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Multitasking Application for Systematic Intervention Program and Games (MASIPAG) in Science: an Evaluation

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A B S T R A C T

Student participation has received a lot of attention in recent decades as a result of moves toward student-centeredness, as well as promising research that suggests a link between student engagement and academic success. The researchers wanted to see how computer-generated software/applications influenced the academic performance of senior high school students. The randomized Pretest-Posttest control group design was used in this study. This study included only 40 students in Grade 11. The cover of the lesson depicts science, and the materials used are computers and cell phones, with Appgeyser serving as the application that the lessons were integrated into. The games were sent to students studying science in grade 11-Life Science and installed on their cellphones by the researchers. Giving a Pre-Test before the lesson and a Post-Test after the lesson was one of the strategies used in this study for each class. For group 1, the lesson was delivered in a modular format using technology such as a cell phone and a computer application. Based on the data gathered, the researchers concluded that students who used mobile games performed better during the post-test than students who used SLMs. The MASIPAG mobile game was also more effective in teaching life science when compared to modular learning. The use of mobile phone games versus the use of SLMs during pandemic education was found to be significantly different in post-test results. The researcher recommended that teachers use a variety of computer applications in their classrooms based on the findings and conclusions of the study. More strategies for engaging teaching-learning situations should be developed

1. INTRODUCTION

When it comes to the responsibilities that teachers have towards their pupils, such as motivating them to study, instilling in them a love of learning, and ensuring that education is enjoyable, educational games are seen as an efficient alternative to complementing traditional teaching methods [1].

In scientific education, these obligations are sometimes disregarded since encouraging students' enthusiasm towards and involvement in classes is typically a tough challenge for in-class teaching, as is still being explored in a significant number of research [2]. On the other hand, when education is presented in an entertaining and participatory style, pupils show a marked increase in their desire to acquire new knowledge [3]. An interactive approach to fostering active learning and motivation and encouraging cooperation may be achieved via educational games. Because they contain features that are both different and interactive, games play a significant part in the implementation of active learning.

The challenge of incorporating technology into the educational experience presented by colleges is not a new one. Since the early 1900s, school administrators and faculty members have grappled with utilizing the best technology innovations such as video and audio recordings, email, and teleconferencing to enhance or supplant traditional teaching methods [4].

According to Ref. [5], one of the most critical aspects of the success of technology-based teaching and learning is that instructors have access to sufficient ICT resources and facilities during their training.

The professional development training programs for teachers were also essential in increasing the overall quality of the pupils' education. This work aims to present an evaluation of how the use of computer-based technology affects the academic performance of students as well as their enthusiasm for learning. The computer-based technology was the primary focus of the researchers. The use of specialized hardware, software, and teachers' participation is required to use computer-based technology (referred to as technology from this point forward). This technology can be used on a computer or a mobile device.

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Additionally, researchers focused on student involvement as the dependent variable of interest since it incorporates a wide variety of facets related to the teaching and learning process; Furthermore, as a result of shifts toward student-centered, constructivist instructional approaches [6], student participation has received much attention over the past few decades and promising research that suggests a connection between student engagement and academic success has been conducted [7].

1.1. Research Objective

The researchers aim to identify the effect/s of Computer-generated software/applications on the academic performance of Senior High school students. Specifically, researchers attempt to find out the answer to the following problems (1) what is the level of academic performance of students before the application of MASIPAG; (2) what is the level of academic performance of students after the application of MASIPAG; (3) is there a significant difference in the level of academic performance before and after the exposure to MASIPAG?

2. METHODOLOGY

2.1. Research Design

This study followed the randomized Pretest-Post-Test control group design. In this research design, the only difference between the experimental and control groups is that the former is given some therapy. At the same time, the latter does not get any intervention [8].

2.2. Data Gathering Procedures

In preparing the research, the researchers prepared parents' consent, and a set of questionnaires in apk format was used to gather data essential to the research, which were sent to selected grade 11 senior high school students through Group chat in Don Brigido Miraflor Integrated School (Jesmag).

The researchers included 40 students in Grade 11 only. The cover of the lesson is on science, and the materials used are computers and cell phones. Group 1 was exposed to the MASIPAG modality of teaching plus the use of modules, while students included in weeks 1, 2, and 3 were the same, while group 2 was exposed to modular modality. The application in the lessons that were integrated was Appgeyser.

The randomized Pretest-Post-Test control group design was used in this study. The sample respondents of the study include 40 grade 11 students currently enrolled in Don Brigido Miraflor Integrated School (Jesmag) during the school year 2020-2021.

As shown in Table 1, Four (4) classes were taught using the Modular modality but the first two sample groups (ICT grade 11 Class and HUMSS grade 11 class (group 1) were taught using Multitasking Application for Systematic Intervention Program And Games (MASIPAG) (20 students, 10 per group while the other group, (group 2) composed of AFA 11 Class an ACAD/TVL 11 Class. Each member of the class was randomly distributed into 2 groups.

2.3. Instrument

The instruments that were used in this study were three sets of questionnaires. The questionnaires were adapted from https://pdfcoffee.com/biotechnology-quiz-key-pdf-free.html and composed of 10 multiples choice items and are given every week for three weeks. The set of questionnaires is utilized for pre-test and post-test purposes.

Table 1. Distribution of Population

Sample Class	No. of male	Number of females	Total	Teaching Modality to be used
Group 1	10	10	20	Using MASIPAG and SLM
Group 2	10	10	20	Using SLM only

2.4. Preparation of Intervention

Researchers prepared three sets of games per week. The games were prepared by utilizing Appgeyser, an Open Educational Resources (OER) software that can be utilized online. The researchers prepared two sets of games per week; the first is the Word Hunt, its purpose is to introduce the words or terms related to the lessons, while the second set of the game is multiple choice, where the student could answer the questions without limit until they got the correct answer. Researchers chose the Puzzle or Word Hunt game template and the Quiz template [9]. These games were prepared for at least 1 hour per game. The questions from the games were adopted from [10]. After finishing the game, game apps, android application package (apk) were downloaded and sent to students through messenger or by utilizing SHAREit mobile apps. The mobile games are limited to android users only since most of the enrolled grade 11 students use android phones.

2.5. Strategy

The research was conducted on Don Brigido Miraflor Integrated School (Jesmag) campus. The researcher also informed the teacher-advisers of each section. Also, parent consents were sent to the parents for their approval for the involvement of their children in the study. A pre-test was administered to two groups of respondents. The experimental groups were exposed to Multitasking Application for Systematic Intervention Program and Games (MASIPAG), while the control group used the Modular modality. A post-test was given after the end of each lesson. The Pre-tests and post-tests given to the experimental and control groups were the same. The lesson was life science from week 2 to week 4. The lessons in Control groups were delivered using a Modular modality to the students about the lesson.

The lessons in Multitasking Application for Systematic Intervention Program and Games (MASIPAG) were integrated with the application/games and played by the students. There were also given SLMS as part of the teaching-learning strategies given by DepEd. Furthermore, the control group was given the same lesson as the experimental group. They were also given the same pre-test and post-test before and after the treatment. The researchers tallied and interpreted their scores in every treatment to determine whether there were significant differences in their mean scores in the post-tests using Wilcoxon signed-rank test.

2.6. Statistical Treatment of Data

To get the mean, the researcher computed the total score. After getting the total, the sum was divided by the total number of students who answered the pre-test and post-test. To check the normality of the data distribution, the researchers used the Shapiro-Wilk [11] to test the normality of the data. The results were also analyzed using the Wilcoxon signed-rank test [12], while the effect size was computed through an effect size calculator [13].

After the collection of data, these were tallied according to groups. The results were tabulated, interpreted, and analyzed concerning the problems presented using the following (1) Mean (X). It was used to determine the arithmetic average of each (2) Shapiro-Wilk test- which is a statistical test used to check if a continuous variable follows a normal distribution (3) Wilcoxon signed-rank test -a non-parametric statistical hypothesis test used either to test the location of a population based on a sample of data or to compare the locations of two populations using two matched samples. (4) Effect Size – it was used to determine how meaningful the relationship between variables or the difference between groups is.

3. RESULT AND DISCUSSION

3.1. Result of Academic Performance before the Utilization of intervention

Table 2.
of Academic Performance Before the Utilization of Intervention

Number of Students	Week 1		Week 2		Week 3	
	G-1	G-2	G-1	G-2	G-1	G-2
1	6.0	10	6	5	7	8
2	6.0	7	5	5	6	7
3	4.0	7	7	5	6	7
4	5.0	8	4	5	6	6
5	5.0	7	6	5	5	6
6	4.0	5	4	6	8	5
7	4.0	8	3	7	4	5
8	5.0	10	3	4	4	5
9	6.0	10	5	3	4	5
10	5.0	10	3	3	5	5
11	6.0	10	5	5	7	8
12	6.0	8	5	5	6	7
13	6.0	8	8	5	6	7
14	5.0	8	4	5	6	6
15	5.0	7	4	5	5	6
16	4.0	5	5	4	5	5
17	4.0	8	3	4	5	5
18	4.0	10	5	4	4	5
19	5.0	10	3	3	3	5
20	4.0	10	6	6	5	5
Mean	**5**	**4**	**5**	**5**	**5**	**6**

Table 2 shows the result of the pre-test of the grade 11 students for the three weeks. The mean score for Group 1 (HUMSS /ICT) in the first week, the pre-test, is higher than Group 2 (AFA/ACAD/TVL) scores. While in the second week, the mean scores of both groups are the same. However, in the third week, the mean score of group 1 is lower than the pre-test means a score of group 2. These suggest that groups 1 and 2 are equal in knowledge of the topic.

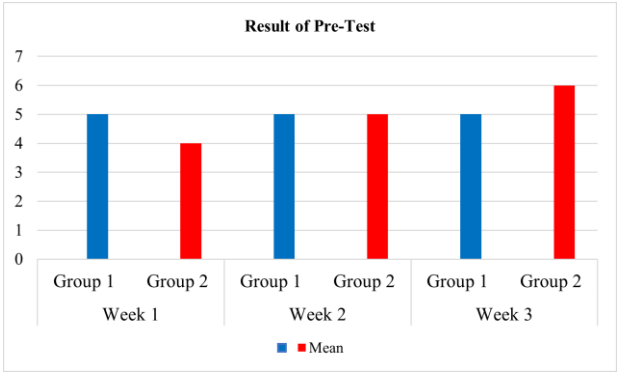

Figure 1. Result of Pre-test

As seen in Figure 1, group 1 is consistent with their scores of 5 in their scores as compared to group 2, which from a score of 4 in the first week, a score of 5 in the second week, and a score of 6 last week. The graph shows that group 2 had higher knowledge of the topic for the week than group 1.

3.2. Result of Academic Performance after the Utilization of Intervention

Table 3
Result of Academic Performance After the Utilization of Intervention

Number of Students	Week 1		Week 2		Week 3	
	G-1	G-2	G-1	G-2	G-1	G-2
1	10	6	10	5	10	8
2	7	7	10	7	10	8
3	7	5	9	7	10	8
4	8	6	9	7	9	8
5	7	5	10	6	10	7
6	5	5	10	5	8	7
7	8	4	8	5	10	7
8	10	5	8	6	10	5
9	10	5	10	5	9	5
10	10	7	9	6	9	6
11	10	6	8	5	8	8
12	8	7	9	7	8	8
13	8	5	10	7	8	8
14	8	6	7	7	8	8
15	7	5	7	6	7	7
16	5	5	7	5	7	7
17	8	4	7	5	7	7
18	10	5	10	6	7	5
19	10	5	6	5	6	5
20	10	7	6	6	6	6
Mean	**8**	**5**	**10**	**6**	**8**	**7**

Table 3 shows the post-test result of the academic performance of the two groups. It indicates that the mean scores of group 1 in 3 weeks are higher than the mean scores of group 2. It also shows that group 1 learned better than group 2 after the utilization of innovation (MASIPAG).

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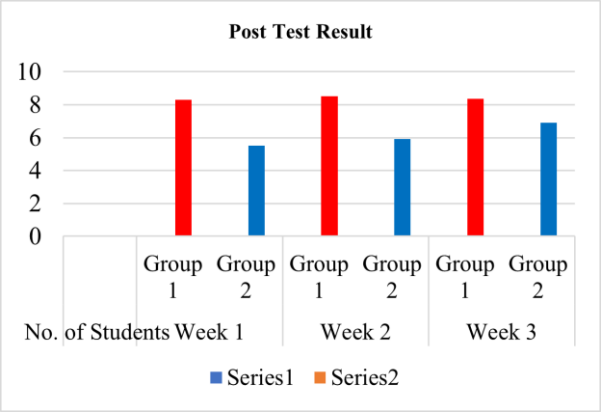

Figure 2. Result of Post-test

As seen in Figure 2, group one's scores are consistently higher than the score of group 2 from week 1 to week 3 while the group has scores from 6 to 7.

3.3. *Test Differences between Pre-test and Post-Test of Using SLM and MASIPAG Mobile game*

Test on Differences between Pre-test and Post-Test Results of using SLM and MASIPAG Mobile Game for Week 1

Table 5
Wilcoxon Signed-Rank Test on Differences between Pre-test and Post Test Results of using SLM and MASIPAG Mobile Game for Week 1

Pre-Test Post-test	**Statistics Z- Value**	**p**	**Mean Difference**	**SE difference**
	-3.9	*<.0001*	*3.35*	*0.19*
Normality Test (Shapiro-Wilk)			**Descriptive**	
	W	**p**	**N**	**Mean**	**Median**
Pre-Test	0.86	*<.001*	*20*	*4.95*	*5*
Post Test			*20*	*8.3*	*8*
	SD	**SE**		**Effect Size**	
Pre-Test	*0.83*	*0.18*		*0.87*	
Post Test	*2.75*	*0.37*			

The objective of this study is to identify the effect/s of Computer-generated software/applications on the academic performance of Senior High school students especially grade 11 students for the week 1 evolution lesson. The performance of students in science subjects for grade 11 was measured using a 10-item adapted test. Before conducting the analysis, Shapiro-Wilk statistics were computed to examine the assumption of normality The result of Shapiro-Wilk test showed that the assumption of normality was violated, W=0.86, p=<0.001.

Results of the Wilcoxon Signed-Rank Test indicated that there is a significant large difference between the student's performance on evolution before (M =4.95 ,SD = .83) and After (M = 8.3 ,SD = 2.75) conducting the intervention, z -3.9, p < .0001. The observed effect size d is large, 0.87. This indicates that the magnitude of the difference between the average of the differences and the expected average of the differences is large. The findings suggest that using MASIPAG as an offline asynchronous intervention material has a large significant effect on students' performance in evolution lessons in grade 11 class.

Test on Differences between Pre-test and Post-Test Results of using SLM and MASIPAG Mobile Game for Week 2

Table 6
Wilcoxon Signed-Rank Test to test Differences between Pre-test and Post Test Results of using SLM and MASIPAG Mobile Game for Week 2

Pre-Test Post-test	**Statistics Z- Value**	**p**	**Mean difference**	**SE difference**
	-3.9	*<.0001*	*3.35*	*0.14*
Normality Test (Shapiro-Wilk)			**Descriptive**	
	W	**p**	**N**	**Mean**	**Median**
Pre-Test	0.90	*<.001*	*20*	*4.95*	*5*
Post Test			*20*	*8.3*	*8*
	SD	**SE**		**Effect Size**	
Pre-Test	*0.83*	*0.18*		*0.87*	
Post Test	1.66	*0.32*			

The objective of this study is to identify the effect/s of Computer-generated software/applications on the academic performance of Senior High school students especially grade 11 students for reproduction lessons. The performance of students on science subjects for grade 11 was measured using a 10-item adapted test. Before conducting the analysis, Shapiro-Wilk statistics were computed to examine the assumption of normality. The result of the Shapiro-Wilk test showed that the assumption of normality was violated, W=0.90, p=<0.001.

Results of Wilcoxon Signed-Rank Test indicated that there is a significant large difference between the student's performance on reproduction before (M = 4.95 ,SD = 0.83) and After (M = 8.3 ,SD = 1.66) conducting the intervention, z = -3.92, p < .0001. The observed effect size d is large, 0.87. This indicates that the magnitude of the difference between the average of the differences and the expected average of the differences is large.

The findings suggest that using MASIPAG as an offline asynchronous intervention material has a large significant effect on students' performance in reproduction lessons in grade 11 class.

3.2. *Test on Differences between Pre-test and Post-Test Results of using SLM and MASIPAG Mobile Game for Week 3*

The objective of this study is to identify the effect/s of Computer-generated software/applications on the academic performance of Senior High school students, especially in grade 11 genetic engineering lessons. The performance of students in science subjects for grade 11 was measured using a 10-item adapted test. Before conducting the analysis, Shapiro-Wilk statistics were computed to examine the assumption of normality. The result of the Shapiro-Wilk test showed that the assumption of normality was violated, W=0.93, p=0.022.

Results indicated that there is a significant large difference between the student's performance on genetic engineering before (M = 5.35, SD = 1.23) and After (M = 8.35 ,SD =1.39) conducting the intervention, z = -3.92, p < .0001. The observed effect size d is large, 0.87. This indicates that the magnitude of the difference between the average of the differences and the expected average of the differences is large.

Table 7.
Wilcoxon Signed-Rank Test to test Differences between Pre-test and Post Test Results of using SLM and MASIPAG Mobile Game for Week 3

Pre-Test Post-test	**Statistics Z- Value**	**p**	**Mean difference**	**SE difference**
	-3.9	*<.0001*	*3.35*	*0.14*
Normality Test (Shapiro-Wilk)			**Descriptive**	
	W	**p**	**N**	**Mean**	**Median**
Pre-Test	0.93	*<.022*	*20*	*5.35*	*5*
Post Test			*20*	*8.35*	*8*
	SD	**SE**		**Effect Size**	
Pre-Test	1.23	*0.27*		*0.87*	
Post Test	1.39	0.31			

The findings suggest that using MASIPAG as an offline asynchronous intervention material has a large significant effect on students' performance in genetic engineering lessons in grade 11 class.

These findings also support that experimenting with video games in and out of the classroom to improve achievement and engagement has influenced the field of education in general, and educational games. Furthermore, gamified systems that employ a variety of game design principles may improve student engagement and achievement without sacrificing creativity in some cases. Making aspects of the educational process more enjoyable, compulsive, and competitive may help students improve their grades and retain more information from their studies [14].

Also, according to Ref. [14]) the students stated that the games effectively enable the retention of new information, promote collaboration with their peers, and increase their interest and motivation for learning. They also found the games to be entertaining, which reinforced their learning, and they found the games to be informative.

4. CONCLUSION

Based on the gathered data, the researcher concluded the following: (1) HUMSS/ICT pre-test scores are more remarkable than AFA/ACAD/TVL. In week two, both groups had similar mean scores. In the third week, however, HUMSS/ICT scores were lower than AFA/ACAD/TVL. (2) The mean scores of group 1 (HUMSS/ICT group) are higher than the mean scores of group 2 (AFA/ACAD/TVL group). It also demonstrates that following the implementation of innovation, the group of HUMSS/ICT learned more effectively than the AFA/ACAD/TVL. (3) There is a significant difference that exists between the pre-test and post-test results on the use of Mobile Phone games during pandemic education based on the T-Test statistical tool. (4) The MASIPAG mobile game was more effective in teaching Life science as compared to modular learning (15).

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