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Improving Performance of Education Students in Mathematics in the Modern World by Relay Teaching Method

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ABSTRACT

In the Philippines, Mathematics in the Modern World is offered to tertiary level students as one of the general education courses in almost programs. This course comprises various mathematics disciplines that aims to expose undergraduate students to various domains of knowledge and ways of comprehending social and natural realities, developing intellectual competencies and civic capacities. Through collaborative teaching, particularly on having more than one instructor in a class could offer a blending of expertise, complementary personalities, and a balanced approach to grading. Thus, relay teaching method was used. The relay teaching method in this study refers to taking turns in succession in teaching students the different lessons on Data Management as a selected topic in Mathematics in the Modern World. This study utilized the pretest-posttest research design with no control group, with three groups of education students were subjected to the relay teaching method. The performances of the students during the pretest and posttest were measured using a valid and reliable multiple-choice type of test. The mean, t-test, and ANCOVA were used to analyze the data. To summarize the feedback of students, it employed qualitative data analysis. The findings of the study revealed that there is an improvement in the level of performance of the students on data management with the implementation of the relay teaching method. The performance of the students before and after exposure to relay teaching was significantly different. The BTLEd students have significantly better performance than the BPEd students. The relay teaching method significantly helped improve the performance of the BTLEd students as compared to the BPEd students. The use of relay teaching could be more effective with enrichment activities such as coaching and sharing of lecture notes, social networking, and the use of social media and the internet.

Keywords: *relay teaching, collaboration, enrichment activities, education students, ANCOVA*

INTRODUCTION

Mathematics in the Modern World is one of the new general education courses offered at the tertiary level. It aims to provide students with a broader range of skills in understanding various dimensions of mathematics deemed to be essential in developing the intellectual, technical, ethical, and practical competencies of individuals. As a whole, the new General Education (GE) curriculum aims to "expose undergraduate students to various domains of knowledge and ways of comprehending social and natural realities, developing intellectual competencies and civic capacities" (CHED Memorandum Order No. 20, series 2013).

In the Philippines, the goal in improving mathematics education, that is, to develop a mathematically empowered citizenry, have already begun through the implementation of

the K-to-12 curriculum in basic education. In spite of the realization of the new curriculum, significant hitches still exist.

One of the challenges in the offering of Mathematics in the Modern World in consonance with ongoing educational reforms in the higher educational levels is the capability of instructors to deliver its contents since it encompasses different mathematics fields of disciplines. It is now in its second year of delivering the course at the tertiary level. Though there have been a series of training for teachers in teaching the subject, there are still some teachers who are struggling to teach it because they have their field of specialization. More so, students are required to learn different mathematics concepts within just one course. Taban & Cadorna, (2019) mentioned in their study that it is also a common observation that students can hardly solve worded math problems. This observation may be due to fear in problem-solving, poor comprehension, lack of knowledge on the problem presented, procedural errors, and difficulty level of the problem. However, when students solve math problems with the aid of effective strategies, they can probably obtain the correct solutions.

One of the strategies that was employed such as in the study Mercado (2011) was using relay teaching in Physics to determine the effectiveness of the enrichment activities in Physics among the fourth-year high school students of San Jose National High School, Caba, La Union. The results of her study showed that the performance of the students improved as shown by their pretest scores and the in the experimental groups was better than the two control groups.

Teaching using the "Relay Teaching Method" may serve as an intervention for an upgraded instruction and student achievement in Mathematics. This study is going to use the definition of relay teaching as *"different instructors in succession in teaching the lessons*" in a mathematics course, particularly in Mathematics in the Modern World. The researchers believe that the use of this method will likely be significant in improving the performance of students in learning lessons in Mathematics in the Modern World. With careful planning and coordination between and among the relay teachers, students will not only perform better in the course but also enhance their teaching capability.

Furthermore, this study aims to motivate researchers to be responsive in realizing the learning objectives required by the educational system with varied teaching and learning strategies. This study hopes that it will contribute to improving mathematics education suited to the demands and contexts where learners shall become competitive and inclined in mathematics. For all students to achieve at their highest capacity, instruction must employ strategies that have demonstrated to be most effective. Suitable teaching and learning models for diverse groups of students may be employed for practice to support the learning styles and differentiated needs of students.

Theoretical Framework

This study is anchored on social constructivism. Collaborative teaching aligns with the principles of social constructivism, a theory proposed by Lev Vygotsky. According to this theory, learning is an active process that occurs through social interactions and collaboration. Collaborative teaching encourages students to engage in joint problem-solving, discussion,

and shared exploration, allowing them to construct knowledge together and develop a deeper understanding of the subject matter.

In addition, the study is also guided by Multiple Intelligences Theory that was proposed by Howard Gardner. This suggests that individuals possess different types of intelligence, such as linguistic, logical-mathematical, spatial, interpersonal, and intrapersonal intelligence. Collaborative teaching allows for diverse forms of intelligence to be recognized and utilized within a group setting. By encouraging students to collaborate, teachers can tap into different strengths and abilities, creating a more inclusive and holistic learning experience.

Many studies recognized the benefits of teachers who work together in generating new knowledge about curriculum and teaching in schools or teams such as in the study of Cober, Tan, Slotta, So, & Könings (2015); Hubers, Poortman, Schildkamp, Pieters, & Handelzalts, (2016); and Pareja Roblin, Ormel, McKenney, Voogt, & Pieters, (2014).

Also, the involvement of teachers in collaborative curriculum design can improve the organization of the curriculum, enhance teachers' possession of the curriculum, and promote curricular collaboration among teachers (Penuel, McWilliams, et al., 2009). Such involvement can only be effective when teachers themselves agree to change their practice, are convinced that their effort will bring about that change, and that they are indeed able to promote and install that change (Becuwe et al., 2015; Morris & Hiebert, 2011).

It has mostly been accepted that support is needed for design teams to become effective (Becuwe et al., 2015; Binkhorst, Handelzalts, Poortman, & Van Joolingen, 2015). Binkhorst et al. (2015) consider an essential role for a coach to support the design team. According to them, detailed tasks for the coach regulates the interaction of the team, alignment of goals within the team, and provides structure in carrying out of the activities in the the team. Linder (2011) describes and distinguishes two forms of support: pro-active and re-active. Pro-active support is designed based on the needs of the design teams, while re-active support is aligned with the process in the design team. On the basis of their study, Becuwe et al. (2015) argue that the coach of the group or team should be able to cater to the needs of the team. On the other hand, Svihla, Reeve, Sagy, and Kali (2015) showed that it is important to frame the design process, because teacher teams are often unfamiliar with the design process. This suggests that both forms of support are plausible and need to be complementary to each other.

Many studies focused on teacher collaboration. For instance, the study of (Vangrieken, Dochy, Raes, & Kyndt; 2015) presented a systematic review of teacher collaboration. The findings of their study showed that collaboration was a continuum ranging from mere aggregates of individuals to strong team collaboration. They also examined the importance of collaboration and provide diverse opportunities for collaborative learning. They also listed the benefits of collaboration for students, teachers, and schools. Besides, their study provided insights that are essential to transform schools into learning organizations to help students become successful in the future and bring an impact to society.

Ronfeldt, Farmer, McQueen, & Grissom (2015) also investigated the kinds of collaborations that may exist in instructional teams across public schools to predict student achievement. They reported that the quality of collaboration is associated to student

achievement leading to a better performance in mathematics and reading. Teachers improve rapidly in schools with better collaboration quality. Overall, their study presented positive feedbacks on collaboration.

Moreover, teachers advance competencies and practice when they consider collaborative design for their professional development. The study of Voogt, Pieters, & Handelzalts (2016) explored empirical shreds of evidence that take place when teachers design and embrace professional development and curriculum innovation. They found that learning outcomes for teachers in terms of pedagogical content knowledge and skills manifested.

Aside from collaboration, teachers must also consider resources and task designs that are integral in the teaching and learning process. (Jones & Pepin, 2016) stated that teachers need to know what to design, the tools for teaching, and the affordances that traditional resources cannot provide. Teachers must also be involved as partners in task design for professional learning so that some aspects of task design would not be neglected.

The aforementioned studies provide a framework for this study on the conduct of relay teaching method which may provide an assessment for faculty and student and identify the strengths and weaknesses of the learners and provide relevant educational decisions. Through collaborative teaching, particularly on having more than one instructor in a class could offer a blending of expertise, complementary personalities, and a balanced approach to grading.

Furthermore, many researchers had conducted studies to enhance students' performance students by employing different instructional strategies such as dyad learning (Aguanta & Tan, 2018), flipped classroom (Segumpan & Tan, 2018), rich assessment tasks (Pagtulon-an & Tan, 2018). These studies have one ultimate goal that is to determine which instructional strategies may help improve the performance of students in the field of mathematics. The conduct of this study hopes to contribute in providing another perspective in teaching mathematics as a form of collaborative teaching.

Fakomogbon and Bolaji (2017) examined the effects of collaborative learning styles on performance of students in a mobile learning environment in Chemistry using a pretest-posttest approach. The results revealed that there were significant improvements between pretest and posttest scores of students exposed with mobile learning experience. Those students exposed to think-aloud-pair technique was considered the most effective collaborative learning style.

In the study of Remo (2019), he found out that most of the students have a fair performance in MMW and is affected by the level of difficulty they experienced in the topics covered in the entire semester. The students consider MMW as a difficult course due to lack of technology resources such as calculator and access to computers.

Moreover, in the study of Roman and Villanueva (2019) revealed that the first-year college students have higher extent of acquisitions on the competencies set in the Mathematics in the Modern World. Students experienced slight difficulties on the different topics in the course with satisfactory performances in the subject. Their study also revealed that acquired competencies and difficulties have significant relationships to the performance of the students.

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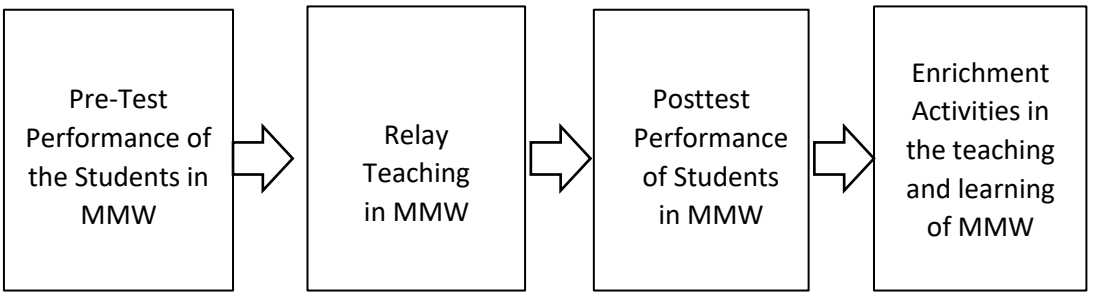
Conceptual Framework

The researchers were guided by the research paradigm illustrated in Figure 1 below.

Figure 1
Research paradigm



The study revolves around the implementation of the relay teaching method. The performance of the students was determined before and after this teaching method through a pretest and posttest. Moreover, specific enrichment activities were identified which could enhance the teaching and learning process.

Objectives of the Study

This study aimed to improve the performance of three groups of education students in Mathematics in the Modern World using the relay teaching method at the University of Northern Philippines during the first term, S.Y. 2019-2020. Specifically, it sought to (1) determine the level of performance of the students before and after their exposure to the relay teaching method, (2) compare the mean scores of the students before and after employing the relay teaching method, (3) determine the significant difference in the mean scores of the three groups of students with the pretest scores as covariates, and (4) propose enrichment activities in the teaching and learning of Mathematics in the Modern World.

METHODOLOGY

This portion includes the research design, population and sample, data gathering instruments, data gathering procedures, and statistical treatment of study.

Research Design

This study utilized the pretest-posttest research design with no control group. Though there were three groups of students involved in the study, a control group was not considered because each group were subjected to relay teaching. To summarize the feedback of students, it employed qualitative data analysis.

Participants of the Study

The participants of this study were the three groups of students enrolled in Mathematics in the Modern World during the first term of School Year 2019-2020 at the University of Northern Philippines.

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Table 1
Distribution of participants

Groups	f	%
Bachelor of Elementary Education I (BEEd)	22	24.45
Bachelor of Physical Education I (BPEd)	29	32.22
Bachelor of Technology and Livelihood Education I (BTLEd)	39	43.33
Total	**90**	**100.00**

This study included a total of 90 students as respondents. These were the students who had a complete attendance during the duration of the study.

Data Collection and Instruments

To gather the needed data in this study, the researchers followed the steps listed below:

Step 1: Preparation of lesson plans, instructional materials, and schedule matrix. The teachers prepared the lesson plans and instructional materials used in delivering the lessons in the selected topic in Mathematics in the Modern World. The course syllabus served as a basis for developing the lesson plans. These were evaluated by competent mathematics instructors to ensure the validity of these materials. They also prepared and followed a scheduling matrix to ensure the same phasing of lessons in the three selected classes.

Step 2: Seeking consent. The researchers sought permission on the conduct of the study from the concerned individuals. They intended to use the first meeting with the students to inform them about the nature of the study and to request their participation with the use of an Informed Consent Form.

Step 3: Administration of Pretest to the students. The researchers administered the pretest and allotted one hour to finish the test. The results of the pretest served as baseline data about their performance in the selected topic in MMW, which is data management.

Step 4: Implementation of the Relay Teaching Method. The teaching and learning of the lessons lasted for three weeks to cover all the lessons on data management. In the first week of implementation, each of the relay teachers started teaching in their assigned class. In the second and third weeks, the relay teachers switched to teaching another class following the schedule matrix. The prepared lesson plans served as a guide in teaching the lessons on data management. The teachers used instructional materials during the implementation of the relay teaching method. These instructional materials comprised of PowerPoint presentations for delivering the different topics, worksheets for drill and group activities, and formative and summative quizzes for assessing the performance of the students.

Step 5: Administration of Posttest to the students. After implementing the intervention, the administration of the posttest followed to assess the performance of the students.

Step 6: Gathering of Feedbacks. The researchers selected six students from each class to give their insights about the implementation of the relay teaching method using the feedback guide questions.

The instruments used in gathering the data needed in the study were the performance test in MMW and feedback guide questions. The performance test is composed of 40 multiple-choice items that served as an instrument for the pretest and posttest. Three mathematics teachers validated the test instrument, which yielded a mean rating of 4.67 described as highly valid. Meanwhile, it was pilot-tested to students who have taken MMW. The result of the reliability test using KR20 yielded a reliability index of 0.723, which means that it was Good for a classroom test. The feedback guide questions were used during the interview with randomly selected students to elicit data about the implementation of the intervention.

Analysis of Data

The data gathered in this study were tallied, coded, analyzed, and interpreted using frequency and percentages, mean, t-test, and ANCOVA. Qualitative data analysis by using the process of sorting and categorization was employed to summarize the challenges and feedbacks of the students about the implementation of the relay teaching method.

Ethical Considerations

There was no conflict of interest in the conduct of this study. The students involved in the study were not the actual students of the researchers. The researchers requested permission from concerned authorities in the conduct of this study. The researchers observed privacy and confidentiality by safeguarding the identity of the participants using code numbers both for hard and soft/electronic copies; the latter was only be accessed by a password. The disposal of these copies shall be through shredding and deletion from the computer, respectively, after two years. The students agreed to be participants of the study through the Informed Consent Form. This study considered complete enumeration of the three groups of students who volunteered to participate in the study. In the case of having students who opted not to participate in the study, the actual subject teacher was in-charged. In the administration of the pretest and posttest to the participants, the researchers ensured that they had enough space to minimize social risks. There was no compensation incentive given to the participants. The results of the study shall be significant inputs to Mathematics instruction in the university. The instructors who provided the intervention would be able to enhance their teaching capability and develop camaraderie to ensure the engagement of their students to different teaching strategies that could result in their improved performance in Mathematics.

RESULTS AND DISCUSSIONS

1. The performance of students before and after exposure to relay teaching method

Tables 2 and 3 presents the performance of the students in terms of pretest and posttest mean score percentages in the different learning areas of Data Management. Table 2 revealed that the students had poor performance on data management before their exposure to the relay teaching method. They obtained 35.64% as their overall performance. The BEEd students got a mean percentage score of 37.16. The BPEd students got a mean

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percentage score of 36.12. And the BTLEd students got a mean percentage score of 34.42. Hence, the three groups of students had a poor performance in the pretest. This result is similar to the finding of Remo (2019) and Roman and Villanueva (2019) that students have a fair performance in MMW.

Table 2

Performance of students before exposure to relay teaching method

Learning Areas	BEEd		BPEd		BTLEd		As a Whole	
	M	DR	M	DR	M	DR	M	DR
1. Basic Statistical Concepts	46.97	G	41.38	G	40.38	G	42.31	G
2. Descriptive Statistics	26.82	P	29.66	P	26.92	P	27.78	P
3. Normal Distribution	31.06	P	35.63	P	38.89	P	35.93	P
4. Hypothesis Testing	40.91	G	43.68	G	38.03	P	40.56	G
5. Correlation and Regression	37.12	P	29.31	P	26.92	P	30.19	P
Overall	37.16	P	36.12	P	34.42	P	35.64	P

Legend:

Mean Score Percentage	*Descriptive Rating*
81.01 – 100.00	*Excellent (E)*
61.01 – 80.00	*Very Good (VG)*
41.01 – 60.00	*Good (G)*
21.01 – 40.00	*Poor (P)*
0.01 – 20.00	*Very Poor (VP)*

In the learning areas, the students obtained the highest mean percentage score of 42.31 described as Good on Basic Statistical Concepts while lowest on Descriptive Statistics with a mean percentage score of 27.78 described as Poor. Despite that they have already taken Statistics and Probability in Senior High School, the students got low scores, which may occur due to low retention of what they have already been taught. Hence, teaching the students with a strategy that may improve their performance was needed.

Table 3 shows that the level of performance of the students after exposure to relay teaching is Good, with an overall mean percentage score of 55.00. All three groups of students BEEd, BPEd, and BTLEd had a good performance with mean percentage scores 54.55, 50.43, and 59.65, respectively. The students obtained the highest mean percentage score of 63.89 on Hypothesis Testing, where they performed Very Good. They were also very good on Basic Statistical Concepts with a mean percentage score of 63.70. They were Good in the other three areas, but they obtained the lowest mean percentage score of 46.85 on Correlation and Regression.

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Table 3

Performance of students after exposure to relay teaching method

Learning Areas	BEEd		BPEd		BTLEd		As a Whole	
	M	DR	M	DR	M	DR	M	DR
1. Basic Statistical Concepts	66.29	VG	57.47	G	66.88	VG	63.70	VG
2. Descriptive Statistics	46.82	G	43.10	G	51.03	G	47.44	G
3. Normal Distribution	49.24	G	48.28	G	50.43	G	49.44	G
4. Hypothesis Testing	57.58	G	56.32	G	73.08	VG	63.89	VG
5. Correlation and Regression	46.21	G	44.83	G	48.72	G	46.85	G
Overall	54.55	G	50.43	G	58.65	G	55.00	G

Legend:

Mean Score Percentage	***Descriptive Rating***
81.01 – 100.00	*Excellent (E)*
61.01 – 80.00	*Very Good (VG)*
41.01 – 60.00	*Good (G)*
21.01 – 40.00	*Poor (P)*
0.01 – 20.00	*Very Poor (VP)*

The improvement of the performance of the students may be attributed to the use of the relay teaching method. This result conforms with the results of Mercado (2011) and Fakomogbon and Bolaji (2017) that there were signicant improvements in the performance of the students after being exposed to the interventions. Based on the feedbacks of the students, they claimed that they learn better with the use of the relay teaching method. One student narrated as follows:

> "This teaching strategy helps me understand our lessons because I was able to ask questions to different teachers that made me more convinced about what they are teaching, especially when I doubt some of the lessons presented".

Moreover, the students also appreciated this new teaching strategy which they perceived that teacher are more prepared for their lessons. Another student expressed that:

> "I observed that I was more engaged during our class, as well as my classmates because our teachers were very good at teaching. When they come to our class, they show that they are well-prepared for the lessons. Before we start with our lessons, our teacher asks and answers questions based on the lessons taught by our previous teacher. Also, as a visual learner, I learned better with the use of PowerPoint presentations during lectures".

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2. The difference between the pretest and posttest scores of the students

Table 4
Difference between the pretest and posttest scores of students

Groups	Pretest $\overline{x_1}$	Posttest $\overline{x_2}$	Mean Difference $\overline{x_2} - \overline{x_1}$	t-value	p-value
BEED	14.86	21.82	6.95	13.481	<0.05
BPE	14.34	20.17	5.83	8.750	<0.05
BTLED	13.77	22.85	9.08	12.490	<0.05
As a whole	14.22	21.73	7.51	17.651	<0.05

Table 4 shows the comparison between the scores of the students in the pretest and posttest. As a whole, the students improved by 7.51 in the posttest as compared to their pretest scores. Furthermore, it shows that the BTLEd students had the greatest improvement with a mean difference of 9.08. On the other hand, the BPEd students portrayed the lowest improvement with a mean difference of 5.83. The result using paired t-test also shows that the differences in the scores of students in the pretest and posttest are significant for all the three groups and as a whole as shown by computed p-values that are less than 0.05. It implies that the performance of the students had significantly improved after the intervention.

3. The difference in the performance of the three groups of students

This part compares the performance of the students based on their posttest scores after the implementation of the relay teaching method. Note that the three groups of students took the pretest. Knowing that the pretest in itself may have improved the students' performance in the posttest. So, this study controls the effect of the pretest on the posttest which is common in pretest-posttest research designs. The following table presents the results of the ANCOVA with the pretest as a covariate, which was measured before the intervention. It shows a statistical analysis for checking the significant interaction between treatment on groups and the covariate at 0.05 level of significance.

Table 5
Test of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	p-value
Corrected Model	244.249[a]	5	48.850	4.809	.001
Intercept	845.958	1	845.958	83.272	.000
Group	66.114	2	33.057	3.254	.044
Pretest	109.548	1	109.548	10.783	.001
Group * Pretest	43.872	2	21.936	2.159	.122
Error	853.351	84	10.159		
Total	43608.000	90			

Dependent Variable: Posttest
a. R Squared = 0.223 (Adjusted R Squared = 0.176)

The p-value of the interaction as shown by Group * Pretest is 0.122, which is not statistically significant. Hence, it does not violate the assumption of homogeneity of regressions that the three groups are more or less similar.

Table 6

Descriptive statistics

Group	Mean	Std. Deviation	N
BEEd	21.8182	3.01798	22
BPEd	20.1724	3.34951	29
BTLEd	22.8462	3.52837	39
Total	21.7333	3.51178	90

Dependent Variable: Posttest

Table 6 presents the descriptive statistics showing the mean scores of each group. It reveals that BTLEd students have higher posttest mean scores than the other two groups. However, it does not yet show the significant difference between and among the groups.

The following table presents the results for checking the equality of variances among the three groups of students as one of the assumptions for the analysis.

Table 7

Levene's test of equality of the error variances

F	df1	df2	Sig
1.854	2	87	0.163

Tests the null hypothesis that the error variance of the posttest scores is equal across groups.

a. Design: Intercept + Pretest + Group

Dependent Variable: Posttest

Since the significance value is 0.163 which is not statistically significant. In this case, it does not violate that assumption of homogeneity of variances.

Table 8

Results of the analysis of covariance on the posttest scores of the students

Source	Type III Sum of Squares	df	Mean Square	F	p-value	Partial Eta Squared	Observed Power
Corrected Model	200.377[a]	3	66.792	6.402	0.001	0.183	0.962
Intercept	1076.634	1	1076.634	103.197	0.000	0.545	1.000
Pretest	81.264	1	81.264	7.789	0.006	0.083	0.788
Groups	135.165	2	67.582	6.478	0.002	0.131	0.896
Error	897.223	86	10.433				
Total	43608.000	90					
Corrected Total	1097.600	89					

Since the p-value for groups is 0.002 which is less than 0.05, it means that the groups significantly differ from one another. Moreover, the effect size of 0.131 which is considered

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to be small, indicates the magnitude of the effect or how likely the difference is going to be present among the three groups of students. This means that 13.1% of the variance in the posttest scores of the students is explained by the groups of students as the independent variable. The observed power of 0.896, shows that the power level for the analysis is very high or considered to have adequate power.

The actual influence of the pretest as the covariate is shown by a sig value of 0.006, which specifies that the covariate significantly affects the posttest scores of the students. Hence, the pretest scores of the students should be included as a covariate that affects the performance of the students after they have been exposed to the relay teaching method. The effect of the pretest explained about 8.3% in the variance in the posttest.

Table 9
Estimated marginal means

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
BEED	21.613[a]	.693	20.237	22.990
BPE	20.133[a]	.600	18.941	21.326
BTLED	22.991[a]	.520	21.958	24.024

Table 9 provides the adjusted means for each group based upon the influence of the covariate. Because there is a statistical difference by the group as shown in the previous table, a post hoc test is needed to figure out which groups are significantly different from each other. Moreover, the table shows that the means are significantly different from each other in which the BTLEd students have the highest adjusted mean scores.

Table 10 provides a post hoc test using Bonferroni to determine which pairs of groups are significantly different. The table shows that the posttest scores of the BTLEd and BPEd students are significantly different (sig. = 0.002), with a mean difference of 2.858. On the other hand, the other two pairs of groups of students have no significant difference in their performance.

Table 10
Pairwise comparisons using bonferroni

Groups	Mean Difference (I-J)	Std. Error	p-value
BEED*BPE	1.480	.915	.328
BTLED*BEED	1.378	.870	.351
BTLED*BPE	2.858*	.795	.002

Based on estimated marginal means
**. The mean difference is significant at the .05 level.*
b. Adjustment for multiple comparisons: Bonferroni.

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The BTLEd students have the highest posttest scores compared to the other two groups of students who have a significant difference with the performance of the BPEd students but not significantly different from the BEEd students. It implies that the relay teaching method significantly helped improve the performance of the BTLEd students as compared to the BPEd students. Moreover, the group of students has a significant effect on their performance after being exposed to relay teaching while controlling the effect of their pretest scores.

This result is supported by the remarks of the students which exhibited more positive feedbacks from the BTLEd group. Some of the positive feedbacks of the students are the following:

> "It is fun because of the opportunity to meet different instructors/professors who have different teaching styles and attitudes."
>
> "Our teachers did not fail to check our understanding of the previous lessons before having the next lesson."

4. Proposed enrichment activities in the teaching and learning of Mathematics in the Modern World

The following are some of the enrichment activities proposed to improve the performance of the students. These proposed activities considered the feedbacks of the students and discussion between and among the relay teachers.

a. For students, establish peer coaching between and among students. Use technological tools for keeping lecture notes and manipulating problems. Moreover, maximizing the use of the internet to supplement library work and classroom activities may also be an alternative to understand the topics more clearly. Also, their orientation and mindset as constructed by their mathematics learning that they took up in elementary up to senior high school should be deconstructed because topics in the MMW as the only general mathematics course in college are more relevant, practical, and exciting.

b. For teachers, keep constant communication with each other. Aside from the conduct of make-up classes in cases when there are class interruptions, alternative mode of learning may be resorted to such as to the conduct of online classes, encourage students to watch related lectures from credible social media sites, among others, or a more flexible approach in case not all students may not have access to the internet such as assigning them to prepare lecture notes with applications and solutions. Further, teachers may give more socially relevant and practical exercises such as examples concerning the entertainment and show business, emerging trends in fashion, latest news, among other fields that may catch students' attention and interest.

CONCLUSIONS

Based on the findings of the study, the level of performance of the students on data management had improved from poor to good when they were taught using the relay teaching method. The performance of the students before and after exposure to relay teaching was significantly different. There is a significant difference between the posttest scores of the BTLEd and BPEd students. The relay teaching method significantly helped

improve the performance of the BTLEd students as compared to the BPEd students. Lastly, enrichment activities may include coaching and sharing of lecture notes, social networking, and the use of social media and the internet.

RECOMMENDATIONS

This study recommends that Mathematics teachers are encouraged to sustain learning activities as indicated in the course syllabus to ensure better performance of students by networking with mathematics teachers around the country. The relay teaching method may be an alternative mode of learning. However, before its implementation, teachers are advised to undergo weeklong professional development workshops. These workshops may include addressing common concerns such as content coverage, teacher interpersonal relationship, student resistance, and skills to implement the method. On the first day of class, teachers may ask the students as to the extent of their access to an internet connection and their exposure to and usage of social media. Another study may be conducted with a control group to test the difference between the traditional method of teaching and the relay teaching method.

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