Abstract: The study aimed to determine the effect of blended learning approach on the academic performance of selected Grade 10 students in Indang National High School in Mathematics 10 during the First Quarter of S.Y. 2019-2020. The study used the pre-experimental One Group Pretest-Posttest Study. This design was used to determine the effect of blended learning strategy in the academic performance of Grade 10 students in Mathematics. The study focused on the selected Grade 10 students of Indang National High School during the First Quarter of S.Y. 2019-2020. Students were selected based on the results of the achievement test in Grade 10 Mathematics covering the topic in the first grading period.

Findings showed that the intervention revealed a positive effect on the academic performance of students. Pre-test and post-test scores among respondents show significant difference.

Keywords: Blended Learning Approach, Classroom Learning, Self-managed Learning

Introduction

Information, communication and technology (ICT) integration is one of the 21st century skills in the K to 12 curriculum that enhance teaching and learning process. Teaching mathematics using technology should be taken into consideration to meet the demands of 21st century learners. The exposure of students to the internet gave way for E-materials. E-materials are part of a new trend, the so-called blended learning, i.e., a new teaching method combining physical and virtual sources. Besides the classical presentation of the material, the students have access to electronic materials such as videos, presentations, electronic worksheets, java applets, e-tests and educational software's like GeoGebra. These materials can be attained through web-applications accessible not only through a computer but also through tablets and smartphones. The presence of tablets, smartphones and netbooks grows in direct proportion to their price. Nowadays, almost every student owns a smartphone with an internet connection which allows an individual approach to electronic materials.

Teachers can thus exploit the potential of ICT in the teaching of mathematics. With these innovations, Kelso, (2015), reiterated blended approach allows full utilization of the technology tools available to 21st century teachers to further enhance the direct instruction experience for students.

In the division of Cavite, the summary of findings revealed that mathematics (35.54%) ranked lowest among the five learning areas tested; a student can, on the average, answer correctly at least 3 out of 10 questions; the overall MPS (44.23%) falls under the average mastery level. It is about time that a research be conducted to enhance student’s academic performance in Grade 10 Mathematics using ICT.

Statement of the Problem

The study aimed to determine the effect of blended learning approach on the student's academic performance in Grade 10 Mathematics among selected Grade 10 students in Indang National High School during the First Quarter of S.Y. 2019-2020. Specifically, this study answered the following questions:

1. What is the academic performance of students in Grade 10 Mathematics before the implementation of blended learning approach?
2. What is the academic performance of students in Grade 10 Mathematics after the implementation of blended learning approach?
3. Is there a significant difference on the academic performance of students in Grade 10 Mathematics before and after the implementation of blended learning approach?

Blended Learning Approach in K-12

The advent of technology in education gave rise to the blended learning approach in teaching. Students tend to perform better and faster when teaching is aided by technology. One of the promises of online technologies is that they can increase access to nontraditional and underserved students by bringing a host of educational resources and experiences to those who may have limited access to on-campus-only higher education. A 2010 U.S. report shows that students with low socioeconomic status are less likely to obtain higher
levels of postsecondary education (Aud et al. 2010). However, the increasing availability of distance education has provided educational opportunities to millions (Lewis and Parsad 2008; Allen et al. 2016). Additionally, an emphasis on open educational resources (OER) in recent years has resulted in significant cost reductions without diminishing student performance outcomes (Robinson et al. 2014; Fischer et al. 2015; Hilton et al. 2016).

Khalafullah's (2011) study aimed at detecting the effectiveness of e-learning and BL in the development of the skills required to produce educational models. The study sample comprised students of Educational Technology in the Faculty of Education, Al-Azhar University. The researcher applied the two educational programs he had prepared, and the results showed the effectiveness of using e-learning in direct lectures in terms of increasing students' cognitive achievement. This method was also effective in developing practical performance of skills. The study also showed the superiority of the integrated teaching group over the e-learning group in terms.

Pajtek (2013) compared computer-aided teaching with paper-based instruction in terms of efficiency and motivation, determining the effects of internal motivation in a computer program that used graphic forms and other programs that did not use these forms on the achievement, trends, and deep participation of 65 underachieving students. The study was conducted at the site of a normal school over the course of one semester. Data related to three groups were collected: the control group (33 students); the alternative treatment group in which the students received computer-aided teaching without graphics formats; and the experimental group where the students received computer-aided instruction with a graphic shapes extension for 20 minutes three times a week. The results did not show any statistically significant difference in academic achievement, trends, or attendance among the three groups. However, the increase in academic achievement reached the level of statistical significance.

This study integrated blended learning approach in teaching Grade 10 Mathematics. This study was limited to topics on polynomials. In addition, the researcher used learning videos on the topics downloaded and power point presentations which was uploaded in the Facebook group account wherein the researcher is the administrator of the account. All videos and power point presentations were screened first by the researcher prior to uploading whether it is in conformity with the concept of the learning competencies. List of students who viewed the videos were monitored in order to identify who did not watch the video thereby planned for other strategies for the students to have access on it. The researcher submitted a request from ICT Coordinator for the use of computer laboratory for the Internet access. Flash drive was required to lessen the problem on internet connectivity and enable them to view it as long as they wanted for mastery. Learning sessions will be properly documented to further validate the results of the study.

Methodology

A. Participants and/or other Sources of Data Information

The participants of this study were selected Grade 10 Absolute students of Indang National High School during the First Quarter of S.Y. 2019-2020. Students were selected based on the results of the periodical test in Grade 10 Mathematics covering the topic in the first grading period. Purposive sampling was applied in selecting the respondents of the study.

B. Data Gathering Methods

The study employed the pre-experimental One Group Pretest-Posttest Study. The benefit of this design is the inclusion of a pretest in order to determine the baseline scores. This design was used to determine the effect of blended learning strategy in the academic achievement of Grade 10 students.

This is represented as follows:

\[ O_1 \times O_2 \]

where \( O \) refers to the observed measures

Pretest: \( O_1 \)
Posttest: \( O_2 \)

\( x \): treatment

An achievement test of 30-item test was prepared based on the learning competencies from curriculum guide of K to 12 Mathematics Basic Education.
Curriculum in Grade 10. Questions were made parallel to pretest given in the learner's module. It consisted of the topics covered for the first grading period specifically geometric sequence. The prepared achievement test was checked by the Head Teacher and the researcher administered a dry-run for the validation of the test items given to the respondents to determine the reliability of the instrument. For the purpose of superior test quality the difficulty and discriminating values were computed. Pretest was administered before the intervention. During the implementation, the teacher posted a lesson for the class to access it on their various devices at home and studied it before coming to school the next day. At school the researcher facilitated group discussions and let students teach those who were not able to get the lesson well. The researcher allotted time or the assigned homework to be done in the classroom. The researcher served as facilitator and guide to complete the assigned tasks. At the end of the study, a posttest was administered on the contents of the topic, geometric sequence. The researcher collated some remarks from the students about the blended learning approach. Pros and cons of the strategy administered were gathered from the students.

Data Analysis
To analyze the gathered data, the researcher used the following statistical tests:

Mean. This was used to measure the mean scores of the pretest/posttest achievement levels using the developed achievement test. The mean is regarded as the best measure of central tendency that shows the point on scale where scores tend to group themselves. It is the balance point or center of gravity of the distribution. To find the mean, add the raw scores and divide the total number of scores (Punzalan & Uriate, 2013).

Standard deviation. This measures the consistency of the data from the mean. This is essential in conducting research particularly in testing hypotheses.

Paired sample t-test. This was used to determine the significant differences between the pretest/posttest scores of the students. t-test at 0.05 level of significance will be used (Punzalan & Uriate, 2013).

T-test for correlated means is sometimes referred to as t-test of dependent samples. This was used when the samples are within the groups. This was applied to problem for the present study. Is there a significant difference in the achievement level of the students who underwent the blended learning approach between pretest and posttest results?

Findings

Table 1 shows the results of pretest of 10.96 and posttest mean of 15.68 on the achievement level of students in the study. Slight difference on standard deviations indicates that scores were not so dispersed among students. The computed value of 24.180 is higher than the critical value of 1.684. Based on the data presented there exists a significant difference between the pretest and posttest achievement scores in favor of posttest. Blended learning approach is an effective teaching-learning strategy. These findings corroborates with the studies by Acejalado (2014), Murtiyasa, et. al., (2015), Larsen (2015) stating it made an increase in academic performance. Furthermore, with regard to behavior of the students it was supported by the study of Bujurny (2014), who suggested that blended learning approach increases student motivation, student knowledge of curriculum content, and student self-regulation. Likewise, it was evident during the implementation of the study wherein students were relaxed and motivated.

<table>
<thead>
<tr>
<th>No. of</th>
<th>Mean</th>
<th>Standard deviations</th>
<th>Computed T-test value</th>
<th>Degrees of freedom</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>Pretest</td>
<td>10.96</td>
<td>4.73</td>
<td>-10.66</td>
<td>49</td>
</tr>
<tr>
<td>Posttest</td>
<td>15.68</td>
<td>4.56</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*level of significance = 0.05

The table above shows the result of difference between the academic performance in geometric sequence of Grade 10 Absolute students of Lumampong National High School – Indang Annex before and after the blended learning approach using the T-test for correlated. The computed t value was -10.66 with its associated probability value of .000 less than the critical value of 0.05. Thus the null hypothesis was rejected. It suggest that there is significant difference between the academic performance in geometric sequence of Grade 10 Absolute students.

Table 2: Effect of Blended Learning Approach in the Academic Performance of Students

<table>
<thead>
<tr>
<th>Academic Performance</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Mean Gain</th>
<th>Percent Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>10.96</td>
<td>15.68</td>
<td>4.72</td>
<td>43.07</td>
</tr>
</tbody>
</table>

Academic performance of the students in Grade 10 Mathematics is affected by the blended learning approach as supported by the data presented in Table 2. These data show a pretest of 10.96 and the posttest of 15.68. It shows a mean gain in the achievement level of 4.72 and the percentage of increase is 43.07. These data
proved that blended learning approach has a positive effect on student academic performance.

**Conclusion**

Based on the findings, the following conclusions are drawn:

1. There was a significant difference between the pretest and posttest results on student academic performance after the implementation of blended learning approach.
2. There was an improvement on student academic performance. With the mean gain it proved that blended learning approach is an effective teaching strategy.
3. There were some drawbacks in the implementation of the strategy particularly students with no internet access outside of class and lack of gadgets but there are remedies which can be done by the teacher like copying the video in a flash drive for students' consumption and seek the help of peers.

**Recommendations**

Based on the above conclusions of the study, the following recommendations were suggested:

1. Feedback from an action research of blended learning approach will be disseminated through submission of reports.
2. Conduct workshop on the technical know-how of blended learning approach for teachers that includes: design process and planning activities; time management: choice of video suitable to learning contents; remedy for unavailability of internet access and technological expertise.
3. Since action research is a tool for continuous improvement, with the positive result of the intervention it can be included in CIP Project like in our school the researcher made use of Blended learning approach in the proposed PROJECT 21st CEL (21st Century Learners). Before it would be implemented a corresponding workshop for teachers will be initiated by the researcher.
4. Solicit from the LGU's any possible donations of learning materials such as flash-drives and tablets.

**References:**


Braza, M & Supapao, S. (2014). Effective Solutions in the implementation of the K to 12 Mathematics Curriculum. West Visayas State University, College of Education, La Paz, Iloilo City, Philippines.


