

Mathematics Teachers' Attitude and Readiness for Utilizing Computer -Aided Instruction During the Pandemic

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Abstract Due to the COVID-19 pandemic, the Department of Education (DepEd) in the Philippines had to implement remote learning to ensure that education continued. One of the primary methods of teaching was Computer-Aided Instruction (CAI), but the readiness of teachers to use it determined its effectiveness. This study aimed to assess the readiness of DepEd Mathematics teachers to use CAI during the pandemic. The research was conducted using a descriptive correlational research design, and data was gathered through an online survey questionnaire. The results indicated that DepEd Mathematics teachers were highly prepared to use CAI, with equipment and connectivity being the main contributors to their readiness. However, some teachers faced challenges using CAI, especially those with low technical skills and limited access to training and support. These findings suggest that the DepEd must provide sufficient training and support to ensure that all teachers have the necessary skills to effectively use CAI.

Keywords: computer-aided instruction, DepEd Mathematics teachers, pandemic, readiness, remote learning

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1. Introduction

The education sector worldwide, including the Philippines, has faced significant disruptions due to the COVID-19 pandemic. To control the virus's spread, the government implemented community quarantine measures, which led to the suspension of face-to-face classes and the introduction of remote learning as an alternative mode of education delivery. The Department of Education [1] in the Philippines has adopted a blended learning approach that combines various delivery modes such as printed modules, radio and television broadcasts, and computer-aided instruction. Recent years have brought challenges to classroom instruction with the delay of face-to-face classes. The shift has been particularly difficult for students, who were not used to distance, online, and blended modalities [2]. [3] suggest, digital instruments have the potential to facilitate the academic environment since they support students' active participation and freedom. Nowadays, teachers must cope with a generation of students raised in the digital age, using various gadgets, and having access to the internet from a young age [4].

Computer-aided instruction (CAI) is a teaching method that uses computers and other technological devices to enhance learning. Compared to traditional teaching methods, it offers benefits such as flexibility, interactivity,

and personalized learning [4,5]. However, the effectiveness of CAI depends on the readiness of teachers to use it, which is influenced by various factors such as technical skills, access to equipment and connectivity, and training and support [6,7]. These researchers have highlighted the significance of CAI in mathematics teaching and learning, stating that technology is critical for both students' and teachers' understanding of the subject. The use of CAI promotes communication and knowledge-sharing among students and also fosters teamwork [3]. Relatively, mathematics classroom instruction typically requires active problem-solving and meaningful interactions between students and teachers. However, the COVID-19 pandemic has made it impossible for physical interactions between students and teachers to occur. Hence, CAI is very helpful since its effectiveness in the teaching-learning process has been proven and it is very applicable in non-face-to-face instruction. Studies showed that mathematics teachers employed variety of digital education tools during the pandemic such as WhatsApp [8], cooperative interaction platforms like Zoom, and Moodle [9]. The usage of numerous programs and media, such as social media, Google Classroom, and Zoom [10].

In mathematics instruction, various factors affect the usage of CAI in the classroom, including the amount and variety of technical assistance available to teachers, their desire to receive training, and technical issues that may

affect their confidence [7,11,12]. Some possible factors are technological expertise and experience [10]. ICT-related training programs can help develop teachers' competencies and positive attitudes towards technology [12,13]. Therefore, teachers should be trained to prepare different types of lessons using CAI. However, both prospects and problems of utilizing computer aided resources in the teaching of preschool mathematics particularly in remote areas should be considered [14] to respond to the pandemic's digital learning environment.

Hence, this study explored the integration of CAI in mathematics instruction among DepEd junior high school mathematics teachers particularly those who graduated year 2019 at Philippine Normal University North Luzon. The study focused on two aspects, the attitudes of the teachers and their readiness to use CAI.

The research findings from these studies have multiple possible benefits for diverse stakeholders. For school leaders, the information derived from this study can be a helpful resource for future reference and improving teaching and learning practices during the pandemic. It provides clear insights into the challenges faced and encourages the pursuit of a high-quality education. Second, professors and staff can use these insights to refine their teaching techniques, guidance, and student support. They offer an opportunity to improve the quality of educational services delivered. Third, for students, these findings might serve as a guide and preparation for using computer-assisted instruction. They create awareness about the importance of such instruction and can help to improve student performance when it is implemented. Fourth, for researchers, this study gives significant information in determining readiness for computer-aided instruction and offers ideas for improving educational methods. Finally, for future researchers, this body of research establishes a solid platform and database for undertaking more investigations in line with present research activities, so contributing to the advancement of knowledge in this area.

1.1. Statement of the Problem

This study evaluated the attitudes and readiness of secondary mathematics teachers in utilizing computer-aided instruction during the pandemic. Specifically, it answered the following questions:

1. What are the mathematics teachers' attitudes on the following:
 - a. contribution to mathematics teaching,
 - b. contribution to mathematics learning, and
 - c. readiness in teaching using CAI?
2. What is the level of readiness of junior high school mathematics teachers in utilizing CAI?
3. Is there a significant correlation between the readiness in teaching using CAI and the following:
 - 3.1. teachers' attitude towards CAI contribution to mathematics teaching;
 - 3.2. teachers' attitude towards CAI contribution to students' mathematics learning
 - 3.3. teachers' attitude towards their readiness in teaching using CAI.

1.2. Hypotheses

There is no significant correlation between the readiness in teaching using CAI and the teachers' attitude towards CAI contribution to mathematics teaching.

There is no significant correlation between the readiness in teaching using CAI and the teachers' attitude towards CAI contribution to students' mathematics learning.

There is no significant correlation between the readiness in teaching using CAI and the teachers' attitude towards their readiness in teaching using CAI.

2. Methodology

2.1. Research Design

The research employed the descriptive correlational method, which is a quantitative research approach used to collect data on a sample population's characteristics or behaviors. This method places more emphasis on the "what" of the research problem/purpose than the "why" [15].

The descriptive technique was used in this study to ascertain the demographic characteristics of the teachers and their attitudes about CAI. To explain the relationship between the teachers' attitudes regarding CAI and their preparedness to apply it, the correlational technique is applied. The queries and comments on the study's goals are similarly best served by providing an answer using this research design.

2.2. Research Respondents

In this study, the respondents were comprised of DepEd Mathematics teachers in the Philippines who used CAI during the pandemic. Particularly, those who graduated from PNU-North Luzon batch 2019 are the respondents of the study who are teaching Mathematics in Junior High School public schools.

Table 1. Profile of Respondents

Profile	Categories	FREQUENCY	PERCENT
Sex	Male	11	37%
	Female	19	63%
Age	21 yrs old	3	10%
	22 years old	18	60%
	23 years old	9	20%
Number of ICT trainings	None	1	3%
	1-2	20	67%
	3-5	8	27%
	6 or more	1	3%

As presented in [Table 1](#), there are more female mathematics teachers (63%) than male mathematics teachers (37%). Majority of the respondents are 22-year-old (60%) and have attended seminars one to two times (67%).

2.3. Research Instrument

There were two main instruments used in this study

namely: Teachers' Attitude Towards the Contribution of Computer-Aided Instruction to Mathematics Teaching and Learning Questionnaire, and Readiness in Teaching Mathematics Using Computer-Aided Instructions Questionnaire.

Teachers' Attitude Towards the Contribution of Computer-Aided Instruction to Mathematics Teaching and Learning Questionnaire was adapted questionnaire from the study of [3] and the Readiness in Teaching Mathematics Using Computer-Aided Instructions Questionnaire was adapted from [7]. These questionnaires employed a Likert Scale format to measure the attitudes and the readiness of the respondents in using CAI. Additionally, the questionnaires included profile information about respondents such as the sex, age, and number of ICT trainings attended. To administer the survey, the questionnaires were placed into a google form. These were distributed via email and social media platforms, with follow-up reminders sent to encourage participation.

2.4. Data Analysis

The data were analyzed using descriptive statistics such as mean and standard deviation to determine the attitudes and readiness of the respondents in using CAI. The computed means were interpreted according to the guide for interpretation in Table 2.

Table 2. Description by Mean Score

MEAN SCORE	QUALITATIVE DESCRIPTION
Attitude	
1.00-1.49	Strongly Disagree/ very negative
1.50-2.49	Disagree/negative
2.50-3.49	Agree/positive
3.50-4.00	Strongly Agree/very positive
Readiness	
1.00-1.49	Not Ready
1.50-2.49	Quite Ready
2.50-3.49	Ready
3.50-4.00	Very Ready

Moreover, Pearson- r was used to determine if significant correlation exist between the readiness in using CAI and the attitudes towards CAI contribution to mathematics teaching and learning. [16].

3. Results and Discussion

Section 1. Attitude of Teachers towards the Contribution of CAI to Mathematics Teaching

Table 3 presents the attitudes of teachers toward the contribution of computer-aided instruction to mathematics teaching.

This result indicates that the participating teachers have a positive attitude toward computer-aided instruction in general and in specific areas related to mathematics teaching (\bar{x} = 3.41, sd = 0.63).

Accordingly, [17] study revealed favorable effects on the students' attitudes toward computer-assisted learning, mathematics, and immediate accomplishment in mathematics. In conclusion, this study indicates that

computer-assisted instruction is a useful addition to traditional mathematics teaching methods.

Table 3. Teachers' Attitude Towards the Contribution of Computer-Aided Instruction to Mathematics Teaching

Indicator	Mean	Standard Deviation	Qualitative Description
I can get mathematical information from the internet more than from books.	3.18	0.67	Agree
I use computer-aided instruction to improve the quality of my teaching in mathematics.	3.71	0.46	Strongly Agree
I am interested in using computer-aided instruction in activities more effectively.	3.50	0.64	Strongly Agree
I am comfortable with the use of computer-aided instruction in teaching mathematics.	3.54	0.64	Strongly Agree
Using computer-aided instruction is important for good teaching of mathematics.	3.46	0.64	Agree
Using computer-aided instruction in teaching mathematics speeds up the process of teaching.	3.36	0.62	Agree
The high level of computer-aided instruction skills makes the mathematics teaching easier.	3.50	0.69	Strongly Agree
Usage of computer-aided instruction makes it faster for course materials (assignments, quizzes, etc.)	3.50	0.64	Strongly Agree
The usage of computer-aided instruction makes it easier to reach instructional resources.	3.54	0.58	Strongly Agree
The use of computer-aided instruction is important rather than printed materials.	2.82	0.77	Agree
<i>Total Mean and SD</i>	<i>3.41</i>	<i>0.63</i>	<i>Positive</i>

Teachers generally have a positive attitude towards the use of computer-aided instruction in mathematics teaching, recognizing its potential to enhance student learning and performance [18,19]. However, they also express concerns about the potential for students to misuse the technology and the need for adequate training and support [18,20]. Despite these concerns, majority of teachers are regular users of computers and perceive them as useful for enhancing mathematics education [20]. The effectiveness of computer-aided instruction in mathematics teaching is also highlighted, with a focus on its potential to enhance the curriculum and teaching and learning of mathematics [21].

Table 4 displays the participating teachers' attitudes toward the contribution of computer-aided instruction to students' mathematics learning.

As presented, the mean score of Table 4 on teachers' responses is (\bar{x} = 3.51, sd = 0.62). The results indicate that the teachers' attitudes are very positive. The participating teachers are aware of the positive impacts that computer-aided instruction can have on students' learning.

This finding is parallel to the study of [4]. According to what they discovered in their research, learner performance may be accelerated, and students are able to comprehend the material better and come up with solutions when teachers integrate CAI, particularly the PowerPoint Presentation.

A range of studies have explored teachers' attitudes towards computer-aided instruction in mathematics. [18]

found that while faculty appreciated the benefits of technology in tracking student performance and providing targeted assistance, they also had concerns about its potential to interfere with true learning. [19] highlighted the positive impact of computer-aided instruction on student learning outcomes. However, [19] also noted a gender difference in teachers' attitudes, with male teachers exhibiting more positive attitudes towards technology. [22] found that in-class computer use was associated with greater content learning opportunities and indirectly with mathematics achievement, suggesting a potential benefit of computer-aided instruction in this context.

Table 4. Teachers' Attitude Towards Computer-Aided Instruction Contribution to Students' Mathematics Learning

Indicator	Mean	Standard Deviation	Qualitative Description
The use of computer-aided instruction promotes active and engaging lessons for students' best learning experience in mathematics.	3.61	0.69	Strongly Agree
The use of computer-aided instruction helps the students to understand the topics easier than the printed modules.	3.39	0.63	Agree
The use of computer-aided instruction catches the students' interest actively perform in learning mathematics.	3.64	0.49	Strongly Agree
The use of computer-aided instruction allows the student to be more creative and imaginative.	3.68	0.48	Strongly Agree
The use of computer-aided instruction enables students to express their ideas and thoughts better.	3.39	0.74	Agree
The students feel more confident when I use computer-aided instruction in teaching mathematics.	3.43	0.63	Agree
Using computer-aided instruction in teaching mathematics enhances learning.	3.54	0.58	Strongly Agree
Using computer-aided instruction in teaching mathematics is helpful for students.	3.54	0.69	Strongly Agree
Using computer-aided instruction in teaching mathematics encourages students to self-learning.	3.39	0.63	Agree
Using computer-aided instruction in teaching mathematics demonstrates the mathematical concepts to students.	3.54	0.64	Strongly Agree
<i>Total Mean and SD</i>	<i>3.51</i>	<i>0.62</i>	<i>Very Positive</i>

Table 5 reveals the participating teachers' attitudes toward their readiness to utilize computer-aided instruction in their mathematics classrooms.

The mean score of Table 5 on teachers' responses is ($\bar{x} = 3.37, sd = .62$). The table indicates that the participating teachers are prepared to utilize computer-aided instruction in their teaching. It demonstrates that the majority of the teachers recognize the potential benefits of using computer-aided instruction in mathematics teaching, which can provide an effective approach to teaching [7,17,23].

This result is consistent with that of [6] who discovered

that their designed educational project was superior to the mathematics teaching in the other classroom. In addition, he anticipated that the curriculum would improve math proficiency, which would provide a student body with the necessary mathematical literacy to satisfy the demands of employers in the twenty-first century and enhance community well-being.

Table 5. Readiness in Teaching Mathematics Using Computer-Aided Instructions

Indicator	Mean	Standard Deviation	Qualitative Description
I use internet for learning mathematics so that I can teach more using computer-aided instruction.	3.61	0.69	Strongly Agree
I use the computer-aided instruction for preparing mathematics learning.	3.39	0.63	Agree
I access the school website or blog address as a source of information and use personal website or blog to the learning experiences.	3.64	0.49	Strongly Agree
I create or develop resources or learning material math-based computer or internet.	3.68	0.48	Strongly Agree
I follow the activities of community learning math teachers using computer-aided instruction.	3.39	0.74	Agree
I am aware that computer-aided instruction gives a great opportunity that offers for effective teaching mathematics.	3.43	0.63	Agree
I am confident that my students learn best with the use of computer-aided instruction in teaching mathematics.	3.54	0.58	Strongly Agree
I have more time to cater to students need if I use computer-aided instructions used in teaching mathematics.	3.54	0.69	Strongly Agree
I think the use of computer-aided instruction gives me freedom to design my own teaching in mathematics.	3.39	0.63	Agree
I use computer-aided instruction because it helps me to improve my teaching mathematics with more dated materials.	3.54	0.64	Strongly Agree
Computer-aided instruction helps me to improve my teaching base on my students' assessment.	3.51	0.62	Strongly Agree
<i>Total Mean and SD</i>	<i>3.51</i>	<i>0.62</i>	<i>Strongly Agree</i>

Section 2. Readiness in Teaching Mathematics Using Computer Aided Instruction.

Table 6 displays the readiness of junior mathematics teachers to utilize computer-aided instruction in their mathematics classrooms.

Table 6 displays that the DepEd mathematics teachers are ready to utilize CAI in teaching mathematics as they exhibit a positive attitude toward computer-aided instruction.

The readiness of mathematics teachers to use computer-aided instructions during the pandemic is a complex issue. While some studies have revealed that teachers have enough digital competence and technological pedagogical subject understanding [24], others have pointed out the

problems in teacher-student interaction and assessment [25]. Prospective instructors have also expressed considerable challenges and unhappiness with online mathematics instruction and learning [26]. These findings highlight the necessity for additional research and assistance for mathematics teachers adopting computer-aided instruction during the pandemic. [11] and [15] discovered that teachers will be ready to use CAI if schools prepare the operational environment, data collection and utilization, teacher capacity, stakeholder participation, infrastructure, technological trust, CAI tool design, and content curation/creation.

Table 6. Level of Readiness of Junior Mathematics Teachers in Utilizing CAI

	Mean	Standard Deviation	Qualitative Description
Teachers' attitude towards computer-aided instruction contribution to mathematics teaching	3.35	0.69	Ready
Teachers' attitude towards computer-aided instruction contribution to students' mathematical learning.	3.34	0.64	Ready
Readiness in teaching mathematics using computer-aided instruction	3.37	0.62	Ready

Section 3. Correlation between Teachers' Readiness in Computer Aided Instruction and their attitudes

Table 7. Correlations with teachers' readiness in computer aided-instruction

Variables	Test Statistics	Result
Teachers' attitude towards computer-aided instruction contribution to mathematics teaching	Pearson Correlation Sig. (2-tailed) N	.615** .000 30
Teachers' attitude towards computer-aided instruction contribution to students' mathematical learning	Pearson Correlation Sig. (2-tailed) N	.742** .000 30
Teachers' attitude toward their readiness in teaching mathematics using computer-aided instruction	Pearson Correlation Sig. (2-tailed) N	.618** .000 30

** . Correlation is significant at the 0.01 level (2-tailed).

Table 7 displays the correlation among the constructs, namely teachers' attitudes towards computer-aided instruction contribution to mathematics teaching, teachers' attitudes towards computer-aided instruction, and readiness in teaching mathematics using computer-aided instruction. The table indicates that all constructs have a moderate and significant correlation with the number of ICT trainings.

In particular, this table shows a moderate positive correlation (0.615**, 0.742**, and 0.618** respectively) on all the set of test variables. This suggests that the more positive the attitude of teachers toward CAI, the greater the perceived success of the mathematics teaching and learning process. Furthermore, this study rejects all the null hypotheses of this study. This is because the Pearson r test ($p = 0.000$) confirmed that there is a significant relationship between the test variables.

The readiness of teachers in computer-aided instruction during the pandemic is influenced by a range of factors. [27] stressed the difficulties that teachers encounter, such

as unfavorable student attitudes, health issues, low internet connection, and restricted flexible learning pedagogies. These problems can have an impact on the effectiveness of computer-assisted instruction. Teachers' unpreparedness for the abrupt transition to online instruction may have led to their negative attitudes regarding instructional technology [28]. [29] underline the importance of teachers' attitudes and ICT abilities in online teaching, citing both as key predictors of their viewpoints and practices in e-learning. These findings, taken together, demonstrate that instructors' readiness for computer-aided instruction during the epidemic is influenced by both external challenges and their own attitudes and skills.

5. Conclusion, and Recommendation

Junior High School Teachers of Department of Education have positive attitude towards Computer Aided Instructions. They are aware of the potential benefits of utilizing CAI to improve the quality of mathematics instruction. Teachers have a very positive attitude about the contribution of CAI to students' mathematics learning. They recognized the lively and engaging aspect of CAI-facilitated sessions, as well as its potential to improve student learning, creativity, and confidence. Moreover, the junior high school teachers were prepared to implement CAI in their mathematics classrooms. They indicated a strong belief in the effectiveness of CAI in mathematics education and expressed confidence in their capacity to incorporate it into their teaching methods.

Teachers understand CAI's potential to improve mathematics instruction and learning. Despite some worries regarding student misuse and the need for sufficient training and support, teachers typically see CAI favorably and are eager to include it into their teaching methods. The study emphasizes the necessity of providing teachers with the appropriate training and assistance to effectively implement CAI in their classrooms.

Since junior high school teachers have demonstrated a positive attitude towards Computer-Aided Instruction (CAI) and are prepared to incorporate it into their mathematics classrooms, it is recommended that the Department of Education prioritize the provision of specialized training programs tailored to enhance teachers' proficiency in utilizing CAI effectively. Furthermore, resources should be allocated to enable access to necessary technology and infrastructure, as well as to encourage teacher engagement in order to exchange best practices and experiences. Continuous professional development opportunities should be provided to teachers to keep them up to date on advances in educational technology, and a method for monitoring and assessing the efficacy of CAI deployment should be established to measure its impact on student learning outcomes. CAI can be used to improve mathematics education and provide a more engaging learning environment for students by providing teachers with the required skills, resources, and support.

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Statement of Competing Interests

The fact that the study was not carried out for private gain might compromise the reliability of its findings. The study activity was always conducted professionally to prevent conflicts of interest. Throughout this research, data security and confidentiality were maintained. The study's participants were neither exposed to any known dangers, nor do they belong to any at-risk categories. In addition, before to the start of data collection, participants' consent is sought.

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