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PROJECT SKEW (STUDENTS' KNOW-HOW IN ACCESSING EDUCATIONAL WEBSITES): EFFECTS ON THE ACADEMIC PERFORMANCE IN PRECALCULUS

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Abstract:
This action research aimed to test the effectiveness of Project SKEW (Students' Know-how in accessing Educational Websites) in improving the academic performance of Ormoc City Senior High School Grade 11 STEM (Science, Technology, Engineering and Mathematics) students in PreCalculus by allowing them to access or use the researcher's own made educational website entitled CALCULUSBYNEPAYA powered by Weebly. The study utilized a mixed methods research design to determine whether there is a significant difference of the pre-test and post-test scores between the randomly selected STEM students who had access to the said educational website, and those who had no access. Specifically, this study aimed to know if there is an increase in the Mean Percentage Score (MPS) on Simplifying Trigonometric Expressions before and after giving the said intervention. To ensure that the control group will not be able access the site, it was programmed in such a way that it will automatically restrict students to log-in especially those who do not belong in the experimental group. A pre-test was administered to both groups to ensure that students from the experimental group were comparable to students from the control group. The reliability of 15-item multiple choice type of questionnaire was measured using the test-retest method, and undergone content validation from experts in the said subject matter. The collected data was treated using inferential statistics, specifically T-test of two samples assuming equal variances. The study revealed that there is a significant difference of the pre-test and post-test results which signifies that Project SKEW was effective. The result of the study was utilized in other subject matters and was disseminated to the school administration, faculty, and stakeholders, which will serve as a basis for adopting intervention programs towards improving student academic performance.

Keywords: educational websites, academic performance, mathematics

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1. Introduction

With the advancement of technology, media has grown exponentially in the recent years. Gone are the days that textbook is the only primary source of information since most people nowadays, especially our 21st century learners, get most of their information from the internet or the worldwide web. Thus, learning is not confined anymore within the four corners of the classroom, no matter where our learners are physically located, even at their own convenience, they already have a wide access to online course contents and can easily download web-based resources through the use of websites.

According to The Free Dictionary (2011), "*a website is a collection of related web pages, typically identified with a common domain name, and published on at least one web server*". Its main purpose is to provide people with entertainment, news and education. These websites dedicated to providing our learners some educational alternatives are called educational websites. Professional Learning Board (2018), states that "*educational websites are those that have games, videos or topic related resources that act as tools to enhance learning and supplement classroom teaching*". Popular examples of these are Khan Academy, Coursera, TedEd, and Academic Earth.

Nowadays, a teacher with an access to the internet can already create a non-commercial website intended for his or her learners using some of the most popular free website builders such as Weebly, Wix, Jimdo, IM Creator, Webstarts, and the like. With the help of these websites, all our learners will be guided on a specific instruction on what to do, they will be able to access what they need without having to ask around all the time, and they will be provided with remediation or enhancement activities to further their learning experiences.

Galuszka (2007), in one of his researches at MIT (Massachusetts Institute of Technology), integrated the subjects of math and science into a web technology program, and he found out that students improved their math scores. This is because as cited by Capper (2003), "*technology increases motivation for teaching and learning thus also improve teaching and learning in content areas*". Moreover, as pointed out in the research by the DITI (Diversity in Information Technology), these forms of digital media can be used by the 21st century teachers to motivate young and diverse learners to learn new knowledge, (Kelly et. al, 2007).

Mathematics is really one of the most challenging subjects for Filipino learners, (Caduhay, 2010). In the National Achievement Test (NAT), the average rating for mathematics from 2014-2016 in elementary is 71.1%, while in secondary is 70.33%, (Department of Education, 2016), which evidently is below the national passing percentage and a clear manifestation that the performance of students in mathematics in the Philippines was persistently been poor. Martin (2013) points out that this is because "*many students feel most anxious and uninterested in learning their mathematics subject*".

To address the research gap of improving the academic performance of students in mathematics, support other studies which claims about the extrinsic motivation effect

brought about by technology towards learning, and equip them with the needed 21st century skills, the researcher maximized the positive use of technology through integrating it in the researcher's higher mathematics class since studies have shown that it is proven to be very helpful in increasing students' motivation towards learning. With this, the researcher investigated the effects of Project SKEW (Students' Know-how in accessing Educational Websites) in improving the academic performance of students in PreCalculus by allowing them to access or use his own made educational website entitled CALCULUSBYNEPAYA powered by Weebly.

This project served as an intervention tool and as a classroom teaching supplement in order to address the low Mean Percentage Score (MPS) of STEM students in the PreCalculus subject since the website CALCULUSBYNEPAYA contains learning resources in PreCalculus and Basic Calculus. Moreover, the site contains downloadable videos, notes, formulas, worksheets, power point slides, enrichment, and remediation activities which are readily available for the consumption of all students' concerned.

2. Research Questions

This study aimed to know the effects of allowing students to access or use an educational website entitled CALCULUSBYNEPAYA in order to improve the academic performance of Grade 11 students in PreCalculus.

Specifically, this study seeks to answer the following questions:

1. What are the average pre-test scores of STEM 11 students in PreCalculus:
   1.1 students who were not allowed to access an educational website;
   1.2 students who were allowed to access an educational website?
2. What are the average post- test scores of STEM 11 students in PreCalculus:
   2.1 students who were not allowed to access an educational website;
   2.2 students who were allowed to access an educational website?
3. Is there a significant difference of the pre-test scores of STEM 11 students between:
   3.1 students who were not allowed to access an educational website;
   3.2 students who were allowed to access an educational website
4. Is there a significant difference of the post-test scores of STEM 11 students between:
   4.1 students who were not allowed to access an educational website;
   4.2 students who were allowed to access an educational website
5. Is there a significant difference of the pre-test and post-test scores of STEM 11 students between:
   5.1 students who were not allowed to access an educational website;
   5.2 students who were allowed to access an educational website
6. What could be the possible program of recommendation based on the results/ findings of the study?

3. Methodology

3.1 Research Design

This study utilized a true experimental quantitative research specifically a Pretest-Posttest Control design to determine whether there is a significant difference of the pre-test and post-test scores of STEM 11 students between the two groups. The design is illustrated below.

R	O_1	x	O_2
R	O_3	-	O_4

Figure 1: The Pretest-Posttest Control Design

The figure showed two groups of samples which can be identified horizontally from left to right. The symbol R means that the subjects were randomly assigned to the two groups and symbol x means that the group was exposed to experimental treatment, wherein students in this group were able to access an educational website. The group with no x mark is the control group which was not exposed to an educational website.

The symbol O_1 and O_2 represent the pre-test and post-test of the experimental groups, while O_3 and O_4 represent the pre-test and post-test of the control group. The vertical arrangement of O's shows that the pre-test and post-test were given to the two groups at the same time. This design involved two groups that were formed by random assignment. Both groups were given a pre-test and a post-test but only the experimental group was given the treatment.

3.2 Research Participants

The main focus of this study is the Grade 11 STEM (Science, Technology, Engineering, and Mathematics) students in Ormoc City Senior High School for First Semester of School Year 2018-2019. The study is delimited to two out of four (4) STEM 11 sections. The researcher purposively selected two sections (Archimedes and Newton). STEM 11-Archimedes is the control group while STEM 11-Newton is the experimental group. The control group are the STEM students who had no access to the said educational website. The experimental group are the STEM students who had access to the said educational website. The website was programmed as such that it will automatically restrict students who do not belong in the Experimental Group to log-in and access the site. Using simple random sampling, fifteen (15) students were selected from each group who took the pre and post-test in PreCalculus.

3.3 Data Collection Procedure

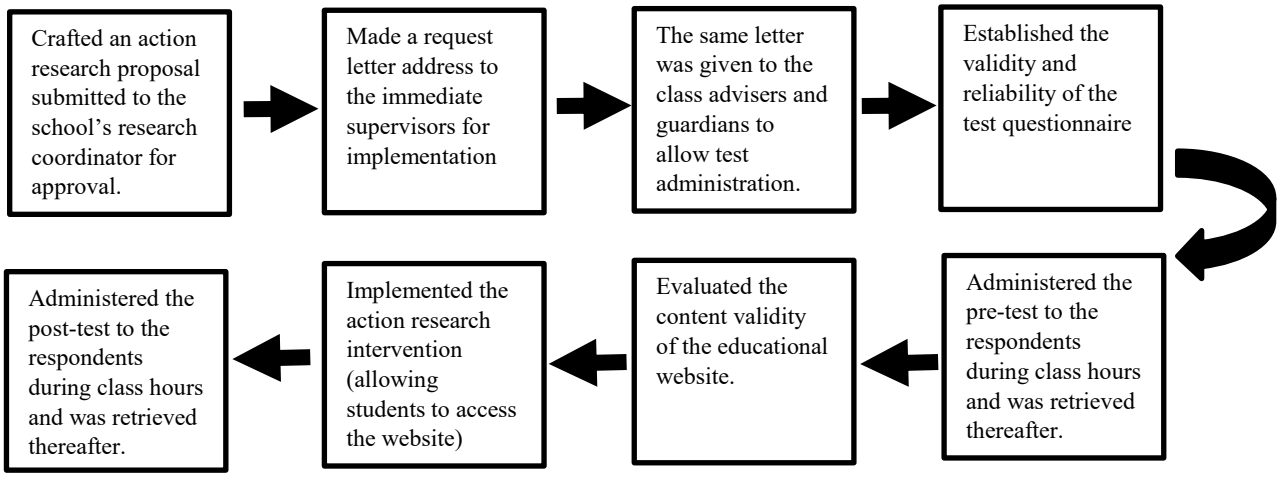

Figure 2: Data Gathering Methods Flowchart

The gathering of the needed data proceeded as follows:

1. The researcher crafted an action research proposal submitted to the school's research coordinator for approval.
2. The researcher made a request letter, address to the immediate supervisors for implementation containing the following signatories:
   - Engr. Ramil Lauron, STEM Subject Group Head
   - Mrs. Brenda P. Maroleña, Ormoc City Senior High School principal
   - Dr. Elvin Wenceslao, Division SEPS in Research and Planning
3. Upon their approval, the same letter was given to the teachers, especially to the class advisers, and guardians to allow administration of the pre-test and the post-test.
4. To test the instrument's content validity, the said test paper underwent content validation from the STEM Subject Group Head, Engr. Ramil Lauron who is also teaching the said the subject matter. In measuring the reliability of the instrument, the researcher used the test-retest method and using Cronbach alpha reliability test.
5. Thereafter, a pre-test was administered personally by the researcher to students during class hours which is a 15-item multiple choice type of test. The questions were based on one of the least learned topics of the said subject which is about Simplifying Trigonometric Expressions. The data were retrieved thereafter.
6. The researcher's own made educational website CALCULUSBYNEPAYA powered by Weebly, was checked on its content and face validity by the school's ICT Coordinator, Mrs. Elisa Berog.
7. Next, the researcher implemented the research intervention to the experimental group by allowing students from section Newton to have access to the said educational website while students from section Archimedes were instructed to use textbooks and printed learning materials provided by the teacher.

8. Then, a post-test was administered personally by the researcher to students during class hours and the data were retrieved thereafter.

The researcher took approximately three months to finish the study from August to October 2018. The result was disseminated to the administration and likewise to all the teachers in the school and served as a basis for adopting intervention programs towards improving students' academic performance.

3.4 Data Analysis

The data were treated using inferential statistics using SPSS (Statistical Package for Social Sciences) software. The researcher used t-test for two independent samples in order to test if there is a significant difference between the data sets from two different groups (control group and experimental group), and t-test for two dependent samples in order to test if there is a significant difference between the pretest and posttest scores of the Control Group, and to know if there is a significant difference between the pretest and posttest scores of the experimental group.

4. Results and Discussion

This chapter discusses the results of the pre-test and post-test of the 15 participants per group. The data were processed through Microsoft Excel. Table and graphs are presented vis-à-vis research questions, followed by corresponding discussions to facilitate understanding.

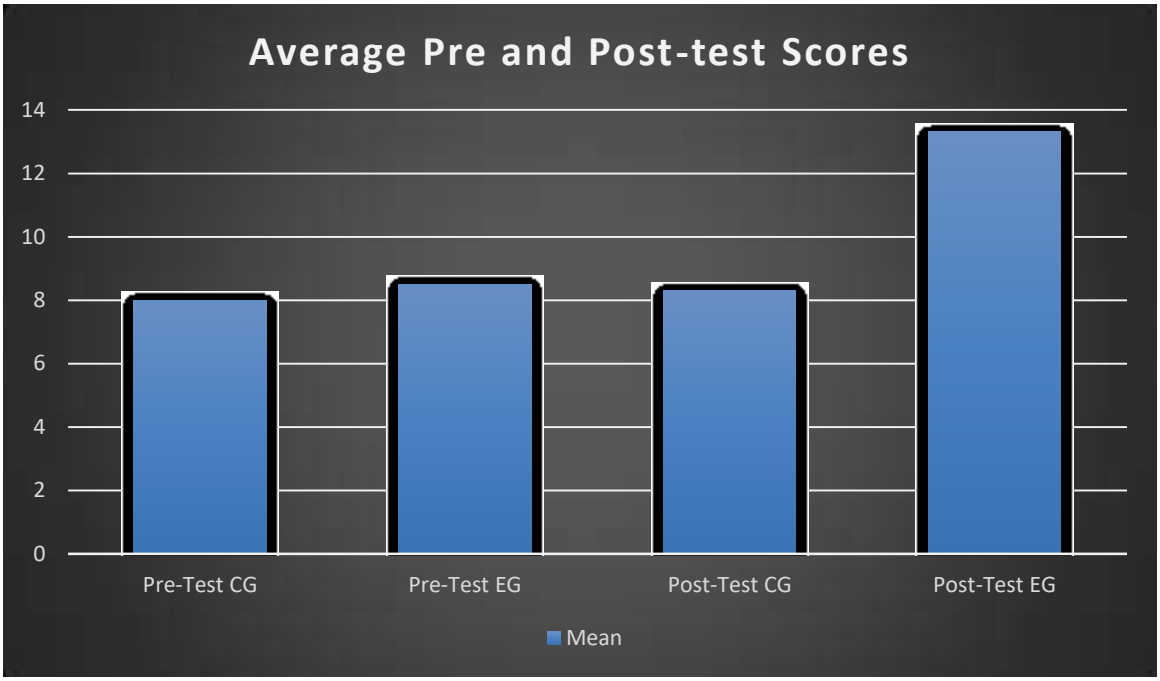

Figure 3: Graphical presentation of the average pre and post-test results of the two groups

The table above showed the pre and post-test scores of the 15 randomly selected students per group on Simplifying Trigonometric Expressions. It can be observed that the average pre-test scores of the Control and Experimental Group are almost same, 8 and 8.5, respectively. However, the average post-test score of the Experimental Group which is 13.3, is 5 notch higher than the average post-test score of the Control Group which is 8.3.

Table 4: Pretest scores of the two groups using T-test

	Mean	SD	t-computed	t-critical	p-value	Decision
Pre Test	8	1.51185789	0.9	2	0.36	Failed to reject the null hypothesis
Pre Test	8.5	1.18723368				

It can be gleaned from the table above that the p-value which is 0.36 is greater than the alpha level of 0.05, moreover the t-computed which is 0.9 is lesser than the t-critical. This means that the pre-test scores of Control Group is not significantly different to the pre-test scores of the Experimental Group at 5% level of significance.

Table 5: Post-test scores of the two groups using T-test

	Mean	SD	t-computed	t-critical	p-value	Decision
Post Test	8.3	3.87298335	10.2	2	0.00000000007	Reject the null hypothesis
Post Test	13.3	3.87298335				

It can be observed from the table above that the p-value which is 0.00000000007 is lesser than the alpha level of 0.05, moreover the t-computed which is 10.2 is higher than the t-critical. This means that the post-test scores of Control Group is significantly different to the post-test scores of the Experimental Group at 5% level of significance.

Table 6: Pretest-post test scores of the Control Group using T-test

Control Group	Mean	SD	t-computed	t-critical	p-value	Decision
Pre Test	8	1.511857892	0.5	2	0.6200000000	Failed to reject the null hypothesis
Post Test	8.3	1.437590577				

It can be viewed from the table above that the p-value which is 0.62 is greater than the alpha level of 0.05, moreover the t-computed which is 0.5 is lesser than the t-critical. This means that the pre-test scores of Control Group is not significantly different to the post-test scores of that same group at 5% level of significance.

Table 7: Pretest-post test scores of the Experimental Group using T-test

Experimental Group	Mean	SD	t-computed	t-critical	p-value	Decision
Pre Test	8.5	1.18723368	10.7	2	0.00000000002	Reject the null hypothesis
Post Test	13.3	1.29099445				

It can be seen from the table above that the p-value which is 0.00000000002 is lesser than the alpha level of 0.05, moreover the t-computed which is 10.7 is greater than the t-

critical. This means that the pre-test scores of Experimental Group is significantly different to the post-test scores of that same group at 5% level of significance.

5. Conclusions and Recommendations

A. Reflections/ Conclusions

This study aimed to determine the effects of accessing educational websites to academic performance of STEM 11 students. Moreover, the following conclusions are as follows:

- There is no significant difference of the pre-test scores of the STEM 11 students who were not allowed to the use of educational websites and those who were allowed to access educational websites.
- There is a no significant difference of the pre-test-post test scores of the STEM 11 students who were not allowed to access CALCULUSBYNEPAYA.
- There is a significant difference of the pre-test-post test scores of the STEM 11 students who were allowed to access CALCULUSBYNEPAYA.
- There is a significant difference of the post-test scores of the STEM 11 students who were not allowed to access CALCULUSBYNEPAYA and those who were allowed to access the said educational website.
- Therefore, allowing students to access the educational website CALCULUSBYNEPAYA is effective in improving the academic performance of STEM 11 students in PreCalculus.

B. Recommendations

Based on the outcomes of this research, the following are the derived recommendations:

- School administrators should find ways to provide internet access to Ormoc City Division schools.
- This would serve as a basis to encourage stakeholders to donate computer sets to schools.
- SHS teachers should integrate the use of technology in his/her lessons.
- SHS teachers should allow students to access educational websites in all SHS subjects.
- It is further encouraged that SHS teachers should think of new innovations that would motivate students to learn thereby increasing academic performance like creating personalized educational websites, online games, online quizzes, and the like.
- Curriculum makers should revisit the SHS curriculum in the country with the inclusion of allowing access of educational websites to students.
- It is further recommended to that the department should continue or strengthen the DepEd Computerization Program (DCP) to providing schools with appropriate technologies that would enhance the teaching-learning process and meet the challenges of the 21st century.

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