmented reality. Beyond just acquiring knowledge about science, AR also played a role in honing the students' language skills by offering real-time translations, guidance on pronunciation, and vocabulary enrichment in a real-world context. The researchers seamlessly integrated iREAL into the framework of modular distance learning, ensuring that students had the requisite tools and resources in place before the planned deployment. Importantly, every student had access to the necessary devices and software, leading to the successful implementation of the study, which, in turn, had a positive impact on students' academic performance.

Certainly, implementing augmented reality (AR) in education can be highly beneficial, and ensuring a seamless integration for both face-to-face and modular distance learning is essential. Integrating augmented reality (AR) into learning can greatly enrich the educational experience. To achieve successful integration, it's crucial to provide comprehensive training and support for both educators and students. This approach ensures that AR can be seamlessly incorporated into the learning experience, whether it's in traditional face-to-face classes or modular distance learning settings.

Keywords: *Augmented Reality, Worksheet, 21st Century Learner*

INTRODUCTION

Learning Science is vital to the learners, according to UNESCO (2020). Science provides answers to problems in daily life and aids in our quest to unravel the cosmos' greatest mysteries. Hence, one of the most significant sources of knowledge is science. It performs several tasks for the benefit of our society, including developing new information, enhancing education, and raising the standard of living.

Despite of this importance, learners encounter challenges in learning Science specifically they experience some concerns and difficulties in understanding the material in terms of student drive, student brainpower, and teacher features, content of the subject matter, and the type of instruction, the classroom setting, the teaching materials, education, and parental assistance, according to Sadera, Torres and Rogayan, Jr. (2020).

Engagement, a word that is very interesting yet so challenging for the educators to sustain in the teaching and learning process in the 21st century classroom where technology is one of the main source of information. Using digital visual components, sound, or other sensory cues, augmented reality (AR) creates an enhanced version of the real world that is transmitted through technology. Businesses specifically engaged in mobile computing and business applications are noticing a growing trend in this direction (Hayes, 2022). Augmented Reality is the best method for teaching abstract concepts in scientific classes that do not involve direct observation and examination, according to the study of Yilmaz (2021).

Moreover, the researchers conducted a study that showed that Augmented Reality is one of the futures of education. Augmented Reality is where the students interact with the physical and virtual world to learn more about a certain word or topic. Introducing technology to reinforce information to students is one of the essentials to the teaching-learning process as we are already living in an era of Artificial Intelligence (AI). The usual printed texts will be more adventurous to learn with the aid of Augmented Reality.

This study is also anchored to one of the four pillars of Basic Education Development Plan 2030 under DepEd Order 024 series of 2022 which is quality. Added to this, DepEd spokesman Michael Poa said that one of the focus of Department in ensuring the quality of education is improving learning material for students.

With these, the researchers come up with the study that reinforced the information in worksheets with the use of augment reality to increase the academic performance of the Grade 8 students of Biñan Secondary School of Applied Academics.

METHODOLOGY

This research project involved the engagement of students in learning using augmented reality in the teaching and learning process. Augmented reality (AR) is a technology that overlays digital information, such as images, text, or 3D models, onto the real world, typically using a smartphone. Moreover, the use of augmented reality in learning provided students with interactive and immersive learning experiences, this study enhanced the students' understanding of various subjects. In line with these, the researchers implemented a study wherein augmented reality was used to determine its impact and effectiveness. In line with these, as we conducted the study, the researchers were able to determine the effectiveness of integrating augmented reality in the teaching-learning process.

The researchers encountered a common issue where students had difficulty engaging with plain text in worksheets, particularly during their modular weeks, which involved self-paced or independent study time outside of a traditional classroom setting. To address this problem, the researchers implemented the iREAL (Information Reinforcement with

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the use of Augmented Reality in Learning) approach that supported the students' learning at home.

iREAL, as mentioned earlier, involved the use of augmented reality technology to enhance the learning experience. In this context, a section of the students of Grade 8 at BSSAA were provided with augmented reality-based content or applications that made their learning materials more interactive and engaging. Augmented reality was able to bring the static text to life by adding visual elements, interactive simulations, or 3D models, which e helped students to better understand and to be engaged more with the content.

By incorporating augmented reality (AR) technology into the learning process, the researchers aimed to make learning more interesting and effective for the students, especially during the times when they were studying independently at home. This approach had a great potential to improve retention and comprehension, making it a valuable tool for educators seeking to enhance students' engagement and learning outcomes.

The researchers of the study conducted a pre-test on the control and experimental group. After the pre-test, the researchers implemented the iREAL for four weeks to the experimental group while control group remained in traditional approach. After the process of implementation of iREAL as teaching strategy, the researchers conducted a post-test for both experimental and control group to test the effectivity of the iREAL.

To solve the research problems, the researchers conducted the Information Reinforcement with the Use of Augmented Reality in Learning (iREAL) that engaged students in learning using technology.

RESULTS

The research was designed to assess the effectiveness of using augmented reality to support Modular Distance Learning (MDL). The comparison of pre-test and post-test results from both the experimental and control groups. Below are the yielded results:

Question 1. What is the pre-test result of control group and experimental group before the application of iREAL?

Table 2. *Pre-Test Mean Value and Indication*

PARTICIPANTS	MEAN
CONTROL GROUP	6.48
EXPERIMENTAL GROUP	5.90

Table 2 showed the results of a pre-test conducted on a control group and an experimental group. The control group had a mean score of 6.48, while the experimental group had a mean score of 5.90. Based on these means, the experimental group's mean score was slightly lower than that of the control group.

Therefore, the data collected showed that, before the implementation of the tool, the control group had a higher average score.

Question 2. What is the post-test result of control group and experimental group after the application of iREAL?

Table 3. Post-Test Mean Value and Indication

PARTICIPANTS	MEAN
CONTROL GROUP	9.19
EXPERIMENTAL GROUP	12.06

Table 3 displayed the results of a post-test conducted on both the control group and the experimental group. The control group had a mean score of 9.19, while the experimental group had a mean score of 12.06.

To interpret these results, the experimental group's mean score in the post-test was higher than that of the control group. This indicated that, after the experimental intervention, the experimental group's performance on the post-test was better on average compared to the control group.

Question 3. Is there a significant difference between the pre-test and post-test of control group and experimental group?

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Table 4. Test Significant Difference of Pre-test of Control and Experimental Groups

PARTICIPANTS	N	X	df	T value	P value	Interpretation
CONTROL	30	6.48	58	1.2243	0.2258	NOT SIGNIFICANT
EXPERIMENTAL	30	5.9				

Table 4 showed that the p-value (0.2258) was greater than the typical significance level of 0.05. Therefore, there was no statistically significant difference between the pre-test scores of the control group and the experimental group. The t-value of 1.2243 was less than the critical t-value that corresponds to a significance level of 0.05 with 58 degrees of freedom.

Table 4 indicated that, based on the pre-test scores, there was no significant difference in performance between the control group and the experimental group.

Table 5. Test Significant Difference of Post-test of Control and Experimental Groups

PARTICIPANTS	N	X	df	T value	P value	Interpretation
CONTROL	30	9.19	58	3.2127	0.0021	EXTREMELY SIGNIFICANT
EXPERIMENTAL	30	12.06				

Table 5 showed that the p-value (0.0021) was significantly less than the typical significance level of 0.05. Therefore, there was a statistically significant difference in the post-test scores of the control group. The t-value of 3.2127 was much larger than the critical t-value that corresponds to a significance level of 0.05 with 58 degrees of freedom.

In summary, based on the provided results, there was an extremely significant difference in performance between the control group's post-test scores. The results indicated that the control group's post-test scores were significantly higher than the pre-test scores after the implementation of the tool, augmented reality (AR).

Table 6. Test Significant Difference of Academic Performance of Experimental Group

PARTICIPANTS	N	X	df	T value	P value	Interpretation
PRE-TEST	30	5.90	29	11.4162	0.0001	EXTREMELY SIGNIFICANT
POST-TEST	30	12.06				

Table 6 displayed that the p-value of 0.0001 indicated that there was an extremely significant difference in the academic performance of the experimental group between the pre-test and the post-test. In other words, the increase in scores from the pre-test (5.90) to the post-test (12.06) was highly statistically significant. These results indicated that the tool, augmented reality (AR), implemented in the experimental group had a significant positive impact on their academic performance.

In this case, the evidence is strong that there was a substantial improvement in academic performance of the experimental group.

DISCUSSION

The provided results supports that there was an extremely significant difference in performance between the control group's post-test scores. The results indicated that the control group's post-test scores were significantly higher than the pre-test scores after the implementation of the tool, augmented reality (AR).

In conclusion with the data presented from Table 2 to Table 6, the iREAL: Information Reinforcement with the Use of Augmented Reality in Learning administered to the experimental group has proven to be highly effective. The data and analysis presented strongly indicated that the iREAL: Information Reinforcement with the Use of Augmented Reality in Learning led to a significant and substantial improvement in the relevant outcomes, demonstrating its clear and positive impact on the experimental group. This underscores the augmented reality's effectiveness and its potential for beneficial applications in similar contexts or settings such as Modular Distance Learning (MDL).

The research's findings underscore the transformative potential of Augmented Reality (AR) in education. AR has the capacity to make learning more engaging, interactive, and memorable. It empowers students to explore and interact with complex concepts in ways that were previously challenging during Distance Modular Learning (MDL). Moreover, AR can be adapted to suit various learning styles and paces. It provides opportunities for personalized learning experiences. This adaptability is particularly beneficial in diverse learning settings where students have different needs and abilities.

The positive impact of AR on learning outcomes based on the presented results suggests that it can enhance knowledge retention. The interactive and immersive nature of AR experiences helps solidify concepts and make them more memorable that's why there was an extremely significant positive impact on the experimental group's academic performance.

On the researchers' note, AR has the potential to boost student motivation and engagement. When students are excited about learning, they are more likely to invest time and effort into their studies. The study's results confirmed that AR has the power to generate such enthusiasm.

On the other hand, teachers play a crucial role in integrating AR effectively into the various learning environment. As a facilitator of AR experiences, teachers guide students through these interactive journeys, helping them extract the most educational value.

In conclusion, the study demonstrating the significant positive impact of augmented reality in learning is an exciting milestone in the field of education. It shows that technology can be harnessed to create more engaging and effective learning experiences. As educators and researchers, we should embrace these findings and continue to explore the potential of AR while also addressing associated challenges to ensure its responsible and inclusive integration into the educational landscape.

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