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EFFECTIVENESS OF USING COMPUTER-ASSISTED INSTRUCTION IN TEACHING UNDERSTANDING CULTURE, SOCIETY, AND POLITICS

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ABSTRACT RESEARCH ARTICLE

Integration of computers in teaching is one of the current trends in the Philippines. The Department of Education has provided computers to students to help them keep pace with the demands of 21st-century learning. The purpose of this quantitative quasi-experimental study was to determine the effectiveness of computer-assisted instruction in teaching Understanding Culture, Society, and Politics. The sample drawn from Matarinao School of Fisheries was purposively assigned to two groups of students. They were tested at the beginning and end of the first quarter of the school year 2023 – 2024 with a Pre-Test to assess progress. One group of students received computer-assisted instruction, while the second group received the lecture discussion method. Test mean scores of students in the group that received computer-assisted instruction were higher than those of their peers at the pre-test. Similarly, the test mean scores of students who received computer-assisted instruction were higher than those who were exposed to the lecture discussion method at the post-test. The t-test value of the post-test mean score between computer-assisted instruction and the lecture discussion method is 5.46, indicating a highly significant difference between the post-test mean scores of the students exposed to computer-assisted instruction and the lecture discussion method. The use of computer-assisted instruction is much more effective in teaching Understanding Culture, Society, and Politics compared to the lecture discussion method. Therefore, it is recommended that teachers utilize computer-assisted instruction in teaching Understanding Culture, Society, and Politics to improve the academic performance of students.

KEYWORDS: Computer-assisted instruction, control group, effectiveness, experimental group, lecture-discussion method

INTRODUCTION

Advancements in portable computer technology have led to automation and increased sophistication in various societal functions. This upgrade, particularly in the realm of personal computing, has reshaped the way processes and functions are carried out across sectors such as business, healthcare, and education.

In the field of education, portable computer technology has facilitated personalized and automated learning experiences. One of the earliest attempts at implementing computer-aided instruction dates back to the development of the Pressey Teaching Machine in the 1920s. This machine, primarily designed for automatic testing of intelligence and knowledge, utilized a multiple-choice format. It presented instructional materials, administered tests, awaited user responses, provided immediate feedback, and recorded each interaction as data ("Computer-assisted Instruction," n.d.).

Norman Crowder proposed branched programming as an advancement from Pressey's multiple-choice machine. He critiqued the Pressey machine for its linear programming approach, which only provided answers to errors without explanations for why student choices were incorrect. Crowder argued that such machines primarily offered drill and practice exercises. In contrast, branched programming aimed to guide students to correct answers by providing explanations. When a learner selected an incorrect choice, the software would present material explaining why that choice was wrong (Education Week).

Around the time that branched programming was being mastered, B. F. Skinner also proposed the idea of programmed learning where he suggested that the techniques in which rats and pigeons can be trained can also be applied to human beings. He then proposed a machine that is a rectangular wooden box with a hinged metal lid with windows. There are various paper discs inside with questions and answers written there that appear in the window panel of the box. Through this machine, the students can see the correct answers while not allowing them to change their choices (Molenda, 2017).

In the 1950s, Gordon Pask introduced another automated teaching machine known as the Self-Adaptive Keyboard Instructor (SAKI). Unlike previous models, SAKI was designed to adapt to individual students' learning needs. It could assess students' answers for accuracy and response time, allowing for personalized instruction. Additionally, SAKI had the capability to generate questions dynamically, rather than relying on pre-set questions from the instructor (Watters, 2015).

When Professor Donald L. Blitzer, an electrical engineer, became aware that 50% of high school graduates in the US lacked functional literacy skills, he collaborated with other software developers and engineers to devise the Programmed Logic for Automatic Teaching Operations (PLATO). PLATO was structured to link users and programmers to a central mainframe, operating on a time-sharing computer system. Initially implemented with a limited number of students, it soon became apparent that its capacity to connect multiple users across various networks paved the way for an online community. This included features such as real-time chats among users, live monitoring of discussions, private chat channels for group activities, and ultimately, the integration of email functionality. These innovations collectively distinguished the system as the inaugural networked educational and communication platform (Jones, n.d.).

Elements of PLATO evolved to encompass not only educational applications but also facilitated the emergence of "multi-user or single-user gaming, online communities, distance education, online classified ads, discussion groups on myriad topics, PLATO 'celebrities,' and even romance—all resembling features of the early 21st-century Internet." However, alongside its societal benefits, the system also introduced various challenges such as user anonymity, identity concerns, and issues regarding privacy and security (Jones, n.d.).

Currently, a variety of gadgets and software are available for both students and teachers. The emergence of handheld portable computer technologies such as personal computers, notebooks, netbooks, smartphones, and tablets has been particularly highlighted and sought after due to the pandemic. The health crisis compelled the Philippines to leverage these technologies for teaching and learning.

Consequently, teachers have had to acquire new skills to effectively utilize different gadgets and software in their daily instruction. Additionally, both students and teachers have been required to utilize their digital literacy skills to achieve their educational objectives. Blended learning and other technology-assisted learning approaches have become prevalent. Most teaching and learning models now rely on Internet connectivity for instruction delivery and learning activities. However, this study will explore a computer-assisted instruction approach that does not rely on the Internet. Instead, it offers offline activities that can be manipulated and accessed by both teachers and students, similar to the way teaching machines were developed during Pressey's time.

The Department of Education recently provided tablet personal computer (PC) units to schools across the country, including Matarinao School of Fisheries (MASOF). The initiative aimed to improve student learning through computer use. However, the effectiveness of this approach has not been verified at MASOF due to the lack of specific studies conducted in the school. Therefore, there is a pressing need for research to investigate whether using tablet PCs can indeed enhance student learning. The findings of this study will provide valuable insights for educators regarding the impact of tablet PC usage in teaching. Furthermore, the research will offer guidance to teachers on how to design computer-assisted instructional materials. Ultimately, the results will empower teachers to develop lesson plans using tablet PCs that do not rely on internet connectivity.

Methodology

This study employed a pre-test post-test quasi-experimental research design, chosen for its ability to assess the impact of an intervention on a target population. This design allows the researcher to evaluate the effectiveness of a handheld tablet-based learning approach in enhancing student achievement. Quasi-experimental research design shares similarities with experimental research, but differs in that the independent variable is not manipulated. Moreover, this study was conducted at Matarinao School of Fisheries, a secondary school in Matarinao, Salcedo, Eastern Samar. Its participants were the senior high school students. Specifically, these students are the Grade 12 who are enrolled during the school year 2023 – 2024. The total number of participants was 31 from the GA section and 31 from the TVL. To sum up, 62 respondents underwent the process of the study.

Furthermore, the number of participants from each section was determined by using purposive sampling or judgmental sampling. In this sampling method, the participants were selected based on the characteristics of the population and the objective of the study.

When it comes to research instrument, the study employed a teacher-made standardized summative test questionnaire. The construction and validation process of this test material involved five phases. Firstly, the Test of Specification (TOS) and test construction were undertaken. The researcher developed a table of specification to ensure that each item aligned with the Most Essential Learning Competencies. Subsequently, a fifty-item multiple-choice quiz was crafted based on the placement of items in the table of specification. Each item offered four choices, labeled A, B, C, and D.

Secondly, a language evaluation was conducted with the assistance of English grammar experts. They reviewed each test item for proper grammar, including subject-verb agreement, punctuation, and tense consistency. The test questionnaire was then revised according to the language evaluators' suggestions.

Next, content evaluation was performed with the help of Social Studies subject experts. The fourth phase involved pilot testing, and the final phase entailed revising the test questionnaire based on the pilot testing results. Upon completion of the test construction and validation process, the researcher sought certification from the District-in-Charge of Salcedo II. This certification affirmed that the research instrument met reliability, validity, and design standards and had undergone Quality Assurance. Thus, the research instrument was deemed valid, standardized, and suitable for gathering the required data for this study.

Lastly, the data from pretest and posttest were analyzed using Statistical Package for the Social Sciences (SPSS). To discern the effectiveness of the instructional methods employed, the researcher opted for the independent sample t-test as the statistical method of choice. This test facilitated a comparison of the mean scores achieved by the Experimental Group with those of the Control Group, allowing for a comprehensive evaluation of any significant differences in learning outcomes between the two groups.

Results

Pre-Test and Post-Test Scores Result of the Grade 12 Students' Assessment Test

Table 1. Score range of the pre – test and post – test result in the experimental group.

The

SCORE RANGE	PRE – TEST	POST – TEST
1 – 10	0	0
11 – 20	21	3
21 – 30	10	20
31 – 40	0	7
41 – 50	0	1
TOTAL	31	31

results of the post-test in the experimental group showed an improvement compared to the pre-test scores. Table 5 summarizes the score ranges for both the pre-test and post-test. During the pre-test examination, 21 students scored between 11 and 20, whereas only three students scored in this range during the post-test. Conversely, 10 students scored between 11 and 20 in the pre-test, while 20 students achieved scores in this range during the post-test. Additionally, seven students scored between 31 and 40 in the post-test, and one student scored between 41 and 50.

As indicated in Table 6, notable progress was observed in the scores between the pre-test and post-test results in the control group. Initially, two students achieved scores within the range of 1-10 in the pre-test. During this phase, 26 students obtained scores between 11 and 20, whereas only two students fell into this range in the post-test. Conversely, the number of students scoring between 11 and 20 decreased from two in the pre-test to 19 in the post-test. Furthermore, while one student scored between 31 and 40 in the pre-test, this increased to 10 students in the post-test.

Table 2. Score range of the pre – test and post – test result in the control group.

SCORE RANGE	PRE – TEST	POST – TEST
1 – 10	2	0
11 – 20	26	2
21 – 30	2	19
31 – 40	1	10
41 – 50	0	0
TOTAL	**31**	**31**

When comparing the pre-test results between the experimental and control groups, it is evident that the students in the experimental group achieved higher scores than those in the control group, as shown in Table 7. Specifically, in the control group, two students scored within the range of 1-10. Conversely, in the experimental group, 21 students scored between 11 and 20, compared to 26 students in the control group. Similarly, while 10 students in the experimental group scored between 21 and 30, only two students attained this range in the control group. Additionally, only one student in the control group scored between 31 and 40. The findings suggest several significant points for consideration. Firstly, the higher scores observed in the experimental group compared to the control group indicate that computer-assisted instruction may be a more effective teaching method for enhancing student learning outcomes in Understanding Culture, Society, and Politics.

This underscores the potential benefits of integrating technology into the classroom to facilitate a more interactive and engaging learning environment. Additionally, the varying distribution of scores across different score ranges highlight the importance of tailored instructional approaches to cater to diverse learning needs. Furthermore, these findings underscore the importance of ongoing professional development for educators to effectively utilize technology-enhanced teaching methods and adapt instructional strategies to optimize student learning. Overall, the implications emphasize the potential of computer-assisted instruction to positively impact student learning outcomes and inform pedagogical practices for educators in similar educational settings.

Table 3. Score range of the pre – test score in the experimental and control group.

SCORE RANGE	EXPERIMENTAL GROUP	CONTROL GROUP
1 – 10	0	2
11 – 20	21	26
21 – 30	10	2
31 – 40	0	1
41 – 50	0	0
TOTAL	**31**	**31**

During the post-test examination, certain students in the experimental group achieved higher scores compared to those in the control group. Table 8 illustrates this difference. Specifically, one student in the experimental group scored within the range of 41-50, while seven students scored between 31 and 40, compared to 10 students in the control group. Additionally, 20 students in the experimental group scored between 21 and 30, slightly more than the 19 students in the control group. Lastly, three students in the experimental group scored between 11 and 20, whereas two students achieved this range in the control group. The findings

suggest that computer-assisted instruction may lead to improved post-test scores compared to traditional lecture-based methods. This highlights the potential effectiveness of integrating technology into teaching practices to enhance student learning outcomes.

Table 4. Score range of the post – test score in the experimental and control group.

Pre-Test and Post-Test Mean Scores Result of the Grade 12 Students' Assessment Test

Table 5. *Pre-Test and Post-Test Mean Scores Result of the Grade 12 Assessment*

Approaches Used in Teaching Understanding Culture, Society, and Politics	**Test Mean Score**				
	Pre-Test	**Post-Test**	**t-test**	**P Value**	**Interpretation**
SCORE RANGE		**EXPERIMENTAL GROUP**		**CONTROL GROUP**	
Lecture Discussion Method	1 – 10	15.58	27.87	10.85	.000	Highly Significant	1
	11 – 20			3			2
Computer-Assisted Instruction	21 – 30	18.00	36.23	14.04	.000	Highly Significant	19
	31 – 40			7			10
	41 – 50			1			0
TOTAL				**31**			**31**

Table 9 shows that students exposed to computer-assisted instruction achieved higher mean scores on both pre-test (18.00) and post-test (36.23) compared to those taught through lecture discussion method (pre-test: 15.58, post-test: 27.87). The t-test values for the lecture discussion and computer-assisted instruction groups were 10.85 and 14.04, respectively, indicating significant differences. These findings align with Kaleli's (2020) study, suggesting that computer-assisted instruction leads to higher levels of student success compared to traditional teaching methods. Moreover, the comparison of mean scores for both instructional methods resulted in a statistically significant difference with a p-value of .000. This finding underscores a notable improvement between the mean scores of the pre-test and post-test for both the lecture discussion method and computer-assisted instruction. The significance of this difference suggests that both teaching approaches effectively contributed to enhancing student learning outcomes over the course of the study. This indicates a substantial positive impact of utilizing both instructional methods in facilitating student understanding and comprehension of the subject matter, underscoring the potential efficacy of integrating technology into teaching practices alongside traditional methods.

The findings indicated that computer-assisted instruction effectively enhances students' academic performance. This effectiveness of utilizing computer-based teaching methods was corroborated by a study conducted by Ige & Hlalele (2017), which demonstrated that students

exposed to computer-assisted instruction achieved higher mean scores compared to those in the control group.

Lecture Discussion Method and Computer-Assisted Instruction Achievement Mean Score

Achievement Mean Score

The data presented in Table 10 illustrate the mean scores of students exposed to both the Lecture Discussion Method and Computer-Assisted Instruction. The Lecture Discussion Method yielded a mean score of 27.87, while Computer-Assisted Instruction achieved a higher mean score of 36.23. This resulted in a t-test value of 5.46, with a corresponding p-value of .000, indicating a highly significant difference between the mean scores of students exposed to the Lecture Discussion Method and Computer-Assisted Instruction.

Table 6. Lecture Discussion Method and Computer-Assisted Instruction Achievement Test Mean Score

Approaches Used in Teaching Understanding Culture, Society, and Politics	**Mean**	**t-test**	**P Value**	**Interpretation**
Lecture Discussion Method	27.87	5.46	.000	Highly Significant
Computer-Assisted Instruction	36.23			

The data indicates that integrating computer-assisted instruction into the teaching of Understanding Culture, Society, and Politics leads to enhanced academic performance among students. This finding aligns with the results of Zhussupbayev et al.'s (2023) study, which demonstrated improved academic performance among students through the utilization of computer-assisted instruction, facilitated by teachers using computers as instructional tools. Additionally, well-designed and executed computer-assisted instruction has been shown to elevate students' test scores, as suggested by Muralidharan, Singh, and Ganimian (2019).

Generally, the analysis of both pre-test and post-test mean scores among Grade 12 students exposed to computer-assisted instruction reveals a statistically significant difference when compared with those students taught using the lecture demonstration method. This suggests that the integration of computer-assisted instruction in the learning process has a notable impact on students' academic performance. This implies that computer-assisted instruction holds promise as an effective pedagogical approach for enhancing learning outcomes in the context of Understanding Culture, Society, and Politics. The observed statistical significance underscores the importance of considering innovative instructional methods, such as computer-assisted instruction, to adapt to the evolving educational landscape and meet the diverse learning needs of students.

Conclusions and Recommendations

Through the gathered, analyzed, and interpreted data, it is evident that Grade 12 students from Matarinao School of Fisheries exhibited the following: First, based on the pre-test mean scores obtained, it is evident that students who underwent computer-assisted instruction in teaching Understanding Culture, Society, and Politics (UCSP) had a higher mean score of 18.00 compared to those who experienced the lecture discussion method, with a mean score of 15.58. This suggests that the computer-assisted instruction approach may be more effective in facilitating students' understanding and retention of UCSP concepts prior to formal instruction.

However, further analysis and investigation into the post-test scores and long-term retention of knowledge are necessary to draw conclusive insights regarding the effectiveness of each teaching method. Nonetheless, these preliminary findings provide valuable insights into the potential benefits of integrating computer-assisted instruction techniques in the teaching of UCSP.

There is a highly significant improvement between the pre-test and post-test mean scores of Grade 12 students in the assessment test who were taught using computer-assisted instruction. The pre-test mean score result was 18.00, while the post-test mean score result was 36.23. These mean scores yielded a t-test value of 14.04. Hence, the interpretation of this result indicates a highly significant improvement between the pre-test and post-test mean scores of the Grade 12 students.

There is a highly significant improvement between the pre-test and post-test mean scores of the students in the Assessment test who were taught using the lecture discussion method. The pre-test mean score result of the students' assessment test was 15.58, while the post-test mean score result was 27.87. These mean scores yielded a t-test value of 10.85. Hence, the interpretation of this result indicates a highly significant improvement between their pre-test and post-test mean scores.

Furthermore, there is a significant difference between the post-test mean scores of Grade 12 students in the Assessment test who were taught using computer-assisted instruction and the lecture discussion method. The post-test mean score of the students who were exposed to computer-assisted instruction is 36.23, while the post-test mean score of the students who were exposed to the lecture discussion method is 27.87. The t-value of the post-test mean score between computer-assisted instruction and the lecture discussion method is 5.46. This result was interpreted as having a highly significant difference between the post-test mean score of the students who were exposed to computer-assisted instruction and those who were exposed to the lecture discussion method. This implies that computer-assisted instruction is much more effective in teaching Understanding Culture, Society, and Politics compared to the lecture discussion method.

Based on these findings, the researcher recommends the following: Teachers should consider integrating computer-based instruction into their lessons on Understanding Culture, Society, and Politics to enhance student academic performance. Teachers may establish clear policies regarding the use of computers, including procedures for charging tablets, assigning devices to students, and coordinating with subject teachers who will utilize the technology. School administrators ought to ensure that every student has access to high-quality computers that meet the demands of the curriculum and student needs. The school's ICT coordinator should prioritize the regular updating of computer software, particularly Microsoft Office, to

maintain compatibility and functionality. Division administrators should organize training sessions for educators to enhance their proficiency in leveraging computers for effective teaching and learning delivery. These training sessions should focus on maximizing the potential of computer-based instruction to improve educational outcomes.

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