

UTILIZATION OF FLIPPED CLASSROOM AS A LEARNING APPROACH IN DEVELOPING 21ST CENTURY SKILLS AMONG GRADE 8 STUDENTS

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ABSTRACT

This research study focused on the students' perception on the utilization of Flipped Classroom and the development of 21st century skills among Grade 8 students. The descriptive method of research was used to gather the necessary data and information on the level of students' perception as to satisfaction, motivation, engagement, independent learning, self-efficacy, and involvement and the level of 21st century skills development in terms of critical thinking, problem-solving and collaboration skills. The purpose of this study is to examine if there will be a significant difference on the 21st century skills development before and after the utilization of Flipped Classroom. The developed questionnaire and the pre-test post-test were the main instruments used in gathering data. Gathered data were analyzed and interpreted using appropriate statistical procedures such as mean, Standard Deviation and T – test. The results revealed that students have a positive view of Flipped Classroom in terms of satisfaction, motivation, engagement, independent learning, self-efficacy, and involvement and is viewed as an effective approach to learning. In addition, it was also revealed that among the 21st century skills, students had a high level of mastery on collaboration skills, average mastery on critical thinking skills and below-average mastery on their problem-solving skills. Furthermore, the study indicated that there is a significant difference in the development of 21st century skills among students before and after the utilization of Flipped Classroom Learning Approach. Utilization of innovative teaching approaches such as Flipped Classroom can help students develop 21st century skills that will help them adapt and succeed in a world with rapidly changing technological advancement and globalization.

Keywords: *Flipped Classroom, Utilization, 21st Century Skills, Critical Thinking Skills, Problem-Solving Skills, Collaboration Skills, Students' Perception, Satisfaction, Motivation, Engagement, Independent Learning, Self-Efficacy, Involvement*

INTRODUCTION

Before the onset of the Covid-19 pandemic, the Philippines was already facing a learning crisis according to the Chief of Education at The United Nations International Children's Emergency Fund (UNICEF) Philippines. Unfortunately, the learning loss has further compounded due to the pandemic.

Pedro Guevara Memorial National High School is among the many institutions that have been impacted by the pandemic. Considering its total population of eight thousand four hundred forty-eight, the resumption of in-person classes in Pedro Guevara Memorial National High School presented several challenges. One of these challenges is effectively utilizing the limited time in the classroom. Students attend in-person classes only three days a week, and teachers have a limited 40-minute window for class discussion. As a result, it has become increasingly challenging to cover all the necessary curriculum competencies, topics, and activities for effective teaching and learning. The problem is compounded by the need to develop students' 21st-century skills and improve academic performance.

This is particularly concerning given that Cattaneo et. al. (2016) determined that increasing instructional time resulted had a significant effect on learning outcomes measured with PISA test scores. This means that finding ways to optimize the limited time in the classroom is essential for maximizing student learning outcomes. It is comparable to the findings of the study carried out by Jez and Wassmer (2015) showing that greater allotted instructional time has a statistically significant and positive impact on a school's average academic achievement.

This constrained time can be particularly challenging in subjects such as Science, where hands-on experiments and interactive activities are essential components of the learning process. Teachers need to come up with innovative strategies to include all these activities. Utilizing Flipped Classroom Learning Approach can be an effective way to address the potential for learning loss due to time restriction and has shown promise in enhancing student learning, however, and promoting the development of 21st century skills.

According to Bishop and Verleger (2013), the flipped or inverted classroom, is a teaching and learning approach that moves lecture delivery out of the classroom with the use of technology, typically using videos and online content, to allow students' engagement in active learning activities inside the classroom.

In Science education, the flipped classroom model can be a particularly effective approach. However, limited research has been conducted on the perception and utilization of the flipped classroom approach in Science 8, and its impact on 21st century skills development in the context of time restrictions.

This study aims to investigate the perception of Science 8 students on the utilization of the flipped classroom approach and its impact on their development of 21st century skills.

Specifically, it sought to answer the subsequent questions:

1. What is the level of students' perception in the utilization of flipped classroom learning approach as to:
 - a. satisfaction;
 - b. motivation;
 - c. engagement;
 - d. independent learning;
 - e. self-efficacy; and
 - f. involvement?
2. What is the level of the students' 21st century skills development in terms of:
 - a. critical thinking skills;
 - b. problem-solving skills; and
 - c. collaboration skills?
3. Is there a significant difference in the students' 21st century skills development before and after the utilization of Flipped Classroom Learning Approach?

REVIEW OF RELATED LITERATURE

21st-century skills are regarded as the most important skills and traits for assisting students and learners to live and work successfully in the twenty-first century according to The Queensland Curriculum and Assessment Authority (2015). In addition to technology literacy, critical thinking, problem solving, communication, and teamwork are other 21st-century skills that are essential for success in both work and life.

Hixson, Ravitz, and Whisman (2012) identified critical thinking skills, collaborations skills, communication skills, creativity and innovation skills, self-direction skills, global connections, local

connections and using technology as a tool for learning, as skills that every student should possess in the 21st century.

Murawski (2014) stated that critical thinking involves examining the ideas produced and formulating plans to identify the suitable action that will solve a problem. Students that possess critical thinking abilities are not just prepared for higher education, but also for work. Teachers influence whether a student will learn critical thinking skills in their academic journey. Hence, providing opportunity for students to develop critical thinking abilities through various subjects should become one of the duties of teachers and curriculum designers.

One of the most important skills and indicator of student learning quality is critical thinking. In order to develop successful critical thinkers, critical thinking must be incorporated into the curriculum content and teaching approaches and sequenced at all grade levels. There are various methods and activities that can be used to enhance students' critical thinking skills such as integrating technology in teaching (Alsaleh, 2020).

Kumar (2020) defined problem-solving skill as the ability to solve a problem using previous experiences and to think in a diverse manner. Learning how to solve problems helps learners navigate a variety of challenges at work and in other facets of life. The capacity for rational thought is correlated with problem-solving skills. Therefore, the development of problem-solving abilities should also be linked to the development of higher order thinking skills that aid in the formulation of workable solutions.

Reeve (2013) claims that the term "problem solving" is a colloquial term that refers to solutions to difficult circumstances. Additionally, problem-solving entails using analytical and critical thinking, creativity, reasoning, and experience to solve an issue.

Collaboration is one skill that is a common requirement in today's world and is very important in the learning process. Working with others provides opportunity to understand each other's strength and weaknesses. Collaboration enables people to solve problems that they face and achieve common goals. Collaboration involves sharing rules around common interests and participating in their roles, influencing each other, finding helpful groups, and pursuing common goals. Collaboration entails establishing rules around mutual interests and engaging in their responsibilities, influencing each other, discovering helpful groups, and achieving common goals (Hidayati, 2013).

Students are able to learn from and engage the various viewpoints and approaches of their teammates as well as explore a greater number of possible solutions to course assignments, by providing them with in-classroom discussion and hands-on problem-solving opportunities. Critical thinking skills, communication skills, and practical experience were fostered through student interactions amongst student collaborative groups (Al-Zahrani, 2015).

Flipped Classroom is a type of blended learning approach where face-to-face interaction is mixed with independent study via technology. Students are introduced to the new content through watching pre-recorded videos at home then come to school to do homework armed with questions and at least some background knowledge (TeachThought, 2014).

Sakulprasertsri (2017) also described Flipped Classroom Learning Approach as an alternative instructional approach that reverses the direct instruction during class time and homework. The main tool in the Flipped Classroom is the video created by the teacher which is posted online. Available commercial materials or online resources can also be used. Learners are introduced to the instructional materials by watching the resources at home prior to class time.

Sasmita (2020) defined perception as the process of interpreting something based on what an individual observed or experience in the form of opinions or feelings. In other words, perception is people's opinion about something that they thought is true. It means that perception refers to someone's sense or view toward a certain object. Perception is people's opinion about something that they thought is true and understand.

Meanwhile, according to Nuzulia (2016) the act of selecting, recognizing, and interpreting sensory information in providing an overview and understanding through senses of the environment experienced by students is known as student perception. Gibson, Ivancevich, and Donnely (2013) also said that people can have different perception based on their judgement and experience in their environment.

Student Satisfaction was defined as a short-term attitude resulting from an evaluation of students' educational experience, services, and facilities according to Weerasinghe et. al (2017).

Twelve underlying variables significantly influence students' satisfaction in Malaysian Higher Education settings were identified by Yusuf et. al (2015). Professional comfortable environment, student assessment and learning experiences, classroom environment, lecture and tutorial facilitating goods, textbooks and tuition fees, student support facilities, business procedures, relationship with the teaching staff, knowledgeable and responsive faculty, staff helpfulness, feedback, and class sizes all have big impact on students' satisfaction.

Hawthorne (2021) defined motivation as the enthusiasm to do something. In education, it helps children and young people to focus their attention on a key goal or outcome. Motivation pushes learners to work hard and aim high in everything that they set their mind to. Learners who are motivated are also more likely to find pleasure in satisfying their academic curiosity.

According to Schunk & DiBenedetto (2020), motivation refers to the process that instigate and sustain goal-directed activities. It is an important building block of self-regulated learning. However, students' motivation to learn can be intrinsic or extrinsic. Despite that, external support from teachers can increase students' motivation to learn such as creating a supportive environment that facilitates and increases students' learning.

Student engagement was defined as students' willingness to be involved in the learning process, which includes cognitive, behavioral, and emotional dimensions (Havik and Westergård, 2019). In their study, emotionally supportive teachers are identified as a key factor on having a high-quality classroom interactions that promotes student engagement. It played a crucial role in students' emotional and behavioral engagement, which may influence their academic performance and attendance.

Finn and Zimmer (2012) defined student engagement as the degree to which students are involved in academic activities, their value for learning, and their motivation to succeed. They emphasize that engagement can result in better academic outcomes, such as higher grades, increased knowledge retention, and improved critical thinking skills which will lead to academic success. Achieving positive and effective learning outcomes requires an engaging learning environment. For that reason, educators should prioritize the design and implementation of an engaging learning experiences that can help students reach their maximum potential.

Empowering students to take ownership of their learning is commonly referred to as independent learning. Acquiring and investigating topics of interest is a skill that will benefit students. Independent learners do not rely solely on the materials that their teachers provide. They do their own research and ask questions. In addition, they take ownership of their learning by setting their own goals and monitoring their progress (Vinikas, 2022).

Learning independence is the capacity to conduct educational activities on one's own initiative in order to master a subject matter to be applied to resolving issues that arise according to Amalia et al., (2018). With independent learning, students can grow separate characters in education, encourage student motivation to learn on their initiative, and teach students to be responsible and confident in overcoming their problems. Independent learning allows students to develop their own educational personalities, motivates them to learn on their own, and teaches them to be accountable and self-assured in solving their challenges.

In the book, “Theories of Personality”, self-efficacy was found to be one of the main factors of students’ success in overcoming their problem. It was defined as human’s belief in their ability to exercise measures to control their self-function and events in an environment. The way students face problems is influenced by their level of self- efficacy. Individuals with high-level of self-efficacy act more persistently and directed especially if the goals to be achieved are clear goals (Feist & Feist,2014).

In his written compilation, Kirk (2019) defined self-efficacy as the belief in one’s capabilities to achieve a goal or outcome. Learners with a strong sense of efficacy are more likely to set ambitious goals for themselves and are naturally driven. They put a high degree of effort to meet their commitments. On the other hand, learners with a low self-efficacy believe that they cannot be successful so they are likely to make a concerted, extended effort and may consider challenging tasks as threats that are to be avoided. As a result, they have low aspirations which may result in disappointing academic performance.

According to Akyol et.al (2021), involvement was defined as an indicator of the development and learning process that can be observed. It is the level of participation and engagement that students have in their educational experience. This includes attending classes, participating in discussions, working on projects, and seeking out additional learning opportunities. Students with high level of involvement are associated with increased academic achievement, improved retention rates and greater satisfaction.

In the book “Higher Education: Handbook of Theory and Research”, Involvement is what the student does and how the student behaves that defines and identifies involvement. It emphasizes active participation of the student in the learning process. Involvement requires an investment of psychosocial and physical energy that varies from student to student. Lastly, student involvement is correlated to academic performance (Paulsen,2013).

METHODOLOGY

The research design used in this study was of the descriptive type coupled with a correlational research design. According to Saunders et. al (2019), a descriptive research design aims to describe or measure the characteristics of a population or phenomenon. It is frequently used to explore educational or social phenomena such as student performance, teacher practices, or community attitudes. It permits researchers to draw inferences about the population under investigation. As mentioned earlier, correlational design was also used in the development of this research. The goal of correlational research is aimed at identifying associations or relationships between variables (Gravetter and Forzano, 2018).

The instruments used in this study was a developed questionnaire with a five-point rating scale to collect students’ perception on the utilization of Flipped Classroom Learning Approach. In addition, a developed pre-test post-test was also used to determine the development of students’ 21st century skills, particularly critical thinking, and problem-solving skills. All the research instruments underwent face validation and content validation from the research panels and six Master Teachers of Pedro Guevara Memorial National High School. One hundred thirty-three Grade 8 students of Pedro Guevara Memorial National High School were the respondents of this study which were selected through simple random sampling.

Mean and standard deviation were used to identify the level of students’ perception in terms of satisfaction, motivation, engagement, independent learning, self-efficacy, and involvement. Moreover, frequency, percentage, mean, and standard deviation were used to determine the level of students’ 21st century skills development in terms of critical thinking, problem-solving, and collaboration skills. Furthermore, t-test was used to identify if the difference in the 21st century skills development before and after the utilization of Flipped Classroom Learning Approach.

RESULT AND DISCUSSION

Table 1. Level of Students' Perception on the Utilization of Flipped Classroom Learning Approach as to Satisfaction

The Flipped Classroom Learning Approach...	MEAN	SD	VERBAL INTERPRETATION
is a more effective and efficient method of learning than the traditional way of learning.	3.71	0.81	High
has helped me have a deeper understanding of Earth and Space topics.	4.04	0.77	High
utilized effective learning materials such as video or PowerPoint presentations and in-class activities to help me better understand the lesson.	4.23	0.73	Very High
provided satisfying topics, format, and structure of learning materials through the integration of technology and multimedia resources.	4.18	0.74	High
is a meaningful and effective learning experience for me since the time and effort I invested in it was well worth it.	4.09	0.81	High
Weighted Mean: SD	4.05: 0.79		
Verbal Interpretation	High		

Legend: Scale Range	Remarks	Interpretation
5 4.20 – 5.00	Strongly Agree	Very High
4 3.40 – 4.19	Agree	High
3 2.60 – 3.39	Moderately Agree	Average
2 1.80 – 2.59	Disagree	Low
1 1.00 – 1.79	Strongly Disagree	Very Low

As shown in Table 1, the students strongly agreed that effective learning materials such as video or PowerPoint presentations were utilized in the Flipped Classroom Learning Approach ($M=4.23$, $SD=0.73$). This suggests that students found this aspect of Flipped Classroom to be beneficial. The use of these learning materials made the difficult concepts easier to understand. On the other hand, students also agreed that the learning approach was more effective and efficient than the traditional way of learning with the lowest ($M=3.71$, $SD=0.81$). This implies that they may believe that the approach was more effective and efficient however, they prefer to stick with the traditional way of teaching because it is more familiar to them.

It also reveals that students were generally satisfied with the Flipped Classroom Learning Approach based on the overall mean of ($M=4.05$, $SD= 0.79$) because it provided them with an engaging and meaningful learning experience by integrating technology and multimedia resources in the learning materials used outside and inside the classroom.

Table 2. Level of Students' Perception in the Utilization of Flipped Classroom Learning Approach as to Motivation

The Flipped Classroom Learning Approach...	MEAN	SD	VERBAL INTERPRETATION
has increased my desire to learn topics in Earth and Space.	4.04	0.83	High
made me well prepared by watching the videos or PowerPoint Presentations given before class.	3.99	0.91	High
provided an opportunity to review the learning materials as many times as necessary, which increased my motivation to study.	4.23	0.91	Very High
made me willing to put the time and effort necessary to learn the lessons in Earth and Space.	3.93	0.88	High

inspired me to work hard and strive for excellence by gaining deeper understanding of the lessons.	4.05	0.86	High
Weighted Mean: SD Verbal Interpretation	4.05: 0.88 High		

As shown in Table 2, the students strongly agreed that their motivation to study increased upon the utilization of Flipped Classroom Learning Approach because it provided them an opportunity to review the learning materials as necessary ($M=4.23$, $SD=0.91$). They agreed that the learning approach inspired them to work hard and strive for excellence ($M=4.05$, $SD=0.86$) and it made them willing to put the time and effort necessary to study the lessons in Earth and Space with the lowest ($M=3.93$, $SD=0.88$).

The students perceived that their level of motivation was high in the Flipped Classroom Learning Approach as revealed by the overall mean of ($M=4.05$, $SD=0.88$). This indicates that the approach has been effective in increasing students' motivation to learn the topics in Earth and Space because it prepared and provided them opportunities to facilitate a deeper understanding of the lessons through the learning materials, which can lead to better performance.

Table 3. Level of Students' Perception in the Utilization of Flipped Classroom Learning Approach as to Engagement

The Flipped Classroom Learning Approach...	MEAN	SD	REMARKS
enhanced my engagement in group activities and participation in discussion.	4.21	0.79	Very High
made me more connected to my classmates and teacher.	4.11	0.83	High
made me elicit clarifications and asked questions on the topics or instructions during in-class.	3.71	0.93	High
stimulated my curiosity and awakened my desire to understand Science.	3.90	0.86	High
increased my engagement during in-class discussions because I can access the instructional material in advance.	3.97	0.81	High
Weighted Mean: SD Verbal Interpretation	3.98: 0.86 High		

As reflected in the table 3, students affirmed that Flipped Classroom Learning Approach enhanced students' engagement and participation in group activities and discussion ($M=4.21$, $SD=0.79$). They also agreed that the approach fostered a sense of connection among students and teachers ($M=4.11$, $SD=0.83$). However, despite promoting engagement and connection, the approach may be less effective in stimulating the students to ask questions or seek clarifications during in-class ($M=3.71$, $SD=0.93$).

Table 3 reveals that the students perceived Flipped Classroom as effective in enhancing their engagement based on the overall mean of ($M=3.98$, $SD=0.86$). However, there are certain aspects where students did not strongly agree such as the approach stimulating their curiosity, and the approach making them elicit clarifications and ask questions. This means that there are factors that may have contributed to their perception of Flipped Classroom such as students' individual learning style, their poor communication skills, or their fear of embarrassment.

Table 4. Level of Students' Perception in the Utilization of Flipped Classroom Learning Approach as to Independent Learning

The Flipped Classroom Learning Approach...	MEAN	SD	VERBAL INTERPRETATION
allowed me to complete tasks without the help of my teacher or another student.	3.83	0.98	High

made me strive to understand concepts rather than just memorizing facts and details.	4.02	0.81	High
made me developed resourcefulness, flexibility, and resiliency to finish an activity or task.	4.01	0.87	High
made me preview and review my notes to ensure that I remember the important parts of the lesson.	4.12	0.94	High
made me evaluate my own performance to determine what is good and what needs to be improved.	4.14	0.90	High
Weighted Mean: SD Verbal Interpretation	4.02: 0.90 High		

As seen in Table 4, Flipped Classroom Learning Approach encouraged the students to take ownership of their learning and made them actively engaged in self-reflection ($M=4.14$, $SD=0.90$). The approach also helped in terms of the retention of important concepts as it allows students to preview and review their notes before in-class discussions ($M=4.12$, $SD=0.94$). On the other hand, students did not find Flipped Classroom particularly helpful in completing tasks independently ($M=3.83$, $SD=0.98$). This suggests that students may require additional support needed to complete a task or they prefer to have more interaction with their teacher or classmates during the learning process.

Table 4 reveals that the level of students' perception on the utilization of Flipped Classroom Learning Approach as to independent learning was high based on the overall mean of ($M=4.02$, $SD=0.90$). This suggests that the students agreed that the approach has promoted a more student-centered and self-directed learning experience.

Table 5. Level of Students' Perception in the Utilization of Flipped Classroom Learning Approach as to Self-Efficacy

The Flipped Classroom Learning Approach...	MEAN	SD	VERBAL INTERPRETATION
I believe I can pass this subject because I developed a good study habit through Flipped Classroom Learning Approach.	3.74	0.93	High
I am convinced that I can master the concepts and topics taught in the class through Flipped Classroom Learning Approach.	3.57	0.85	High
I am confident that I can do an excellent job in written works and performance task through Flipped Classroom Learning Approach.	3.76	0.98	High
I believe that I can get an excellent score in the post-test after learning in a Flipped Classroom Learning Approach.	3.32	0.94	Average
I challenge myself when I encounter difficulties in accomplishing task or activities in a Flipped Classroom Learning Approach.	3.89	0.90	High
Weighted Mean: SD Verbal Interpretation	3.66: 0.94 High		

Based on the given data, majority of the students agreed that Flipped Classroom Learning Approach made them developed a problem-solving and growth-oriented mindset which is reflected on their willingness to challenge themselves when they encountered difficulties in accomplishing task or activities ($M=3.89$, $SD=0.90$). They also expressed confidence in their ability to do an excellent job in

written works and performance tasks ($M=3.76$, $SD=0.98$). However, students were moderately in agreement in their ability to achieve an excellent score in the post-test after learning in the approach ($M=3.32$, $SD=0.94$). Possible factors could be due to test anxiety, lack of confidence in the subject matter, or unfamiliarity with the testing format.

The overall mean score of ($M=3.66$, $SD=0.94$) suggests that the level of students' perception in the utilization of Flipped Classroom Learning Approach was high. This indicates that the approach has a potential to positively influence the students' confidence and belief to learn the subject.

Table 6. Level of Students' Perception in the Utilization of Flipped Classroom Learning Approach as to Involvement

The Flipped Classroom Learning Approach...	MEAN	SD	VERBAL INTERPRETATION
increased my involvement in the learning process because the video and PowerPoint Presentation prepared me well for the in-class.	3.99	1.00	High
has provided me with more opportunities to reflect on and evaluate my performance.	3.87	0.97	High
enabled me to ask more questions and receive personalized guidance and support, which increased my interest and involvement in class.	3.70	0.91	High
has given me more opportunities to show my understanding of the lesson.	3.93	1.00	High
has increased my involvement because my ideas and suggestions are used during activities.	3.84	1.05	High
Weighted Mean: SD Verbal Interpretation	3.87: 0.99 High		

Table 7 illustrates the level of students' perception in the utilization of flipped classroom learning approach as to Involvement.

From the statements above, the students agreed that the Flipped Classroom Learning Approach has been beneficial in increasing their involvement in the learning process because the pre-class materials such as video and PowerPoint Presentations were effective in preparing them for the in-class activities ($M=3.99$, $SD=1.00$). They also agreed that the approach allowed them to demonstrate their understanding of the lesson in a more meaningful way like in group activities or performance tasks ($M=3.93$, $SD=1.00$). Flipped Classroom also had a positive impact on students' involvement in class by enabling them to ask more questions and receive personalized guidance and support ($M=3.70$, $SD=0.91$). However, other students may not be willing to ask questions and seek guidance because of their learning style preference. Some students may prefer a more collaborative learning environment while others may prefer to work independently.

The weighted mean score of ($M=3.87$, $SD=0.99$) indicates that the students' overall perception of Flipped Classroom was high. The approach has been successful in increasing student involvement because it allowed the students to take more control over their learning. This gave them the opportunity to actively engage in the learning process.

Table 7. Level of Students' 21st Century Skills Development in terms of Critical Thinking Skills

Grade	Pre-test		Post-test		Descriptive Equivalent
	f	%	f	%	
90 - 100	0	0.00	18	9.73	Outstanding
85 - 89	0	0.00	34	18.38	Very Satisfactory
80 - 84	4	2.16	39	21.08	Satisfactory

75 - 79	20	10.81	60	32.43	Fairly Satisfactory
Below 75	161	87.03	34	18.38	Did not meet Expectation
Total	185	100	185	100	
Weighted Mean	71.31		80.44		
SD	3.50		5.96		
Verbal Interpretation	DNME		S		

Table 8 presents the level of students' 21st century skills development in terms of critical thinking skills. Out of a total number of two hundred and two respondents, only one hundred and eighty-five completed the Pre-test and Post-test for critical thinking and problem-solving skills test.

The pre-test data shows that the majority of the students (87.03%) scored below 75, indicating that they did not meet the expectations for critical thinking skills development. Only a small proportion of students scored in the Satisfactory, Very Satisfactory, or Outstanding categories. After the utilization of Flipped Classroom, the percentage of students who did not meet the expectations for critical thinking skills development decreased significantly to 18.38%.

The overall level of students' critical thinking skills development post-intervention is satisfactory based on the overall weighted mean of ($M=80.44$, $SD=5.96$). This result means that the majority of the students have improved their critical thinking skills. It may be attributed to the active learning experience, the various teaching strategies and learning materials, the teacher's pedagogical skills and teaching style or the opportunity for students to reflect on and evaluate their performance. However, it is important to note that some students still did not meet the expectation after utilizing Flipped Classroom. Possible contributing factors to this could be the students' individual differences in learning styles, lower levels of prior knowledge and skills as a result of the pandemic and external factors such as family problems or health concerns. Further research and analysis to identify the specific factors and to develop interventions to help the students.

Table 8. Level of Students' 21st Century Skills Development in terms of Problem-Solving Skills

Score	Pre-test		Post-test		Descriptive Equivalent
	f	%	f	%	
90 - 100	0	0.00	14	7.57	Outstanding
85 - 89	0	0.00	22	11.89	Very Satisfactory
80 - 84	3	1.62	39	21.08	Satisfactory
75 - 79	57	30.81	72	38.92	Fairly Satisfactory
Below 75	125	67.57	38	20.54	Did not meet Expectation
Total	185	100	185	100	
Weighted Mean	71.81		78.83		
SD	4.18		6.88		
Verbal Interpretation	DNME		FS		

Table 9 presents the level of students' 21st century skills development in terms of problem-solving skills. Out of a total number of two hundred and two respondents, only one hundred and eighty-five completed the Pre-test and Post-test for critical thinking and problem-solving skills test.

The result showed that there was an improvement in the students' problem-solving skills after the utilization of Flipped Classroom. The weighted mean increases from ($M=71.81$, $SD=4.18$) to ($M=78.83$, $SD=6.88$) in the pre-test and post-test results indicated significant improvement in their performance. The majority of the students, 38.92%, scored in fairly satisfactory range in the post-test, while 20.54% of the students did not meet the expectation. This suggests that Flipped Classroom has helped them to improve their problem-solving skills but there are still some students who need more improvement.

These students may have faced difficulties understanding the concepts taught in Flipped Classroom. It is also possible that before the approach, these students had lower proficiency in problem-solving skills as a result of the global pandemic, making it challenging for them to reach the expected level of performance. The lack of face-to-face interaction with their teachers and peers affected their motivation and their ability to find solutions to complex problems or tasks. Lastly, they may not be fully invested in the approach, or they lack support to fully engage in the learning process.

Table 9. Level of Students' 21st Century Skills Development in terms of Collaboration Skills

Score	Before		After		Descriptive Equivalent
	f	%	f	%	
90 - 100	0	0.00	123	64.40	Outstanding
85 - 89	0	0.00	21	10.99	Very Satisfactory
80 - 84	62	32.46	16	8.38	Satisfactory
75 - 79	19	9.95	11	5.76	Fairly Satisfactory
Below 75	110	57.59	20	10.47	Did not meet Expectation
Total	191	100	191	100	
Weighted Mean	60.83		90.29		
SD	4.22		10.59		
Verbal Interpretation	DNME		Mastered		

Table 10 presents the level of students' 21st century skills development in terms of collaboration skills. Out of a total number of two hundred and two respondents, only one hundred and ninety-one completed the collaboration skills test.

The data presented shows that the majority of the students (64.40%) achieved an outstanding level of collaboration skills development and only a small percentage of students (10.47%) did not meet the expected level of collaboration skills development. This indicates that Flipped Classroom Learning Approach was successful in enabling students to collaborate effectively with their peers. Additionally, there is a clear indication that students were actively engaged in the learning process and were able to apply what they have learned in the approach.

Students have largely mastered the concept of collaboration skills as shown in the weighted mean of ($M=90.29$, $SD=10.59$). However, there is still room for improvement. Further investigation may be necessary to identify the factors contributing to the low percentage of students who did not meet the expected level of collaboration skills development.

Table 10. Difference in the students' 21st Century Skills Development before and after the utilization of Flipped Classroom Learning Approach

	Mean		SD		t-stat	p-value	Analysis
	Pre-Test	Post Test	Pre-Test	Post Test			
21st Century Skills Development	14.39	24.81	3.60	7.16	22.29	0.0000	Significant

Table 10 presents the difference in the students 21st century skills development before and after the utilization of flipped classroom learning approach.

In the pre-test, a large percentage (85.95%) of the students did not meet the expectation while only a small percentage (1.08%) achieved a satisfactory level. However, after the utilization of Flipped

Classroom Learning Approach, there was a significant improvement in the students' 21st century skills development. Students who did not meet the expectation decreased to 22.16%, while students who achieved satisfactory level increased to 50.27%. This suggests that the approach has been effective in developing the students' 21st century skills particularly collaboration skills and critical thinking skills. However, problem-solving skills need improvement compared to other skills. This could be due to factors such as social isolation during the pandemic that hinder the students to persevere through challenging tasks, difficulty in understanding the concepts or they are not fully invested in the learning process.

This improvement is reflected in the weighted mean score, which increased from 71.52 to 79.85 after the utilization of Flipped Classroom. The distribution of scores became more dispersed based on the increase in standard deviation of 2.88 to 5.73. This means that there were both high-performing and low-performing students after the utilization of the approach. It could be attributed to the opportunity that it provides students to study at their own pace. The integration of technology and the activities made the learning experience interactive and engaging to the students. However, it is important to note that the overall level of student performance is still at the "Average Mastery" level, so further research may be necessary to identify any underlying issues of students who did not meet the expectations and tailor the instructions to address these needs.

Based on the data provided, an improvement in students' understanding and application of 21st Century Skills was evident based on the increase in the mean score of 14.39 to 24.81. Furthermore, the standard deviation of 7.16 for the post-test was also greater than that of the pre-test which is 3.60. The t-statistic value of 22.29 and p-value of 0.0000 implies that the students 21st century skills developed after the utilization of Flipped Classroom Learning Approach. Thus, the null hypothesis is rejected. This approach promotes active learning, collaboration, and inquiry-based learning, which can enhance students' 21st century skills.

CONCLUSION

In light of the findings of the study, it was concluded that the students' perception of Flipped Classroom Learning Approach is positive in terms of satisfaction, motivation, engagement, independent learning, self-efficacy and involvement. It was also shown that there was a significant difference in the students' 21st century skills development before and after the utilization of Flipped Classroom Learning Approach. Majority of the students achieved an outstanding level of collaboration skills after the utilization of Flipped Classroom while the development of their critical thinking skills also reached a satisfactory level. However, their problem-solving skills was revealed to have a fairly satisfactory level indicating the need for further improvement.

RECOMMENDATIONS

In consideration of the result, the following recommendations were proposed:

1. The Department of Education, School Administrators, Policymakers and Educators should continue to leverage Flipped Classroom Learning Approach as a means of enhancing the development of 21st century skills. It is important to provide trainings for educators to cultivate and strengthen their knowledge and skills about Flipped Classroom.
2. Educators and policymakers must focus on promoting mastery of critical and problem-solving skills by incorporating other pedagogical approaches such as Problem-Based Learning (PBL). The approach will provide students with open-ended and inquiry-based problems that guide student learning through discovery-based learning and authentic applications that will further develop their critical thinking and problem-solving skills to a higher level of proficiency.

3. School Administrators, policymakers and educators should prioritize the design and delivery of effective Flipped Classroom lessons which are aligned with DepEd's Most Essential Learning Competencies (MELC). Gaps in knowledge and skills should be identified so that learning materials can be adjusted so that it is tailored to the needs of the learners.

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