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EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGY INTEGRATION STRATEGY IN TEACHING MATHEMATICS

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ABSTRACT

Global studies have indicated that the incorporation of Information and Communication Technology (ICT) can enhance students' learning outcomes and contribute to the improvement of pedagogical practices. For more information, this study was conducted to determine the effects of ICT Integration Strategy in Teaching Mathematics among Grade 5 learners at Balingasag Central School, Division of Misamis Oriental, School Year 2022 – 2023. Specifically, it sought to: 1.) find the effects of ICT integration strategy in teaching Mathematics in terms of learners academic performance in mathematics test and their attitude towards Mathematics; 2.) determine the significant difference in the learners' academic performance in Mathematics in the pretest and posttest of the experimental and control group; and 3.) find the implications of the findings in this study to the teaching of Mathematics to Grade 5 learners. The researcher used quasi-experimental research design. The respondents were the eighty (80) Grade 5 learners at Balingasag Central School where the study was conducted. The questionnaire was adapted and modified from the Self - Learning Modules of DepEd based from MELCs of Grade 5

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Mathematics in the third quarter. The analysis and interpretation of the gathered data were carried out using Descriptive Statistical Measures: frequency, percentage, mean, and standard deviation to describe the learners' performance in Mathematics of the 2 groups: experimental and control. T-test and F-test were employed to determine the significant difference in the learner's performance in the pretest and posttest results of the experimental and control group.

The findings revealed that both the control and experimental group have fairly satisfactory performance in Mathematics in the pretest. Meanwhile, the learners in the control and experimental group showed positive attitude towards Mathematics. There is no significant difference in the learner's performance in Mathematics pretest of the control and experimental group. However, there is a significant difference in the learner's performance in Mathematics during the posttest of the control and experimental group. ICT integration in mathematics is an effective strategy in improving learner's performance in mathematics. It is recommended that school administrators should give teachers the opportunity to attend ICT-based training-workshops on the integration of ICT in teaching mathematics.

Keywords: *Information, Communications, Technology Integration, Teaching Mathematics*

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INTRODUCTION

Mathematics is regarded as one of the key subjects that develop learners to be problem solvers to stay competitive in the globalize country, the Philippines. New technologies have a great impact in the teaching and learning process. It has a lot to offer when it comes to visualization of the Mathematical concepts. It gives opportunities to pupils to explore mathematical ideas, to simplify, to explain results and analyze situations, and to receive fast and reliable, and non-judgmental feedback. The ICT integration strategy in Mathematics provides teachers with integrative teaching methods that motivate students learning, support their independent learning and active participation in the discovery of Mathematics concepts and topics. Implementing an ICT integration strategy in Mathematics equips educators with cohesive teaching approaches that inspire student engagement, foster independent learning, and encourage active participation in exploring mathematical concepts and topics. The incorporation of an ICT strategy in the instruction of Mathematics contributes to improved student achievement in this learning domain.It enables learners to do tasks on their own which enables the teachers to work collaboratively with them and have a smooth interaction pertaining to the subject matter.

Nowadays, the abrupt switch of the learning delivery is quite stressful for learners, parents, and teachers as well. It is the emergence of an event that restarts time, creates radical ruptures and imbalances, and brings about a contingency that becomes a necessity (Žižek, 2020). Many learners performed low in Mathematics since teachers have limited access of explaining

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Mathematical concepts and ideas to learners. The ability to effectively use Information and Communication Technologies (ICT) play an important role in schools, many workplaces and in people's everyday lives (Ferrari, 2012; Fraillon et al., 2019). It makes work safer, easier, and convenient while implementing limited face-to-face class. However, one such a recent study indicates that students learn mathematics better with effective and appropriate technology (Perienen, 2020). By using the ICT in making localized activity sheets and other related activities in Mathematics, the learning outcomes could be possible and measurable. Educational approaches based on ICT are teaching and learning methods in which ICT instruments are actively utilized to enhance the student learning (Agbo-Egwu et al., 2018).

In theory, mathematics offers a straightforward framework for logical reasoning and knowledge acquisition, distinguishing it as a distinct subject. It serves as a foundation for learning various other subjects. Development is an ongoing, perpetual process. Information and Communication Technology (ICT) serves as a catalyst for innovation in education, evident in the psychological, socio-economic, and technological transformations it introduces to schools in the 21st century. It has changed the role of information professionals and is becoming popular in the library (Das, Kaushik, 2019). Today, humanity is entering what seems like the unimaginable atmosphere of the global knowledge or information age. Indeed, today's education is a far cry from what the elders experienced. No doubt, technology is the difference. Born in the digital age, today's learners are called – digital natives. The use of technology plays a pivotal role in their

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learning. It makes these digital natives wanting to be more engaged and participative in learning. Thus, old methodologies may no longer be effective with them, like the lecture method where students sit for an hour just listening to the teacher.

The use of ICT strategy in education provides a unique opportunity for teachers. The competence of every teacher is one of the factors that can possibly affect the academic performance of the pupils. There is a relationship between teachers having ICT skills that can personalize, engage, and create an interactive atmosphere for students and purposeful implementation of ICT into the classroom (Willis, Royce; Lynch, David, Fradale, Paul; Yeigh, Tony, 2019). The teachers being innovative, resourceful and resilience can help a lot in producing quality learners in the new normal. By this, the needs of the 21st century learners especially the Grade 5 pupils at Balingasag Central School will be met.

As such there is a need for every school to address the issue. Thus, it is on this context that this study is conducted to find the effects of ICT integration strategy on learners' performance in Mathematics at Balingasag Central School, Division of Misamis Oriental School Year 2022-2023.

RESEARCH METHODOLOGY

This chapter discusses the methods and procedures of this study. This encompasses the study's research design, setting, participants, and sampling methods, as well as the data collection

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procedure, research instrument, instrument validity and reliability, scoring system, and the statistical treatment employed for analyzing and interpreting the gathered data in the research.

Research Design

This study made use of quasi-experimental research design method, that is commonly used with groups of participants naturally assembled such as those in the classroom. Conducted in an objective and controlled manner, this design aims to maximize precision, allowing for specific conclusions to be drawn regarding the study's hypothesis statement. Data were analyzed and interpreted based on the result of the pretest and posttest assessment which showed the effects of ICT integration strategy among the Grade 5 learners at Balingasag Central School, Balingasag, Misamis Oriental for the School Year 2022 – 2023.

Research Setting

The study was conducted at Balingasag Central School, Balingasag Central District, Division of Misamis Oriental of School Year 2022 – 2023. Presently, the school has a total enrollment of 2,250 learners. This is under the leadership of the School Principal, Mrs. Adelina C. Japona which also comprises of 82 teaching personnel. The total area of Balingasag Central School is approximately 39,26 2 square meter and it is situated between Brgy.1 and Brgy. 4 Balingasag Misamis Oriental. It was founded last 1925 and it is said to be the biggest elementary public school in the municipality which covers most of the barangays in town. Before the pandemic

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struck the country, Balingasag Central School is also known to be where the top performers in academe were found both teachers and learners.

Balingasag, officially the Municipality of Balingasag, is a 2nd class municipality in the province of Misamis Oriental, Philippines. It is approximately 8.74499 o 8 44'42" north 124 78047 46'50" east. The municipality has a total land area of 56.80 sq mi or 147.11 km which comprises progressive 30 barangays. In the 2020 census, Balingasag, Misamis Oriental, had a population of 74,385 people, with a density of 510 inhabitants per square kilometer or 1,300 inhabitants per square mile. Balingasag boasts several cultural properties, one of which is the Vega Ancestral House. This house, inspired by the 1st Transition Bahay na Bato style, has stood the test of time, witnessing various colonial periods in the Philippines over its estimated 200 years of existence. The town is actively pursuing inclusion in the UNESCO World Heritage List, given its impressive collection of colonial structures showcasing hints of indigenous Mindanaoan architecture.

During the Covid-19 outbreak, the closure of academic ventures left unprecedented impacts on education (teaching-learning process). The lack of basic mathematics skills among the Grade 5 learners in Balingasag Central School has been recognized as an issue known as a "Mathematics Problem". Challenges in retaining specific lessons and diminished academic performance in mathematics that students encountered during the pandemic in acquiring knowledge through the blended learning modality. There was a paradigm shift in delivering the education system through various distance learning platforms.

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The researcher chose Balingasag Central School Grade 5 learners since she is currently assigned in a school under the mega category and teaching Mathematics. The study was conducted to address the needs of the learners who were low performing in Mathematics. Through this study, the researcher introduced new strategy that will be beneficial to the learners. It helped the learners to understand mathematical concepts in a simpler and easier way according to the level of their understanding. Mathematics is going to be a learning area which will be loved by many and valued by everybody. Its basic skills solving word problems and mathematical sentences through technology can be understood and answered easily.

Respondents and Sampling Procedure

The respondents of this study consisted of Grade 5 learners at Balingasag Central School, Division of Misamis Oriental during the School Year 2022 – 2023. The school has 10 sections of Grade 5 classes and the researcher chose only 2 sections with a population of 40 learners per class. The distribution of respondents by grade and section is shown in Table A.

Table A

Distribution of Respondents

Grade and Section	Group	Respondents
V – Honest	Experimental	40
V - Respectful	Control	40
	Total	80

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Research Instrument

The instrument used in gathering the data is a test in mathematics that was utilized in the conduct of pretest and posttest to the two groups: experimental group and control group. This was adapted and modified from the Self - Learning Modules of DepEd based from MELCs of Grade 5 Mathematics in the third quarter. Some items were modified because these modules were already used for 2 years and probably the learners are familiar to it especially on topics like Place Value, Decimals, Solving Word Problems involving Addition and Subtraction of Decimals.

The test covers modules 1 to 9 for 9 weeks with the 20 topics in the 3rd quarter which started in February 2023 to May 2023.

The variable on Attitude towards Mathematics was patterned and modified from Anantika Sanchal and Sashi Sharma (2017) on the study entitled "Students' Attitudes towards Learning Mathematics: Impact of teaching in a sporting context". It had ten (10) indicators with the options: Strongly Agree, Agree, Disagree and Strongly Disagree.

Validation of Instrument

The instruments were tried-out to 30 respondents at Napaliran Elementary School last February 13, 2023. The participants were part of the population with similar characteristics to those of the final respondents, but they will not participate in the actual study. This was done to obtain accurate and reliable data in the procedure of investigation. The result of the try-out was quite good. There were only few queries raised by the participants during the try-out: the

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placement of decimal points and some items on problem solving that were not stated clearly. After the try-out, revisions were made before the actual investigation. These were utilized as guide in the improvement of the instrument.

Data Gathering Procedure

The researcher asked for an approval to conduct the study from the Dean of Graduate School in Cagayan de Oro College, PHINMA Cagayan de Oro City. This is after the recommendation of the thesis proposal from the adviser.

The researcher sought an approval from the office of the Schools Division Superintendent of Misamis Oriental, aside from the School Superintendent, an approval was also sought from the office of the Schools District Supervisor, and School Principal at Balingasag Central School, Division of Misamis Oriental.

Based from the Most Essential Learning Competencies (MELCs), the researcher determined the topics of the module used in this study. This specific objective as well as the number of hours required in every session. These are all found in the table of specifications.

The following procedures were taken in the process of collecting data:

A pretest was administered based on the objectives of the study to attain the coverage of the 3rd grading period. This was conducted to the two groups: Experimental and Control Group in the morning. The result of the pretest was recorded following the scoring procedure with the grade equivalent. This was also true to the variable attitude towards Mathematics.

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The next part was orienting the learners of the experimental group on the procedure and techniques in the integration of ICT strategy in the classroom such as the use of powerpoint, interactive games, interactive homework assignments, video lessons, online grading systems, classroom tablets, keeping students engage and help students with different learning styles. The control group had the same lesson as the experimental group but did not receive the same treatment. The traditional method of teaching was employed in the control group.

After 3 months, the posttest was conducted to same group of learners. The researcher conducted the posttest, the same test was given in the pretest in order to determine the effect of the treatment given to the experimental group. And also to find the academic performance in Mathematics of the control group with the traditional method of teaching used. The questionnaires were retrieved by the researcher and recorded the results. The researcher compared the results in the pretest and posttest of the experimental and control group. The result was subjected to statistical treatment for the analysis and interpretation of data gathered.

System of Scoring

To facilitate the analysis and interpretation of the data gathered the following are the system of scoring:

I. Mathematics Academic Performance

Equivalent Rating	Description

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90 – 100	Outstanding
85 – 89	Very Satisfactory
80 – 84	Satisfactory
75 – 79	Fairly Satisfactory
Below 75	Did not meet the expectation

II. Attitude towards Mathematics

Scale	Range	Description	Interpretation
4	3.26 – 4.00	Strongly Agree	Very Positive
3	2.51 – 3.25	Agree	Positive
2	1.76 – 2.50	Disagree	Negative
1	1.00 – 1.75	Strongly Disagree	Very Negative

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Statistical Treatment

After collecting and recording the data that were gathered in the study, the following statistical tools were used:

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were employed to characterize the academic performance of the learners in Mathematics of the 2 groups: experimental and control. These are reflected in the findings for the problems where the statistical tools are found.

T-test and F-test were employed to determine the significant difference in the learners' academic performance in Mathematics pretest and posttest of the experimental and control group.

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter discusses the presentation, analysis and interpretation of the data gathered from the learners to determine the effect of ICT Integration strategy on Mathematics achievement among Grade 5 learners in Balingasag Central School, Division of Misamis Oriental, School Year 2022 – 2023.

Problem 1: How effective is ICT integration strategy in teaching Mathematics in terms of:

1.1 Academic Performance in the Test;

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1.1.1 Pretest (Experimental & Control Group)

1.1.2 Posttest (Experimental & Control Group)

1.2 Attitude towards ICT Integration Strategy;

1.2.1 Experimental Group, and

1.2.2 Control Group

Table 1

Distribution of Respondents in terms of their Academic Performance in Mathematics Pretest

Group	Equivalent Rating	Description
Experimental Group	77.12	Fairly Satisfactory
Control Group	76.23	Fairly Satisfactory

Legend: 90-100 Outstanding
85-89 Very Satisfactory
80-84 Satisfactory
75-79 Fairly Satisfactory
Below 75 Did not meet the expectation

Table 1 shows the respondents' level of academic performance in Mathematics in the pretest. As shown in the table, the experimental group had an equivalent rating of 77.12 which is fairly satisfactory and the control group had an equivalent rating of 76.23 which is also fairly satisfactory. This implies that prior to the conduct of the experiment both classes of the control and experimental group have below average prior knowledge on mathematics concepts. This is quite true since DepEd learners have shown poor performance in mathematics which can be attributed to various factors. As observed, learners got low scores during the pretest as shown in

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the result without using the technology as part of the strategy of this study. Traditional way of delivering the lesson was applied to both classes or groups. They will listen to the discussion and answer pen and paper test given by the teacher-researcher. It can be seen that they perform less in Mathematics and prior knowledge is not evident in the result. Further, this might be due to the fact that mathematics was considered difficult by many students because of its abstract nature. As a matter of fact, the low performance of students in mathematics is a prevalent issue not just in the Philippines but also in other nations. This poor student achievement in Mathematics prompted educational researchers to continuously identify factors that can bolster academic outcomes in the classroom (Valderama, 2022). Moreover, as mentioned by Care et al., (2015) the participation of the Philippines in TIMSS confirmed this deplorable condition-based from the report posted last 2013 that the performance of Filipino students in national and international surveys on mathematics and science competencies lag behind its neighboring countries like Singapore, South Korea, Hongkong, Chinese Taipei and Japan. Hence, it is important for DepEd authorities to study how mathematics performance of students across all levels can be improved considering the different factors that might affect the performance of students in Mathematics. Moreso, it is important to capacitate mathematics teachers in the field to use innovative pedagogical approaches through intensive trainings and benchmark from neighboring ASEAN countries practices.

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Table 2

Distribution of Respondents in terms of their Academic Performance in Mathematics Posttest

Groups	Equivalent Rating	Description
Experimental Group	80.00	Satisfactory
Control Group	77.19	Fairly Satisfactory

Legend: 90-100 Outstanding
85-89 Very Satisfactory
80-84 Satisfactory
75-79 Fairly Satisfactory
Below 75 Did not meet the expectation

Table 2 displays the learners' posttest scores from the control group and those exposed to the ICT integration in Mathematics classroom. Results reveal that the control group remained below average performance as indicated by the overall posttest mean score of 77.19 (SD=6.293). This means that the control group which was taught using the conventional teaching method remained at their level of performance. As noticed, the performance of the control group did not improve that much since the researcher used the traditional strategy and did not receive the treatment. Hence, the traditional method was not that effective in improving the performance of the learners in mathematics. This is because, as opined by Azucena et al. (2022) mathematics plays a crucial role in developing students' logical thinking skills. Thus, in order for effective mathematical learning promotion, teachers should take into account various factors. By doing so, students can better develop their mathematical thinking and problem-solving skills, leading to improved performance in mathematics and other academic areas.

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Meanwhile, the experimental group showed an improved performance from fair to satisfactory performance during the posttest as indicated by their overall mean score of 80.00 (SD=5.642). This means that the learners exposed to the ICT integration in mathematics classroom strategy have satisfactorily learned the required competencies needed to be learned. It is noticeable that the strategy used affects the performance of the learners based on the result shown above. It can be gleamed that technology has a great impact on the performance of the learners especially in Mathematics. Das (2019) supported this stand when he disclosed that ICT integration in Mathematics-education has a positive impact on both the teaching and learning process. Furthermore, as argued by Phuong, et al., (2022) that in mathematics education, ICT also equips teachers with fundamental tools and methods to alter teaching approaches, assist students in self-directed learning, and actively engage in the exploration of mathematical concepts and topics. The integration of ICT in mathematics education contributes to a deeper comprehension of mathematical ideas among students. Therefore, it can be inferred that the successful application of ICT in mathematics education results in improved student performance. While the potential of ICT makes classroom integration a promising practice, its success hinges on various factors. Research on the utilization of ICT in mathematics education serves as a pathway to enhance the effectiveness and viability of ICT applications in this educational domain.

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Table 3
Summary of the Respondents' Pretest and Posttest Academic Performance in Mathematics

Groups	Pretest		Posttest		
	Equivalent Rating	Description	Mean	SD	Description
Experimental	77.12	Fairly Satisfactory	80.00	5.642	Satisfactory
Control	76.23	Fairly Satisfactory	77.19	6.293	Fairly Satisfactory

Legend: *90-100 Outstanding* *75-79 Fairly Satisfactory*
85-89 Very Satisfactory *Below 75 Did not meet the expectation*
80-84 Satisfactory

Table 3 presents the summary of the learner' scores in the pre-test and post-test performance in Mathematics for the control and experimental group. Overall, the combined results show that in the pretest and posttest, both groups have a combined below average performance in mathematics as indicated by the overall mean pretest and posttest means scores of 76.68 (SD=7.689) and 78.60 (SD=5.968), described as fair, respectively. Overall, the combined results show that in the pretest and posttest, both groups have a combined below average academic performance in mathematics as indicated by the overall mean pretest and posttest means scores of 76.68 (SD=7.689) and 78.60 (SD=5.968), described as fair, respectively.

Hence, it can be concluded that the Grade 5 learners really find mathematics as a challenging subject. According to DepEd (2019) as cited in the article of Bernardo, et al., (2022) that Filipino students were among the lowest performing groups of students among all the participating countries in the 2018 Programme for International Student Assessment (PISA). In mathematics, less than 20% of students demonstrated the minimum proficiency level (Level 2),

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while more than 50% showed very low proficiency (below Level 1). Falling below the lowest proficiency level in the PISA, these Filipino students are evidently lagging behind in mathematics education. More than half of the students in these age groups exhibit insufficient mathematical skills compared to their counterparts in other regions globally. The disparity in poor mathematical performance is also notable between students in public and private schools, with mean scores of 343 and 395, respectively.

However, it can be also observed that between the control and experimental group, the experimental group which is exposed to the ICT integration in Mathematics has slightly improved from fair level to satisfactory level. Hence, it can be argued that the ICT integration in mathematics was helpful in improving the academic performance in mathematics of the Grade 5 learners. As supported by Arrieta (2020), the integration of ICT with traditional instruction produces higher academic results in a variety of subject areas than does traditional teaching alone. Students learn more quickly and with greater comprehension when learning with the use of technology.

Table 4

Distribution of Respondents in terms of their Attitude Towards Mathematics of the Experimental Group

Indicators	Mean	SD	Description
Mathematics is one of my favorite subjects.	3.28	0.452	Strongly Agree
I think clearly when working with mathematics.	3.40	0.672	Strongly Agree
Mathematics is a very worthwhile and necessary subject.	3.38	0.677	Strongly Agree
Mathematics is important in everyday life.	3.58	0.549	Strongly Agree

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Mathematics is one of the most important subjects for people to study.	3.63	0.585	Strongly Agree
When I hear the word mathematics, I have a feeling of dislike.	2.05	0.815	Disagree
I am always confused in my mathematics class.	2.28	1.176	Disagree
I enjoy studying mathematics in school.	3.05	0.959	Agree
I like to solve new problems in mathematics.	3.13	0.407	Agree
I can think of many ways that I use mathematics outside of school.	3.60	0.672	Agree
Overall	**3.14**	**0.72**	Strongly Agree

Legend: *3.26-4.00 Strongly Agree/Very Positive* *1.76-2.50 Disagree/ Negative*
2.51-3.25 Agree/ Positive *1.00-1.75 Strongly Disagree/ Very Negative*

Table 4 shows the level of attitude towards Mathematics among the learners in the experimental group. Overall, results show that the learners in the experimental group possess high positive attitude towards Mathematics as indicated by the overall mean of 3.14 (SD=0.72). This means that the learners in the experimental group possess the high positive attitude towards Mathematics. It implies that it is important for mathematics teachers to develop the positive attitude of learners toward Mathematics. Fostering a positive attitude towards mathematics can prepare children for academic success from a very young age. As observed, the experimental group of learners expressed their positive feedback and attitude towards learning Mathematics. It can be understood that they have an optimistic view about Mathematics. Every child can succeed in mathematics with good practice, teaching, encouragement, and motivation. As a matter of fact, a positive attitude towards mathematics can lead to higher achievement, and high achievement can result in more favorable attitudes. Kiwanuka, et al., (2020) supports this finding when he revealed that students with a positive attitude toward mathematics tend to enjoy the

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subject, understand its value, and have confidence in it; thus, they are likely to prioritize the study of mathematics which could lead to high class performance.

The indicator **Mathematics is one of the most important subjects for people to study** obtained the highest mean rating of 3.63 (SD=0.585) described as **strongly agree**. This means that the learners considered mathematics as a vital subject in their study. The significance of mathematics extends beyond the realms of scientists or engineers; it plays a pivotal role in fostering skills like data analysis, evidence-seeking, and pattern recognition in everyday life. It provides individuals with an opportunity to enhance their understanding and interpretation of information. As observed, learners valued Mathematics since they can relate it to their real-life settings. They know how useful the Mathematical concepts towards their real-life situation are. Abd Algani (2022) pointed out that mathematics is closely related to the details of daily human life and its activities. Man uses mathematics in its many applications and forms without being directly aware, whether in the kitchen, office, study place, or places of play and entertainment, where mathematics organizes human life.

The indicator **When I hear the word mathematics, I have a feeling of dislike** got the lowest mean rating of 2.05 (SD=1.176) described as **disagree**. This means that the learners disagree that they dislike mathematics. In fact, they like mathematics because they perceived it to be very important in their life. This only means that the learners show a positive attitude towards mathematics. It is noticeable that learners in this group like Mathematics and does not

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hate this learning area. Therefore, teachers need to examine their students' attitude and provide appropriate support to stimulate the development of a positive attitude toward the subject (Hwang & Son, 2021).

Table 5

Distribution of Respondents in terms of their Attitude Towards Mathematics of the Control Group

Indicators	Mean	SD	Description
Mathematics is one of my favorite subjects.	3.18	0.385	Agree
I think clearly when working with mathematics.	3.25	0.670	Agree
Mathematics is a very worthwhile and necessary subject.	3.25	0.630	Agree
Mathematics is important in everyday life.	3.35	0.802	Strongly Agree
Mathematics is one of the most important subjects for people to study.	3.48	0.599	Strongly Agree
When I hear the word mathematics, I have a feeling of dislike.	1.90	0.591	Disagree
I am always confused in my mathematics class.	2.90	0.955	Agree
I enjoy studying mathematics in school.	3.20	0.648	Agree
I like to solve new problems in mathematics.	3.33	0.730	Strongly Agree
I can think of many ways that I use mathematics outside of school.	3.13	0.791	Agree
Overall	**3.10**	**0.680**	**Agree**

Legend: *3.26-4.00 Strongly Agree/Very Positive* *1.76-2.50 Disagree/ Negative*
2.51-3.25 Agree/ Positive *1.00-1.75 Strongly Disagree/ Very Negative*

Table 5 shows the learners' attitude towards Mathematics of the control group. Overall, results show that the learners in the control group possess a positive attitude towards Mathematics as indicated by the overall mean of 3.10 (SD=0.680). This means that the Grade 5 learners in the control group showed a positive attitude towards Mathematics. It denotes that a positive attitude towards mathematics is an important factor for students to perform well in class. As perceived, students in the control group still show positive attitude and feedback about

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Mathematics. As opined by Mijares (2022), Filipino students' attitudes toward mathematics had a significant influence on the student's performance. Students who have a positive attitude toward the subject perform better. Consequently, cultivating a favorable outlook on mathematics can contribute to the enhancement of students' performance in the Philippines. Anxious attitudes are undeniably a factor influencing the performance of learners.

The indicator **Mathematics is one of the most important subjects for people to study** obtained the highest mean rating of 3.48 (SD=0.559) described as **strongly agree**. This means that the learners considered mathematics as one of the very important subjects in school. It denotes that it is important for young learners to establish a solid foundation in mathematics. Further, it signifies that mathematics gives learners the critical ability to learn and think logically in any field of endeavor. As noticed, Elementary mathematics teachers play a crucial role in influencing the attitudes that students will carry with them throughout their mathematics education. These teachers have the ability to foster a love for the subject and preempt any beliefs that mathematics is difficult. Suleiman Y. and Hammed, A. (2019) support the statements when they stated that Mathematics is regarded as one of the most important subjects in the school curriculum globally.

The indicator **When I hear the word mathematics, I have a feeling of dislike** got the lowest mean rating of 1.90 (SD=0.591) described as **disagree**. This means that, this group of learners also disagree that they have a feeling of dislike towards Mathematics. It signifies that

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they disagree on the attitude of disliking the subject Mathematics which taught them to become logical thinkers. It is noticeable that the learners value mathematics since it is everywhere despite the difficulty in solving numbers in this subject, learners still disagree to dislike mathematics. This statement is supported by Ali and Jameel (2016) disclosing that Mathematics continues to be one of the most challenging subjects in schools as perceived by students.

Problem 2: Is there a significant difference in the learners' academic performance in Mathematics pretest and posttest of the control and experimental group?

Table 6

Comparison of the Learner's Pretest Academic Performance in Mathematics of the Experimental and Control Group

Group	Pretest		T-value	P-value	Interpretation
	Equivalent Rating	Description			
Experimental	77.42	Fairly Satisfied	0.51	0.418	Not Significant
Control	76.23	Fairly Satisfied			

Legend: *significant at p<0.05

Table 6 shows the comparison of the learner's academic performance in Mathematics in the pretest for both control and experimental group. Results show no significant difference on learner's academic performance in Mathematics as indicated by the t-value (t=0.51) and

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probability value (p=0.418) greater than 0.05 which led to the acceptance of the null hypothesis. This implies that prior to the conduct of the study; both groups have comparable performance in Mathematics. There might be various reasons or factors that affect learner's fair by satisfactory performance in mathematics. Hence, with this kind of performance of learners, it is important for mathematics teachers to strategize their activities that will promote and improved performance of the learners. This finding is in consonance with the statement made by Callaman & Itaas (2020) that teachers may utilize varied teaching strategies so that students would develop interest and positive learning attitudes towards mathematics. Furthermore, DepEd school authorities may conduct intensive training for mathematics teachers across all levels on effective teaching practices that help promote learners' academic performance in mathematics.

Table 7

Comparison of the Learner's Posttest Academic Performance in Mathematics of the Experimental and Control Group

Group	Posttest		t-value	p-value	Interpretation
	Equivalent Rating	Description			
Experimental	80.00 (Satisfactory)	Satisfactory	2.10	0.005*	Significant
Control	77.19 (Fair)	Fairly Satisfactory			

Legend: *significant at p<0.05

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Table 7 shows the respondents' level of academic performance in Mathematics in the Posttest between the control and experimental group. The equivalent rating of 80.00 in the experimental group showed satisfactory while the equivalent rating of 77.19 in the control group is fairly satisfactory. As shown in the table, majority of the experimental group had a satisfactory proficiency level while the control group had a fairly satisfactory level in the posttest. The results showed that the experimental group had a higher equivalent rating than the control group during the posttest.

The table also justified that the Information and Communication Technology strategy as applied to the experimental group had a better impact tolearners achievement in Mathematics. Hence, the ICT integration in mathematics was an effective strategy to improve the performance of the learners in mathematics. The integration of ICT in education enhances engagement and knowledge retention. When incorporated into lessons, ICT increases student involvement in their tasks. This is attributed to the diverse opportunities technology offers to make the learning process more enjoyable and entertaining by presenting the same concepts in various ways. Chatterjee (2021) supports this stand when she disclosed that ICT helps students to think critically and creatively and to reflect on their own learning process. They even set their individual goals for growth and development of their potential.

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Hence, it is imperative for DepEd authorities to conduct training on ICT integration in mathematics across all levels to promote learners' performance. ICT resources should also be provided for the application of the teachers training in their schools.

Problem 3: What are the implications of the findings in this study to the teaching of Mathematics to Grade 5 learners?

Mathematics, often regarded as the queen of all sciences, was historically confined to the academic realm. However, its role has expanded beyond academia and infiltrated the domains of technology and industry. The integration of ICT in Mathematics serves as a significant aid in teaching and learning. ICT offers educators the opportunity to leverage its capability to assist students in visualizing mathematical ideas and concepts. According to Das (2019), ICT is a changing process of Mathematics teaching and learning by adding elements of vitality to classroom education environments, including virtual environments for the purpose. The integration of ICT in mathematics education equips teachers with comprehensive teaching methods that inspire student learning, foster independent learning, and encourage active participation in discovering mathematical concepts and topics. Consequently, it facilitates a deeper understanding of mathematical ideas among students. The incorporation of ICT in the teaching and learning of mathematics, driven by the educational affordances of ICT, contributes to improved student achievement in mathematics. While the potential benefits of ICT make its

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integration in the mathematics classroom promising, the success of this practice relies on various factors.

Hence, DepEd need to capitalize the benefits of ICT to meet the demands of global learners to further the DepEd Computerization Program which aims to equip public schools with technological advances that will make the instruction and learning process more effective and allow them to address the issues of the 21st century better.

Conclusions

The following conclusions are hereby drawn for the study:

ICT integration strategy is an effective way in teaching Mathematics based on the results of the pretest and posttest conducted to the respondents. Learners can easily understand Mathematical concepts when ICT Integration is being used as strategy and it can be seen in the results of their assessments. Both groups had comparable pretest performance in Mathematics while in the posttest, the experimental group showed better performance compared to the control group. ICT integration strategy plays an important role in the development and understanding of Mathematical concepts.

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Recommendations

On the basis of the results of this study, the following are recommended:

1. School Administrators should give teachers the opportunity to attend ICT-based training-workshops on the effective integration of ICT in mathematics teaching.
2. Mathematics teachers should strive to incorporate ICT into their lessons and to encourage collaborative learning and practice.
3. School Heads should develop policies that will address the barriers that negatively influence the use of ICT in teaching practices.
4. Future researchers should be conducted by teachers in other places considering other variables to validate result.

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