

Satisfaction of Students in the Methods Used in Mathematics in the Modern World in a New Normal

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Abstract One notable component to look at in the teaching-learning process is the way the subject is taught because one way or another, students are greatly affected by it. Viewing students' perspectives on the use of the different teaching methods, this study determined the frequency of use of these teaching methods and their level of satisfaction. Through a systematic investigation, the findings from a critical questionnaire administered to first-year BS Hospitality Management college students at Ifugao State University were analyzed and summarized. The frequency of use of the indicated instructional strategies was shown to have a significant relationship with student satisfaction in this study. Furthermore, the data reveal a substantial difference in student satisfaction with instructional approaches utilized before and during the pandemic. Students, on the other hand, prefer the teaching techniques employed before the outbreak to those utilized during the pandemic.

Keywords: *blended, distance, learning management system, limited face-to-face, online*

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1. Introduction

The College Readiness Standards CHED Memorandum No. 20, Series 2013 on the K-12 Basic Education Curriculum Enhancement has included General Education (GE) classes in the curriculum Core classes in high school for higher education programs [1]. As a result, the general education curriculum in tertiary was revised.

One of the subjects at the tertiary level is Mathematics in the Modern World. This subject is about the nature of mathematics, appreciating its practical, intellectual, and artistic components, and using it as a tool in everyday life [2]. As a mathematics subject, its value extends far beyond the four walls of the classroom [3].

Several studies were conducted in an attempt to determine the outcomes of the course and the attitudes of the students toward the subject. Reference [4] stated that the course promotes a sense of belonging through class activities. However, some experienced "boredom", "dizziness", and "sleepiness". The teachers stated that the course's teaching process influences students' behavior and performance. Reference [5] concluded that students thrive in a learning environment that encourages discovery, creativity, collaboration, love, and respect. Similarly, [6] discovered that studying Mathematics in the Modern World is greatly influenced by how much students love and find value in the subject. Students exhibited a favorable attitude toward the course because they recognized the significance of mathematics in their lives.

Since 2013, the educational system has been in a new phase. In the year 2020, the country faced a new problem that affects the social-political, economic, military, and educational sectors of the Philippines [7].

Classroom instruction in the recent couple of years has undergone a great challenge especially when face-to-face classes were postponed. Despite this reality, students are the ones who are greatly affected because they were not used to distance, online, and blended modalities [8].

Before, classroom instruction is in a face-to-face setting where teachers and students meet inside the classroom. One notable component to look at in the teaching-learning process is the way the subject is taught because one way or another, students are greatly affected by it. Many kinds of research revealed that students find Mathematics as a collective concept boring and difficult. Reference [9] found that even the mathematical terminologies and related concepts were difficult for the students. Students dislike mathematics due to a variety of factors related to instruction and assessment. Learners' cognitive, affective, and psychomotor characteristics, as well as the subject matter and learning environment [10]. Moreover, this view might have been also rooted in the fact that even though Mathematics surrounds us, academically speaking, not every student has an inclination for Mathematics compared to other subjects. Furthermore, it might have been built from the habitual teaching method which is traditional – using merely a set of formulas and procedures which teachers rely only on the textbooks given. Then the sudden shift of this instruction becomes the new normal. With the varied teaching methods that are

said to apply to distance learning, students faced another great challenge [11].

On that note, the success of introducing and using different teaching methods became a challenge as well. The ones that are used before the pandemic became almost not applicable during the pandemic. To cater to this problem, different teaching platforms have been developed. Some of the strategies used were using video recordings, online guest lecturers, and live demonstrations [12,13,14]. Teaching methods have evolved in response to innovation, and this innovation is relevant to today's current crisis. Teachers at all levels are dealing with distance learning education [15]. However, are the students satisfied with these new teaching methods?

This research aims to contribute to the enhancement of teaching techniques in the subject, Mathematics in the Modern World. Subject teachers will learn which strategies are effective, and which are not by assessing student satisfaction with regularly utilized teaching methods.

This study demonstrates the various opinions of students on the instructional methods utilized by teachers for Filipino students. It is anticipated that through improving teaching techniques, students' performance in Mathematics in the Modern World would improve. This research aids in the recognition of students' various learning styles since they are more inclined to be satisfied with teaching approaches that meet their learning needs.

This research will be of great use to instructors in the Philippine Education System, particularly subject teachers of Mathematics in the Modern World because it will provide them with ideas on how to make their chosen teaching techniques effective. The awareness of the efficacy of their teaching techniques based on the viewpoints of their students will help them refine these methods. As a result, the perception that mathematics is uninteresting and difficult will be diminished.

The output of this research study can be employed in the setting up of classroom teaching to attain the desired academic outcome by Future Mathematics in the Modern World teachers.

Future Researchers will benefit greatly from this study since it will aid in the discovery of new, and fascinating research subjects as well as the investigation, and even invention of outstanding teaching techniques.

This study was primarily bounded on understanding the frequency of use of the identified teaching methods, and the level of satisfaction of students with these methods. As many know, a teacher's teaching strategy plays a serious role in the development of students' learning, however, as [16] mentioned in his study, there can be other factors that can affect students' achievement.

In this study, data collection was conducted on 30 first-year college students enrolled in the Bachelor of Science in Hospitality Management course at Ifugao State University. Hence, other students which do not fall as part of BS Hospitality Management students were not within the scope of this research. By utilizing Google Forms, the floating of the questionnaire is done for reference. The gathered data served as evidence in answering the problems of this study. However, this study did not cover other problems which find reasons for the frequency of use of teaching methods and the level of satisfaction of students.

1.1. Statement of the Problem

The main objective of this study was to determine the frequency of use and the level of satisfaction of first-year college students towards the teaching methods of their Mathematics in the Modern World subject.

Specifically, this study sought to answer the following questions:

1. What is the frequency of use of the different teaching methods in teaching Mathematics in the Modern World?
2. What is the level of satisfaction of college students towards the teaching methods used in their Mathematics in the Modern World before and during pandemic?
3. Is there a significant difference between the level of satisfaction of the students towards the teaching methods used in their Mathematics in the Modern World before and during pandemic?
4. Is there a significant relationship between the frequency of use of the different teaching methods used in Mathematics in the Modern World and the level of satisfaction of students?

1.2. Hypotheses

There is no significant difference between the level of satisfaction of the students towards the teaching methods used in their Mathematics in the Modern World before and during pandemic.

There is no significant relationship between the frequency of use of the different teaching methods used in Mathematics in the Modern World and the level of satisfaction of students.

2. Methods

2.1. Research Design

This study used a quantitative approach, particularly descriptive–correlational, and comparative research designs. The study was descriptive because it described the frequency of use, and level of satisfaction of the students with the different teaching methods used in teaching Mathematics in the Modern World. The frequency of use was correlated with the level of satisfaction, hence, this study was also correlational. Moreover, the study was comparative because the level of satisfaction of the students toward the teaching methods used in their Mathematics in the Modern World course before the pandemic was compared with the level of satisfaction during the pandemic.

2.2. Research Locale

The study was conducted at Ifugao State University. The Ifugao people's victories over adversity since its early origin may be traced back to the Ifugao State University (IFSU). IFSU was founded in 1920 as Nayan Settlement Farm School (NSFS) by American Educators. It provided comprehensive primary education while participating in agriculture initiatives, notably the production of pigs,

chickens, and vegetables. Colleagues and representatives from higher education sponsored a measure in congress because they wanted the institution to flourish. The Republic Act (R.A.) 2432, which elevated the school to become the Ifugao Pilot Opportunity School of Agriculture (IPOSA), was adopted sometime in 1959.

The name of the school has been proof of the many developments that happened. After IPOSA, was renamed to Payon Bagan Pilot Opportunity School of Agriculture (PBPOSA), then converted to Ifugao Agricultural and Technical College (IATC), upgraded to Ifugao State College of Agriculture and Forestry (ISCAF), and the vision to transform ISCAF to university finally happened when it was converted Ifugao State University (IFSU).

The university has six campuses, namely: Lamut (Main); Lagawe; Hapao; Potia; Aguinaldo, and Tinoc. Currently, IFSU is headed by Dr. Eva Marie Codamon-Dugyon.

The research was carried out in an area that the researcher has access to. The location is particularly at IFSU - Potia Campus which is located in the municipality of Alfonso Lista, Ifugao.

The campus provides both graduate programs and bachelor's degree programs. While undergraduate studies provide seventeen (17) bachelor courses, graduate studies only offer eleven (11) Master's Degree Programs. Additionally, the university has three (3) diploma programs.

2.3. Research Respondents

The first-year college students enrolled in the Bachelor of Science in Hospitality Management course were the respondents since they have a General Education (GE) subject – Mathematics in the Modern World during their first semester of the academic year 2021-2022 at Ifugao State University. A total of 30 students who were enrolled in the said course which is a non-board examination program were purposively selected to participate in the study.

Table 1. Profile of the Students

Profile of Students	Frequency	Percent
Sex		
Female	19	63.3
Male	11	36.7
Total	30	100.0
Age		
18.00	3	10.0
19.00	12	40.0
20.00	8	26.7
21.00	6	20.0
22.00	1	3.3
Total	30	100.0
Mean Age:	19.67 SD: 1.03	

The majority of the respondents are female students (63.3%), and the rest are male students (36.7%). The table also shows the varying age of the students. Their mean age is 19.67 (sd = 1.03). Most of them are aged 19 years old (40%), some are aged 20 years old (26.7%), some are 21 years old (20%), some are 18 years old (10%), and one student aged 22 years old (3.3%).

2.4. Research Instruments

The main instrument in this study was a modified questionnaire from the study of [17]. Along with the modification is the inclusion of the online platforms and modalities identified by [8]. They provided some methods to be used which are considered more accurate during the pandemic. This study's instrument is categorized into the following major parts.

Profile Questionnaire. This questionnaire was used to determine the sex and age of the students.

Frequency of use Questionnaire. This is a Likert scale questionnaire that contains lists of the different teaching methods in teaching Mathematics in the Modern World Questionnaire. It aimed to ask how often the students experienced the use of the identified teaching methods before and the during pandemic.

Level of satisfaction Questionnaire. This Likert-Scale questionnaire measured the level of satisfaction of college students towards the teaching methods used in their Mathematics in the Modern World. There were eight teaching methods identified both before the pandemic and during the pandemic.

2.5. Data Gathering Procedure

To get all pertinent data for this study, a letter was forwarded to the instructor of the students to seek permission to conduct the study. Ethical considerations were considered. A consent letter was given to the students to get their approval before the questionnaires were given to them. All willing students were the only included respondents of the study. The questionnaire was administered through a google form. The questionnaire forwarded back through google form was the considered data.

2.6. Statistical Treatment

Means and standard deviations were computed to describe the frequency of usage, and level of satisfaction of college students towards the teaching methods used in their Mathematics in the Modern World. The frequency of usage and level of satisfaction were described using the guide for interpretation presented in Table 2.

Table 2. Guide for Interpretation

Mean Range	Frequency of Usage
1.00-1.49	Never
1.50-2.49	Rare
2.50-3.49	Often
3.50-4.00	Always
Mean Range	Level of Satisfaction
1.00-1.49	Not satisfied
1.50-2.49	Slightly Satisfied
2.50-3.49	Moderately Satisfied
3.50-4.49	Satisfied
4.50-5.00	Very Satisfied

Significant difference in the level of satisfaction towards the teaching methods before and during the pandemic was determined through paired sample t-test.

A Pearson-r correlation was used to find if a significant correlation exists between the frequency of use and level of satisfaction towards the teaching methods used in their Mathematics in the Modern World.

3. Results and Discussions

3.1. Frequency of Use of the Teaching Methods

Table 3 shows the frequency of use of the teaching methods utilized in their Mathematics in the Modern World course.

Table 3. Frequency of Use of the Teaching Methods

Teaching Methods	Mean	Std. Deviation	Qualitative Description
Teaching Methods before the pandemic			
1. Direct Instruction	3.17	.87	Often
2. Discovery Learning	2.90	.88	Often
3. Discussion	3.10	.84	Often
4. Drill and Practice	2.87	.73	Often
5. Inquiry	2.93	.64	Often
6. Lecture	2.90	.99	Often
7. Mental Modeling	3.03	.76	Often
8. Question and Answer	3.00	.83	Often
Overall Mean & SD for Teaching Methods before the pandemic	2.99	0.11	Often
Teaching Methods during the pandemic			
1. Learning Management System (LMS)	3.23	.77	Often
2. Limited Face-to-Face	2.17	1.21	Rare
3. Messaging/Chats	3.27	.87	Often
4. Modular	2.63	1.10	Often
5. zoom meeting	2.50	1.07	Often
6. google meet	2.80	.92	Often
7. chat room	2.90	.96	Often
8. Uploaded Videos	2.80	.92	Often
Overall Mean & SD for Teaching Methods during the pandemic	2.79	0.14	Often

As presented, the result stated an overall mean of 2.99 with a standard deviation of 0.11 for the teaching methods before the pandemic. On the other hand, the result stated an overall mean of 2.79 with a standard deviation of 0.14 for the teaching methods during the pandemic. This implies that the frequency of use of the list of teaching methods both before and during the pandemic is often used to teach Mathematics in the Modern World subject.

All the listed teaching methods before the pandemic are often used on the subject with direct instruction ($m = 3.17$; $sd = 0.87$) more frequently used compared to the rest. On the listed teaching methods during the pandemic, messaging/chats ($m = 3.27$; $sd = 0.87$) and LMS ($m = 3.23$; $sd = 0.77$) is more frequently used compared to the rest of the methods. This implies that teachers connect with their students through messaging or chats and that the school has an established learning management system (LMS).

3.2. Level of Satisfaction with the Teaching Methods

Table 4 shows the level of satisfaction of the students with the teaching methods used in their Mathematics in the Modern World course.

Table 4. Level of Satisfaction with the Teaching Methods

Teaching Methods	Mean	Std. Deviation	Qualitative Description
Teaching Methods before the pandemic			
1. Discovery Learning	3.47	.90	Moderately Satisfied
2. Discussion	3.57	.82	Satisfied
3. Drill and Practice	3.47	.86	Moderately Satisfied
4. Direct Instruction	3.70	.99	Satisfied
5. Inquiry	3.43	.90	Moderately Satisfied
6. Lecture	3.53	.86	Satisfied
7. Mental Modeling	3.57	1.04	Satisfied
8. Question and Answer	3.43	.90	Moderately Satisfied
Overall Mean & SD for Teaching Methods before the pandemic	3.52	0.07	Satisfied
Teaching Methods during the pandemic			
1. Learning Management System (LMS)	3.43	1.10	Moderately Satisfied
2. Limited Face-to-Face	2.77	1.28	Moderately Satisfied
3. Messaging/Chats	3.73	.87	Satisfied
4. Modular	3.10	1.30	Moderately Satisfied
5. zoom meeting	2.87	1.17	Moderately Satisfied
6. google meet	3.33	.96	Moderately Satisfied
7. chat room	3.37	.93	Moderately Satisfied
8. Uploaded Videos	3.40	1.10	Moderately Satisfied
Overall Mean & SD for Teaching Methods during the pandemic	3.25	0.16	Moderately Satisfied

As shown in Table 4, the level of satisfaction towards the teaching methods before and during the pandemic is measured and interpreted. The overall mean of 3.52 with a standard deviation of 0.07 indicates that students are satisfied with the use of the teaching methods before the pandemic. While the overall mean of 3.25 with a standard deviation of 0.16 implies that students are moderately satisfied with the teaching methods used during the pandemic.

Moreover, students are more satisfied with the use of direct instruction ($m = 3.70$; $sd = 0.99$) compared to the rest of the teaching methods before the pandemic. In the study of [18], the students were also satisfied with the traditional classroom method however, they suggested the use of an active learning classroom to boost engagement and improve the performance of the students. This implies that students are satisfied when the teacher explains or demonstrates the lessons of their subject. Apart from this, students are more satisfied with the teacher's use of messaging/chats ($m = 3.73$; $sd = 0.87$) as a teaching method during the pandemic. This signifies that students are satisfied with the online messaging platform like messenger and group chats for greeting purposes and updating their subject tasks.

The pandemic of COVID-19 has significantly increased the adoption and utilization of online learning [19]. Classroom replication, online practical skills training, online assessment integrity, and student engagement were all designed by lecturers in an online setting. These strategies were used to improve the quality of online learning, but students who used ineffective online participation strategies had low engagement. Hence, according to [19] lecturers and students must improve their dexterity to adapt, and maneuver their online strategies across various online teaching and learning modalities.

Some regard emergency remote teaching as a temporary online shift during a crisis, whereas online learning entails purposeful design for online delivery [20]. Direct instruction was still conducted but not face-to-face. Reference [21] revealed in their study that teachers reported that few teachers (15%) preferred direct teaching in a Canadian context.

3.3. Difference between the Level of Satisfaction before and during the Pandemic

Table 5 shows the paired sample t-test result on the significant difference in the level of satisfaction of students towards the teaching methods used before and during the pandemic.

Table 5. Paired Samples Statistics of the Level of Satisfaction of Students towards the Teaching Methods used before and during the pandemic

Level of Satisfaction	N	Mean	Std. Deviation	Paired t-test Statistics	
				t(df)	Sig. (2-tailed)
Before Pandemic	30	3.52	0.80	2.147	0.040
During Pandemic	30	3.25	0.68		

The table presents the paired sample t-test values of $t(29) = 2.147$ and $p = 0.40$. Also, the table shows a mean of 3.52 ($sd = 0.80$) on the level of satisfaction of students with the teaching method used before the pandemic, and a mean of 3.25 ($sd = 0.68$) on the level of satisfaction of students with the teaching method used during the pandemic.

Before the pandemic, the mean level of satisfaction with the teaching technique ($m = 3.52$, $sd = 0.80$) was substantially greater than the mean level of satisfaction with the teaching method during the epidemic ($m = 3.25$, $sd = 0.68$). As a result, the null hypothesis which states that there is no significant change in student satisfaction with the teaching techniques employed in teaching Mathematics in the Modern World before and after the epidemic, is rejected in this study. This is because a paired samples t-test demonstrated a significant difference. However, prior to the pandemic, satisfaction with teaching methods was significantly higher than it was during the pandemic. This means that students are more satisfied with pre-pandemic teaching methods than with those used during the pandemic. However, this does not mean that all of the students.

3.4. Relationship between the Frequency of Use and the Level of Satisfaction towards the Teaching Methods

Table 6 shows the correlation between the frequency of use and the level of satisfaction with the teaching methods.

Table 6. Correlation between the Frequency of Use and the Level of Satisfaction towards the Teaching Methods

Variables	Pearson Correlation	Sig. (2-tailed)
Mean of the Frequency of Use ↔ Mean of Level of Satisfaction	.614**	.000

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

This table shows a moderate positive correlation (0.614**) between the frequency of use and the level of satisfaction. This suggests that the more frequently the teaching methods are used, the greater the satisfaction of the students. Furthermore, this study rejects the first null hypothesis which states that there is no significant relationship between the frequency of use and the level of satisfaction of students with the teaching methods used in teaching Mathematics in the Modern World. This is because the Pearson r test ($p = 0.000$) confirmed that there is a significant relationship between the frequency of use and the level of satisfaction.

In the metaphor of learning, the teacher is the captain directing the course as if it were a ship. In the meantime, the students are passengers [4]. This is supported by [22] who found that the satisfaction of the students was based on teachers' performance and the pedagogy used by the teachers. Moreover, [23] found that teaching methods have a significant correlation with the quality of teaching. Aside from the method, other factors include teaching content, condition, and teaching management.

4. Conclusion and Recommendations

4.1. Conclusion

Mathematics in the Modern World teachers often used different teaching methods in teaching Mathematics in the Modern World.

The college students were satisfied with the teaching methods used in their Mathematics in the Modern World during the pandemic and were moderately satisfied during the pandemic.

The students were more satisfied with the teaching methods used in their Mathematics in the Modern World before the pandemic than during the pandemic.

The frequency of use of the different teaching methods in Mathematics in the Modern World, and the level of satisfaction of students were positively correlated. The more frequently used of the different methods in Mathematics in the Modern World subject, the more satisfied the students towards the different methods.

To conclude, this study provides an insightful understanding of students that may be of help to make effective ways of teaching Mathematics in the Modern World. These results conform with the main goal of the study which is to determine the frequency of use of the identified teaching methods and the level of satisfaction of students with these methods. Upon realizing the level of satisfaction of students towards the teaching methods used, teachers can reflect on their instruction. On this note, it will guide them on the enhancement and improvement of their teaching methods.

The mixed results of this study suggest that we have much more to learn about the effective way of learning Mathematics in the Modern World subject. Some important points were extracted but this study is yet to solve the entirety of the challenges that teaching Mathematics subjects is facing.

4.2. Recommendations

Teachers should consider more innovative methods in teaching Mathematics in the Modern World, particularly activities that focus on the learner (learner-centered). This is to make learning Mathematics fun and exciting. This could assist the differentiated and multicultural teaching and learning process of the Philippine education system. Teachers should also consider more frequent use of varied methods in teaching the subject to maintain or boost the satisfaction of the students. Since the students are more satisfied with the methods before the pandemic period, most especially in using direct instruction, the teachers must conduct direct instruction more frequently.

Further study may be conducted by exploring the behavioral aspect of students to know about the underlying reason for their level of satisfaction.

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Statement of Competing Interests

The study was not conducted for personal advantage, which might jeopardize the validity of its conclusions. To avoid conflicts of interest, the study activity was carried out professionally at all times. Data security and confidentiality were upheld during this investigation. Participants in the research are not members of at-risk groups and weren't exposed to any recognized risks. Additionally, permission from participants is requested before data collection begins.

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