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TECHNOLOGY ASSISTED INSTRUCTION: A STRATEGY TO ENHANCE STUDENTS' ATTITUDE AND ACHIEVEMENT IN BIOLOGY

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Abstract

This study aimed to determine the performance of the Bachelor of Science in Office Administration Students in Biology before and after the study using instructional technology in instruction. It also aimed to determine the attitude of the students towards Biology. The study also gathered data on the effect of the presence or absence of the instructional technologies and the reflections of the subjects. Conducted at Iloilo State College of Fisheries-San Enrique Campus, San Enrique, Iloilo, from January to March 2017, Thirty (30)randomly chosen BSOA students taking Natural Science 1, were the subjects of the study. The pretest-posttest control group experimental research design was used. The data were gathered using the test, attitudinaire, interview guide, observation guide and journal. The data were analyzed using the mean and t-test. The result showed that there was a significant difference in the performances of the subjects in both the experimental group and control group before and after the study. A significant difference was also noted in the performance of the experimental and control group after the study. The students have positive attitude towards Biology, and no significant difference was ascertained in the attitude of both groups before and after the study. Bringing the instructional technologies in the classroom helped the students understood better the Biology concepts while its absence made it difficult for them to learn. The students reflected that the knowledge gained from the lessons in Biology was useful and applicable in their daily living, future activities and in helping conserve the environment. The activities employed made them well-motivated, enhance their self-confidence and develop teamwork.

Keywords – Technology Assisted Instruction, Strategy, Enhance, Attitude, Achievement, Biology.

Introduction

The potential benefits of Computer Assisted Instruction (CAI) cannot be underestimated in the contemporary world. There is a plethora of established findings on the instructional value of computer, particularly in advanced countries. The introduction of computer in education has not only being found to improve access to learning by all and quality knowledge delivery; its application has also bearing in the teaching-learning process. This may improve students' achievement in some subjects such as biology where students' performance is very low (Chang et. al., 2004).

Biology is a science subject being taught at the senior secondary school including tertiary education. The subject appears to be the most popular science subject at this level. Biology teaching helps learners to understand biological concepts, principles theories and laws. Among others, the objectives of teaching biology involve the ability of the learners to develop an awareness of the environment, to have meaningful and relevant knowledge in biology necessary for successful living in a scientific and technological world and to make room for technological advancement.

In view of the above statements, it was observed that the schools are not only tasked to equip learners with basic knowledge of biology content but also the practical skills needed for enhancing self-development. In order to achieve this, the pedagogical approach which is centered on teachers' method of imparting facts and concepts

of the subjects is important as well as of equipping the students with the skills needed for further advancement. The implication is that biology teaching must be effective and meaningful to achieve this goal. The conventional instructional methods may not be able to achieve these goals.

The integration of instructional technologies in classroom aims at transforming classrooms into active learning environment where students become active participants in lectures and discussions. This intends to reinforce important lecture concepts and enhance students' science cognitive skills.

A great number of opportunities are emerging from the growing use of technology in education: opportunities for teaching and learning in existing innovative ways; creation and imagination of new worlds; and opening the frontier of human interaction. At its most basic level, technology brings three dramatic changes to schools (Tagabuen, 2013).

First, it breaks down classroom walls, bringing the students and teachers into contact with people and places they would have otherwise met and visited. This breaking down of walls usually occurs when students take their first step online and send e-mail messages to a class on the other side of the world.

The second change is that technology dramatically expands classroom resources by making the latest information, graphic images, and software available at the click of a mouse. These resources yield individual and group projects, collaboration, curriculum lesson plan and materials, and an increased level of idea sharing.

Finally, technological resources often encourage independent, autonomous learning, which most educators agree can help students become lifelong learners. And since many of these resources have the ability to remove subjectivity and promotes diversity, they are natural tools for addressing all students. Some educators think that students are most actively involved, question more, works more cooperatively and initiate learning more often when they have access to technological resources; others believe that technology help them teach their students how to manage information efficiently (Tagabuen, 2013).

Students' attitude is an integral part of learning. It influences one's behavior, inner mood and therefore learning. Both positive and negative attitude have a strong impact on the success of a subject learnt. The attitude of an individual in his/her tendency to respond favorably or unfavorably to an objects or events. A certain task may be relatively easy, but if the learner who has a negative attitude towards the tasks' like problem solving skills, he/she might not be motivated to accomplish the task, thus resulting to poor performance . On the other hand, a student who possesses positive attitude towards the subject subjectivity and promotes diversity, they are natural tools for addressing all students. Some educators think that students are most actively involved, question more, works more cooperatively and initiate learning more often when they have access to technological resources; others believe that technology help them teach their students how to manage information efficiently.

This study was anchored on Piagets' (Ebenezer and Connor 1998 in Billena 2001) theory of intellectual or cognitive development. The theory states that the nature of intellectual development is attractively captured in the term "Constructivism". Another theory was anchored on Bandura's Social Learning Theory. He believed that people can learn through observation and that internal mental states are essential part of this process. According to Bandura, there are three basic models of observational learning which includes a live mode, which involves an individual demonstrating or acting out a behavior; a verbal instructional model, which involves descriptions and explanations of a behavior; and a symbolic model, which involves real or fictional characters opportunities for students to connect new information to schema.Finally, Tolman's Theory of Learning, where learning is always purposive and goal oriented.

Inspired by all these issues, the researcher challenges himself to conduct the study using technology assisted instruction in enhancing students' attitude and achievement in Biology.

Independent Variables **Dependent Variables**

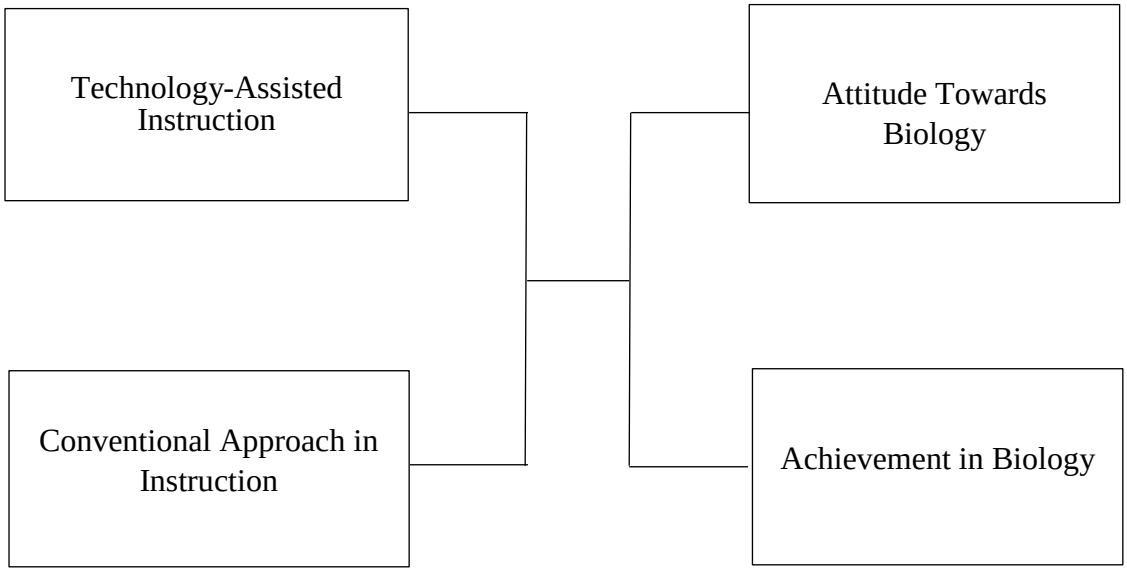

Figure 1. The use of technology-assisted instruction as a strategy to enhance students' attitude and achievement in Biology.

This study was conducted to determine the attitude and achievement in biology of the Bachelor of Science in Office Administration (BSOA) students exposed to the use of technologies.

Specifically, it sought to answer the following questions:

1. What is the performance of the experimental and control group before the study?
2. What is the performance of the experimental group before and after the study?
3. What is the performance of the control group before and after the study?
4. What is the performance of the experimental and control group after the study?
5. What is the attitude of the experimental and control group before and after the study?
6. Is there a significant difference in the performance of the experimental and control group before the study?
7. Is there a significant difference in the performance of the experimental group before and after the study?
8. Is there a significant difference in the performance of the control group before and after the study?
9. Is there a significant difference in the performance of the experimental and control group after the study?
10. Is there a significant difference in the attitude of the experimental and control group before and after the study?
11. How did the presence or absence of the use of technology in instruction affect the learning of the students in Biology?
12. What are the reflections of the students exposed to the use of technologies in instruction and of those who were exposed to the use of the conventional approach in instruction?

The result of this study may benefit the following:

Students. The findings may help increase students' level of awareness on the role of instructional technology in the learning process and its relevance in achieving better performance.

Faculty. The results will provide information on what instructional technology is and may increase students' science performance. It can be an eye opener for them to be more flexible in the use of different teaching enhancement tools in the classroom.

Administration. The result of the study would inform them on the different instructional technologies that the faculty can prepare and use in the classroom. With that, they can appropriate funds in the purchase of supplies that every faculty needs. By providing funds, the administration can help motivate or inspire faculty to prepare instructional materials with excellence for they are free from worries concerning money matters.

Curricularist. As a body or group of professional educators who are responsible for the development or improvement of the curriculum, the result of this study may guide them when to integrate educational technology in the curriculum specifically in Biology regarding the scope to be covered and may give them clear view of what skills the teacher must possess to handle the discipline.

The purpose of this study was to determine the performance of the students in Biology using instructional technology, specifically their performance in the pre-test and post-test and their attitude towards biology. It also ascertained the reflections of the students in both groups. This study was conducted at Iloilo State College of Fisheries-San Enrique Campus for the second semester of the academic year 2016-2017. It was conducted for six weeks, on the last term of the second semester. This started on January until the first week of March 2017. The content of the lesson covered by the experiment was the second and third chapter in the course syllabus. The subjects of the study were the thirty (30) third year Bachelor of Science in Office Administration (BSOA) students taking Natural Science 1 (Biological Science) who were chosen through randomization. The subjects were randomly distributed into two groups: the experimental and control group. Subjects were grouped as to their average grade during the previous semester and as to sex.

The pretest-posttest control group design was used in this study. The data were gathered through the pretest, posttest, classroom observation guide, interview guide and journal. While their attitude towards biology was determined using an attitudinaire. The t-test was used to analyze the significant difference between the performance of the experimental and control group in the pretest and post-test. Inferential statistics was set at 0.05 level of significance.

Methodology

This study was conducted at Iloilo State College of Fisheries-San Enrique Campus, San Enrique, Iloilo. ISCOF-San Enrique Campus is one of the external campuses of
ISCOF system located at Garrido Street, San Enrique, Iloilo. The school was originally known as San Enrique Polytechnic College, one of the CHED Supervised
Institutions in the Province of Iloilo located at the fourth district, and was officially integrated to ISCOF in January 2001.

ISCOF-San Enrique Campus offers degree courses in Agriculture, Education, Information Technology, Hotel and Restaurant Management and Office Administration, Agriculture being the flagship program.

This study utilized both descriptive and inferential statistical tests. In the descriptive statistical test, the mean was used.

Mean. The mean was the descriptive statistics used to determine the level of performance of the subjects both in experimental and control groups. The subjects' performance before the study was measured based on the result of the pretest, while, the performance after the study were measured based on the result of the post test. Likewise, their attitude towards biology were also measured using attitudinaire administered before and after the study.

The t-test. The t-test is a tool to compare two means, the means of two independent samples or two dependent groups before and after the treatment. Ideally, the t-test were used when there are less than 30 samples, but some researchers used the t-test even if there are more than 30 data samples (Broto, 2006).

In this study the t-test for independent samples were used to determine the significant differences in the performance of both groups before the study, after the study, and their attitude towards biology before and after the study. The t-test for dependent samples were used to determine the significant differences in the performance of two groups before and after the study.

Findings

The findings of the present investigation are the following:

1. The performance of the experimental and control group before the study was "fair" having a mean scores of 19.93 and 19.87 respectively.
2. The experimental group had "fair" performance in the pre-test and "very satisfactory" performance in the post-test showing a mean gain of 14.60 or 73. 26% from the pre-test.
3. The control group exposed to the conventional method of instruction exhibited a "fair" performance in the pre-test and a "very satisfactory" performance in the post-test. It has a mean gain of 42.28% or an equivalent of 12.33 from the pre-test.
4. The performance of the experimental and control group after the study was "very satisfactory" having a mean scores of 34.53 and 32.20 respectively.
5. Both groups had positive attitude towards Biology before and after the study.
6. There was no significant difference in the performance e of the experimental and control group in the pre-test.

7. A highly significant difference was noted in the performance of the students assigned in the experimental group in the pre-test and post-test.

8. The performance of the control group in the pre-test and post-test was found to be highly and significantly different.

9. A highly significant difference was identified in the performance of both groups in the post-test.

10. Both groups exhibited the same positive attitude towards Biology.

11. The presence of instructional technologies in the classroom was found to be helpful, enjoyable and challenging. Its absence makes learning difficult and boring.

12. Both groups reflected that the knowledge gained from the lessons were useful and applicable in daily life situations, for future use and in conserving and preserving the natural resources. The activities conducted helps improved their motivation, self-confidence and teamwork.

Table 1. Performance of the experimental and control groups before the study

Group	Mean Score	Description
Experimental Group	19.93	Fair
Control Group	19.87	Fair

Legend:
41.00-50.00 – Outstanding
31.00-40.00 – Very Satisfactory
21.00-30.00 – Satisfactory
11.00-20.00 – Fair
1.00-10.00 – Needs Improvement

Table 2. Mean result on the performance of the experimental group before and after the study

Performance	Mean Score	Description
Pretest	19.93	Fair
Posttest	34.53	Very Satisfactory

Table 3. Performance of the control group before and after the study

Performance	Mean Score	Description
Pretest	19.87	Fair
Posttest	32.20	Very Satisfactory

Table 4. Mean result on the performance of the experimental and control group after the study

Group	Mean Score	Description
Experimental Group	34.53	Very satisfactory
Control Group	32.20	Very satisfactory

Table 5. Attitude of the experimental and control group before and after the study

Group	Before the Study		After the Study	
	Mean	Description	Mean	Description
Experimental Group	4.03	Positive	4.17	Positive
Control Group	3.97	Positive	3.99	Positive

Legend:
4.21-5.00 – Very Positive
3.41-4.20 – Positive
2.61-3.40 – Fair
1.81-2.60 – Negative
1.00-1.80 – Very Negative

Table 6. t-test result showing the difference in the performance of the experimental and control group in the pre-test

Variable	df	n	Mean Score	t-value	Sig. (2-tailed)
TAI	28	15	19.93	.097[ns]	.923
CAI		15	19.87		

ns – not significant

Table 7. t-test result showing the difference in the performance of experimental group before and after the study

Variable	df	n	Mean Score	t-value	Sig. (2-tailed)
Before the study	14	15	19.93	23.42**	0.00
After the study	14	15	34.53		

** - highly significant

Table 8. t-test result showing the difference in the performance of control group before and after the study

Variable	df	n	Mean Score	t-value	Sig. (2-tailed)
Before the study	14	15	19.87	20.871**	0.00
After the study	14	15	32.20		

** - highly significant

Table 9. t-test result showing the difference in the performance of the experimental and control group in the posttest

Variable	df	n	Mean Score	t-value	Sig. (2-tailed)
TAI	28	15	34.53	3.314**	0.003
CAI		15	32.20		

** – highly significant

Table 10. t-test result showing the difference in the attitude of the experimental and control group before and after the study

Variable	df	n	Mean Score	t-value	Sig. (2-tailed)
Experimental Group					
Before the study	14	15	4.03		
				1.248[ns]	.233
After the study	14	15	4.17		
Control Group					
Before the study	14	15	3.97		
				.153[ns]	.880
After the study	14	15	3.99		

ns - not significant

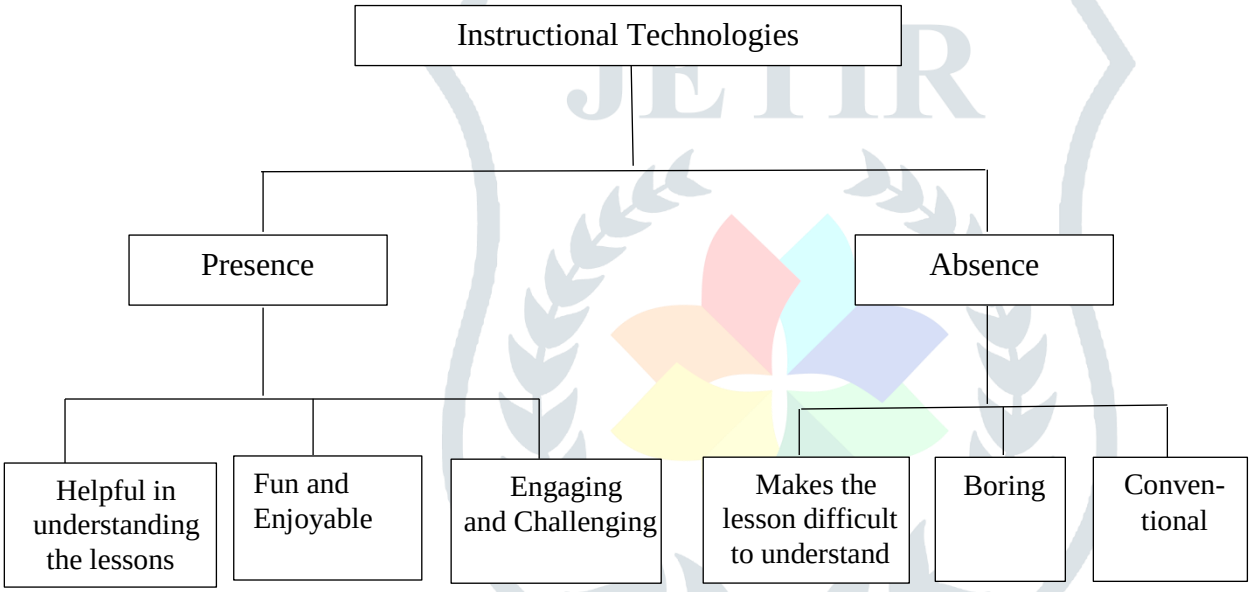

Figure 2. Data Analysis Map on the Ideas of the Students on the Presence and Absence of Technological Instructions.

Conclusions

1. Both groups have the same performance before the start of the study.
2. The use of the different technologies in instruction help increase the performance of the students in Biology.
3. The use of conventional approach in instruction also helps improve the performance of the students.
4. The use of technologies and conventional approach in instruction had both increased the performance of the students after the study.
5. Students exhibited positive attitude towards Biology.
6. The performance of both groups in Biology was comparable.
7. Exposing students to the use of technologies in instruction affect the students performance in Biology.
8. Conventional approach in instruction provide the students the opportunity to learn.
9. Bringing technologies in the classroom was found to be effective.
10. Students' attitude towards Biology before and after the study are comparable.
11. Bringing the instructional technologies in the classroom have helped the students understand better the Biology concept while its absence makes learning difficult boring and conventional.

12. Lessons in Biology were applicable and useful for daily living, for future use and in conserving the environment. The activities conducted improved their motivation, enhanced their self-confidence and develop teamwork.

Recommendations

Based on the findings of the study, the following recommendations are drawn:

1. Since the result of the study revealed that the use of the different technologies in instruction was found to effective, it is recommended that teachers may use this approach in teaching the subject Natural Science. It is understood that in order for this subject to be properly comprehended by the students, the use of technologies like the overhead projector, LCD, television, CD-ROMS, websites and the like is highly recommended. Complicated science concepts may be best understood by the students if they will be able to see it.

2. The Dean of each School may include in their Annual Procurement Plan the purchase of the different technologies needed in enhancing students learning like the television, overhead projector, LCD and similar equipment. These equipment were found to have helped increase students retention rate.

3. With the advent of technology where internet has become a commonplace, it is recommended that internet connection may be installed in learning areas where students can have an access. This will enable the students to learn at their own pace.

4. Sailing through the 21st century, it is but essential to equip the classroom with the different technologies. By embracing and integrating technology in the classroom, students have a competitive edge to succeed not only in school but also in the workplace as well. Educational technology in the classroom helps prepare the students for their future and sets them up for the increasing digital economy.

5. To better equip the students with the 21st century skills, it is recommended that the Dean of the School of Management together with the faculty members should review and assess the integration of the use of technologies in the curriculum. It should emphasize the usefulness of technologies in teaching Office Administration students believing that the lesson previously learned with the aid of computer can be applied in the lesson they will be learning at the present and in their employment.

6. Teachers are burdened with the responsibilities aside from classroom work. With this, it is recommended that they should prepare ahead of time an instructional materials covering all the course content with the aid of technologies in order to have a systematic and meaningful teaching-learning process. The Dean of the School of Management may include in the faculty development program the conduct of series of ICT trainings among faculty for them to enhance their usual teaching with the integration of technologies. Teacher shall embrace the impact that technology has offered in today's generation, hence, this study may also be replicated with other sets of students and in other subject areas to validate the result.

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