

Developing Students 21st Century Skills Using Project Based Learning

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Abstract – *The aim of the research was to investigate the effects of Project-Based Learning method in developing the 21st century skills of the Grade 7 students in Computer Hardware Servicing and compare it to that of lecture-discussion method. This is an experimental research which utilized the Quasi-Experimental research design specifically the Non-equivalent Control Group Design with Pretest and Posttest. There were twenty (20) research respondents in the experimental group and twenty (20) research respondents in the control group. The experimental group was exposed to project-based learning method while the control group was exposed to lecture-discussion method. The validated and reliability – tested pretest were given prior to their exposure to project-based learning and lecture-discussion methods. Posttest was administered after the instructional intervention. The data collected from the pretest and posttest performance were analyzed using the mean and t-test. Findings of the research investigation are as follows: the experimental and control groups obtained low in their test performance in Computer Hardware Servicing in the pretest. During the posttest, both groups obtained average in their performance. There is significant difference in the levels of performance in the pretest and posttest of the experimental group and control group. It was found out that there is no significant difference as to the effectiveness between project-based learning method and lecture-discussion method. It was revealed that project-based learning method and lecture-discussion method are good methods in teaching Computer Hardware Servicing.*

Keywords – *21st century skills, level of performance, project-based learning*

INTRODUCTION

Due to expanded globalization and developments in innovation, new abilities are expected to prevail in the worldwide workforce. It is vital for schools to make pressing move to stay aware of the new demands. As in all changes, education will assume a critical part in setting up the coming age of laborers. However, the nature of the present training in the Philippines misses the mark in giving the students the essential aptitudes, since education frameworks are generally centered on preparing students for standardized testing, yet with an absence of research, an absence of utilization of the learning.

The Department of Education had embarked into a new basic education reform – the K to 12. This reform includes decongest and enhancing the basic education curriculum, lengthening the cycle of basic education to cover kindergarten through year 12. The K to 12 Curriculum considers every aspect of the development

of the learners so that graduates will acquire true mastery of basic competencies to better prepare them for employment, entrepreneurship, middle level skills or higher education.

According to Luistro [1], the realities of the modern world require a different kind of Filipino. The Filipino must be a lifelong learner, holistically developed, globally oriented and locally grounded. The modern Filipino must possess the skills and vision applicable in the 21st Century.

The K to 12 Curriculum is focused on the learner's acquisition of the 21st century skills, Department of Education, [2]. These skills include: learning and innovation skills; information, media, and technology skills; effective communication skills; and life and career skills. These skills are needed by the students to be successful in the 21st century workforce, Partnership for 21st Century Skills [3].

This new focus in the curriculum brings a shift in the educational structure. There is now a significant change in the teaching tools and methodologies to develop the 21st century skills of the learners. Traditionally, the dominant approach of transmitting factual knowledge to the learners is through lectures and textbooks, then assessing this content knowledge with quizzes, and test at the end of a chapter or learning module. Now, there is a need to use a different approach to deliver content to develop the 21st century skills of the students.

Project-based learning is seen as an approach that empowers students to build up the "21st century capabilities"- - psychological and socio emotional abilities - required for progress [4]. According to Boss [5], educators have long seen and understood the value of projects to help students learn new concepts. Karaman and Celik [6] describe Project-Based Learning (PBL) as a model that organizes learning around projects. Learners decide how to approach a problem and what activities to pursue. They gather information from variety of sources and synthesize, analyze and derive knowledge from it. Their learning is inherently valuable because it is connected to something real and involves adult skills such as collaboration and reflection. In the end, students show their newly acquired knowledge and are judged by how much they have learned and how well they communicate it.

Due to expanded globalization and developments in innovation, new abilities are expected to prevail in the worldwide workforce. It is vital for schools to make pressing move to stay aware of the new demands. As in all changes, education will assume a critical part in setting up the coming age of laborers. However, the nature of the present training in the Philippines misses the mark in giving the students the essential aptitudes, since education frameworks are generally centered on preparing students for standardized testing, yet with an absence of research, an absence of utilization of the learning.

It was in this context that the researcher took interest to conduct an investigation on the implications of the Project-Based Learning in developing the 21st century skills of students compared to the traditional method of teaching TLE – Computer Hardware Servicing subject of Grade 7 students.

OBJECTIVES OF THE STUDY

This study sought to determine the implications of the Project-Based Learning in developing the 21st

century skills of Grade 7 TLE – Computer Hardware Servicing students. Specifically, it aims to determine the 21st century skills level of performance in Computer Hardware Servicing of experimental and control groups in the pretest and posttest; determine if there is a significant difference in the 21st century skills level of performance in Computer Hardware Servicing of experimental and control group in the pretest and posttest and to determine if there is a significant difference in the mean gains between the level of performance in Computer Hardware Servicing of the experimental and the control group.

Null Hypothesis

The following hypotheses were tested at the .05 level of significance:

H₀ 1. There is no significant difference significant difference in the 21st century skills level of performance in Computer Hardware Servicing of experimental and control group in the pretest and posttest.

H₀ 2. There is no significant difference on the the mean gains between the level of performance in Computer Hardware Servicing of the experimental and the control group.

MATERIALS AND METHODS

Research Design

To determine the effectiveness of the use of Project-Based Learning in developing the students' 21st century skills, the researcher utilized the Quasi-Experimental research design specifically the Non-equivalent Control Group Design with Pretest and Posttest. This design includes at least an experimental and control group. It mirrors the Pretest-Posttest control group experimental design, but instead of randomization, naturally occurring comparison groups are selected to be as alike as possible (Gribbons & Herman, [7]. According to Cohen et al., [8], in this experimental design, groups are considered non-equivalent as groups are not randomized. Non-equivalent groups specifically mean that participant characteristics may not be balanced equally among the control and experiment group. This design distinguish a correlation gather that is as comparative as conceivable to the treatment gather as far as benchmark qualities [9].

Subjects of the Study

The subjects of the study were the forty (40) Grade 7 students of Old Poblacion National High

School, Division of Escalante City. They were grouped according to experimental and control group. The subjects of the study were chosen since the researcher handles the said group of students. To protect the study from Hawthorne effect, the subjects were not informed that they are under being studied.

Research Instrument

In gathering the data of the study, the researcher prepared a table of specification and constructed a test in Computer Hardware Servicing on the topics covered by the study. The test was composed of two parts with a total score of fifty (50). The first part was a 35-item multiple choice test with four alternatives for the respondents to choose from. The multiple choice test was developed based on Bloom's Taxonomy of Objectives on test construction which includes knowledge, comprehension, analysis, application, synthesis and evaluation. The second part of the test was a hands-on test which was rated using rubrics. The total score obtained in the hands-on test was fifteen (15) points. The test was administered by the experimental and control groups. The researcher selected one instructional unit as the coverage of the entire study.

Validity of the Instrument

Since the researcher himself constructed the test in Computer Hardware Servicing, it has to go through proper validation. The instrument was validated by a panel of experts. The experts composed of the Chief Education Supervisors in Curriculum Implementation, Education Program Supervisor in Technology & Livelihood Education and a School Principal. The panel of validators rated the test "valid" with a Mean of 4.67 which is interpreted as "Very Satisfactory".

The lesson plan and session plan used in this study were also validated by the panel of experts.

The Dry Run Phase

After the validity of the research instrument was established, the final revised copies of the test questionnaire were conducted to the Grade 7 students of Escalante National High School. Their scores obtained from the test were used for item analysis.

Item Analysis

The items of the test were evaluated to determine the too easy or too difficult items. Each item was evaluated by estimating the item difficulty,

assessing the discriminating power of each item and the effectiveness of each alternative, Rabacal [10]. In order to determine the level of difficulty and level of discrimination, the researcher used the U-L Index Method.

Reliability of the Instrument

The instrument that was used in this research was subjected to KR-21 test reliability. The range of the reliability is from .00 to 1.00. The reliability coefficient of the test instrument was 0.87 which indicated that the instrument was better for or desirable in classroom test.

Data Gathering Procedure

A. Pre-experimental Phase

After the permission to conduct the study was granted by the School Head and Schools Division Superintendent, the forty (40) Grade 7 students were identified as participants of the study. They were divided into two groups, the experiment group and the control group. The pretest was administered simultaneously to both groups in one classroom.

B. Experimental Phase

Factors that might affect the experiment were controlled prior to the delivery of the lesson to ensure that both groups received similar treatment and the only difference was the intervention used.

Both groups were using the same room and were exposed to similar lighting condition, and ventilation. There was no rigid seat assignment in order that the students were free to take their seats where they were comfortable.

The sessions were scheduled at 7:30 to 8:30 in the morning for the experimental group and 8:30 to 9:30 for the control group everyday within the period of the experiment. The experiment lasted for twenty (20) days.

The teaching of Computer Hardware Servicing to the control group was done through lecture-discussion method of teaching. On the other hand, the experimental group was exposed to Project-Based Learning.

In the implementation of PBL, the concepts were first explained to the students through a lecture and then detailed instruction for the project was given. In the course of the project, the students were divided into micro groups and tasked to plan for their project. The students then received feedback from other groups.

They presented their final work in class as a final stage of the PBL.

C. Post-experimental Phase

After the four weeks instruction method, the posttest was given to both groups using the same test instrument. The results of the pretest and posttest were analyzed using statistical treatment.

Data Analysis Procedure

After the retrieval of the research instrument from the respondents, the data were computed using Window-based SPSS (Statistical Package for Social Sciences) with the aid of a qualified statistician. It was analyzed in order to establish the extent to which the research questions had been addressed.

The following statistical tools were used to arrive to the computation of the results:

1. To determine the 21st century skills level of performance in Computer Hardware Servicing of experimental and control groups in the pretest and posttest, the Descriptive Mean was used.
2. To determine the difference on the pretest and posttest performance in Computer Hardware Servicing of every group, the T-test for dependent sample was used.
3. To determine the difference on the pretest and posttest performance in Computer Hardware Servicing between two groups, the T-test of independent sample was used.
4. To determine the difference on the mean gains of pretest and posttest performance in Computer Hardware Servicing of experimental and control groups, the T-test of independent sample was used.

Scoring Interpretation

The scores that were obtained by the students in the pretest and posttest were categorized and assigned description as follows: 1.0 - 9.79: Very Low; 9.8 - 19.59: Low; 19.6 – 29.39: Average; 30.4 – 39.19: High; 40.2 – 50: Very High

The numerical weights allow statistical analysis which facilitated the giving of meaning and interpretation to the results.

RESULTS AND DISCUSSION

As shown in Table 1, both the control and experimental groups obtained low performance in the pretest as indicated by mean scores of 11.75 and 11.50 respectively. The low performance indicates that both

groups possess the same level of knowledge in Computer Hardware Servicing prior to the instructional intervention.

Table 1. 21st Century Skills Level of Performance in Computer Hardware Servicing of Experimental and Control Groups in the Pretest

Groups	SD	Mean	Interpretation
Experimental	3.12	11.75	Low
Control	2.83	11.50	Low

This result was similar with the findings of Asan [11], in his study on implementing project-based learning in computer classroom. The competency level of both the experimental and control groups were similar at the beginning of the study.

The findings implied that both groups may have inadequacy of skills and competencies on the topics included in the pretest to obtain high scores.

Students learn by connecting new information to something that they already understand. Because of this, it is crucial for teachers to instill the most essential things for learners to remember, understand and do (Good, 2006).

Table 2. 21st Century Skills Level of Performance in Computer Hardware Servicing of Experimental and Control Groups in the Posttest

Groups	SD	Mean	Interpretation
Experimental	6.13	28.10	Average
Control	6.58	25.35	Average

As reflected in Table 2, the obtained mean of the students under the experimental group was 28.10 and that under the control group was 25.35 which fall under the range of 19.6 – 29.39 which is interpreted as average. This indicates that the two groups exhibited the same levels of knowledge in Computer Hardware Servicing after the instructional intervention. It can be noted, that there was an increase in the performance of the two groups from low to average level.

The findings of Magno, Lajum, and Regodon [12] supported this result, after concluding that learning approach in general increases when students are exposed in both methods (lecture and PBL) since they facilitate better learning.

It can be inferred from the result that students were able to acquire basic knowledge and skills on the topics and were able to use them for learning purposes.

According to Skinner’s Theory of Behaviorism which states that, once there is a systematic change in the environment, which could be possible, be it the technique and style in teaching, the learners will have a high possibility of assimilating the lessons.

Table 3. Difference in the Pretest and Posttest Performance in Computer Hardware Servicing of Experimental Group

SV	SD	Mean	DF	P	Interpretation
Pretest	3.12	11.75	19	.000	Highly
Posttest	6.13	28.10			Significant

As indicated in Table 3, the obtained mean in the pretest under the experimental group was 11.75 while in the posttest was 28.10. The probability value is .000 which is less than 0.05 and this is interpreted as highly significant.

The result of the statistical treatment showed that there is a significant difference in the pretest and posttest scores of students under the project-based learning method.

Findings of Barak and Dori [13], supported this result, after determining that the experimental group which used project-based learning scored significantly higher in the posttest.

Given the above findings, it can be implied that project-based learning method is an efficient instructional strategy that helps increase students’ level of achievement. It is efficient in such a way that projects given to students are oftentimes more complex than in the classroom -based learning.

Table 4. Difference in the Pretest and Posttest Performance in Computer Hardware Servicing of Control Group

SV	SD	Mean	DF	P	Interpretation
Pretest	2.83	11.50	19	.000	Highly
Posttest	6.58	25.35			Significant

Table 4 reveals that the obtained mean under traditional method during pretest was 11.50 while during the posttest was 25.35. The probability value was .000 which is less 0.05 and this is interpreted as highly significant.

As revealed in the findings, there is a significant difference in the pretest and posttest score of students under traditional method.

This finding implied that lecture had an effect on students’ deep learning approach which supports the

explanation provided by Fyrenius, Bergdahl, and Silen [14]. This can be explained that the lecture method is a powerful technique for teachers who lecture well and dynamic strategies are successful for educators who are skilled at creating important in-class exercises [15]. In this regard, hypothesis 1 and 2 which postulated that there is no significant difference in the level of pretest and posttest performance in the experimental and control group were rejected.

Table 5. Difference in the Pretest Performance in Computer Hardware Servicing of Experimental and Control Groups

SV	SD	Mean	DF	P	Interpretation
Exper.	2.83	11.75	38	.793	Not
Control	3.12	11.50			Significant

As shown in this table, the mean of the experimental and control group during the pretest were 11.75 and 11.50 respectively. The probability value was .793 which is higher than 0.05 level of significance. This means that there is no significant difference on the performance of students under project-based learning method and lecture-discussion method during the pretest.

The results of this study were in line with the view of the research of Bas [16]. in investigating the effects of project-based learning on students’ academic achievement and attitudes towards English lesson. The results show that there is no statistically significant difference between the pretest scores of the students between the experimental and control group. He further said that both groups were equal to one another.

Based on the findings, it can be inferred that both groups’ pre-learning levels in Computer Hardware Servicing lesson are equal to one another.

Table 6. Difference in the Posttest Performance in Computer Hardware Servicing of Experimental and Control Groups

SV	SD	Mean	DF	P	Interpretation
Exper.	6.13	28.10	38	.180	Not
Control	6.58	25.35			Significant

Table 6 reveals that the mean of the experimental group and control group were 28.10 and 25.35, respectively. This means that there is no significant difference between the experimental group and control group on their performance in the posttest as indicated

by the probability value of .180 which is higher than 0.05 level of significance.

The findings revealed that after exposing the experimental group to project-based learning method and the control group to the lecture-discussion method, the performance of the two groups in the posttest is the same. However, it was observed that the improvement in the achievement of the students in the experimental group was significantly greater than that of the control group.

The positive contribution of project-based learning in this research was supported the findings of Cirak and Nassir [17]. Their findings revealed that students in the experimental group outperformed the students in the control group where traditional instruction methods were used.

Focusing on the findings, it can be implied that the difference acquired between these two groups can be attributed to the responsibilities that the students took in project-based learning, the active role of the students in the learning process.

Hypothesis which postulated that there is no significant difference in the level of pretest and posttest performance in the experimental and control group was accepted.

Table 7. Comparison of Mean Gains of Pretest and Posttest Performance in Computer Hardware Servicing of Experimental and Control Groups

SV	SD	Mean	DF	P	Interpretation
Exper.	7.40	16.35	38	.259	Not
Control	6.35	13.85			Significant

The results show that the mean gain of the experimental and control groups in their pretest and posttest performance were 7.40 and 6.35, respectively. This means that there is no significant difference between the two groups. Furthermore, it means that both methods are suitable in the teaching-learning process that the teachers may utilize inside the classroom.

Thus, hypothesis which postulated that there is no significant difference in the level of pretest and posttest performance in the experimental and control group was accepted.

CONCLUSION AND RECOMMENDATION

There are several implications derived from the study; improving the learning condition in school and locale, and continual professional development among

teachers. The move for advancement in instruction and learning through project based learning presents challenges for the teacher accustomed to methods of recitation and direct instruction. The results of the study indicate that the application of project-based learning and lecture discussion method contributed to the improvement of the performance in the students in Computer Hardware Servicing. Thus, the researcher concluded that project-based learning method and lecture-discussion method are effective methods in teaching. In light of the current study findings, curriculum implementers and teachers may use project-based learning method and lecture-discussion method as instructional strategies to help students apply theoretical and practical knowledge essential in developing their 21st century skills.

REFERENCES

- [1] Luistro, Armin. (2015). *K to 12 Toolkit*. Retrieved August 25, 2015, from <https://goo.gl/JGpHHG>
- [2] K-12 Learners: A Generation of Innovators (2016). Retrieved August February 5, 2018, from www.gov.ph.
- [3] 21st Century Skills: Learning for Life in Our Times. Retrieved August 18, 2015 from <https://goo.gl/usyQJS>
- [4] Quint, J. & Condliffe, B. (2018). Project-Based Learning: A Promising Approach to Improving Student Outcomes. Issue Focus, Retrieved January 31, 2018 from eric.ed.gov.
- [5] Boss, S. (2012). The challenge assessing of project-based learning: on the heels of Common Core State Standards, administrators begin assessing critical thinking and content mastery. District Administration, 48(9), 46 –52.
- [6] Karaman, S., & Celik, S. (2008). *An exploratory study on the perspectives of prospective computer teachers following project-based learning*. International Journal of Technology & Design Education, 18(2), 203-215. Doi:10.1002/s10798-006-9021-1.
- [7] Gribbons, B., & Herman, J. (1997). *True and quasi-experimental designs*. Washington, DC: ERIC Clearinghouse on Assessment and Evaluation.
- [8] Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. New York: Routledge.
- [9] White, H., & S. Sabarwal (2014). Quasi-experimental Design and Methods, Methodological Briefs: Impact Evaluation 8, UNICEF Office of Research, Florence.
- [10] Rabacal, J. (2016). Test of Science Process Skills of Biology Students towards Developing of Learning Exercises. Asia Pacific Journal of Multidisciplinary Research, 4 (4), 9-16.

- [11] Asan, A. (2005). *Implementing Project-Based Learning in Computer Classroom, Vol.4, Issue 3, Article 10*
- [12] Magno, C., Lajom, A.L., & Regodon, J.R. (2005). *Developing a Deep Approach and Attitude to Learning through Project-based Learning*
- [13] Barak, M., & Dori, Y. J. (2005). Enhancing undergraduate students' chemistry understanding through project-based learning in an IT environment. *Science Education*, 89(1), 117-139.
- [14] Fyrenius, A., Bergdahl, B. & Silen, C. (2005). *Lectures in problem-based learning-Why, when and how? An example of interactive lecturing that stimulates meaningful learning*. *Medical Teacher*, 27, 61.
- [15] Covill, Amy E. (2011). College students' perceptions of the traditional lecture method. *College Student Journal*, 45 (1), 92.
- [16] Baş, G. and Beyhan, O. (2010). *Effects of multiple intelligences supported project-based learning on students' achievement levels and attitudes towards English lesson*. *International Electronic Journal of Elementary*
- [17] Çırak, D. (2006). *The use of project based learning in teaching English to young learners*. Unpublished master's thesis. Selçuk Üniversitesi Sosyal Bilimler Enstitüsü, Konya.

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