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Facebook group as an alternative learning management system: Its effect on the mathematics performance of students

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Abstract

This study was conducted to determine the effects of Facebook Group as an alternative learning management system on the performance of students on mathematics. This study used a quasi-experimental pretest and posttest design. Selected two sections were chosen as the subjects of the study wherein experimental group was exposed to Facebook Group as their learning platform and the control group used digital self-learning modules. The study used Mathematics Performance Test (MPT) which consisted of 40 teacher- made parallel items for the pre-test and post-test and Technology Acceptance Questionnaire was utilized to determine the technology acceptance of Facebook Group. Appropriate statistical tools such as weighted mean, frequency, standard deviation, paired sample t-test were used to treat the data. Results of the study showed that after the exposure of the two groups in their respective treatments, it revealed that students from experimental group showed a significant improvement in their mathematics performance. While in the control group, no significant improvement was observed. Moreover, a significant difference was found out between the pretest and posttest scores of students in the experimental group, while there is no significant difference between the pretest and posttest scores of students in the control group. It was also revealed that Facebook group was perfectly acceptable as a learning management system for students. Hence, Facebook Group is an effective platform in improving the students' performance and learning experiences towards mathematics.

Keywords: Facebook group, learning management system, technology acceptance model, mathematics performance, online learning

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1. Introduction

Digital and technical developments have changed all facets of living in the 21st century. Thus, social media has become a global communication instrument. These platforms allow users to share, remark, discuss, and produce knowledge. With 2.701 billion active members, Facebook was the most popular social media platform and roughly 74 million Filipinos used this platform. As Facebook moves toward meaningful communities, users are engaging with Facebook Group. Most Facebook group users communicate and educate online students and professors (Zuckerberg, 2020). Though not designed for education, Facebook groups can be utilized for online conversations and information sharing (Kurtz, 2014). Facebook Groups offer mentorship, learning blocks that includes running courses in the platform, content organization, admin assistant tools, and live watch parties with members. This platform is free, easy to use, and available on PCs, tablets, and phones, making Facebook more accessible, inclusive, and user-friendly.

At present, various commercially known learning management systems (LMS) such as Canvas of Instructure Inc., Moodle, and Google Classroom were widely used for online learning. However, these LMS limitations make them fewer ideal options such as their price, not user-friendly interface, and demands for IT support for its usability. These limitations are the best features of Facebook (FB) Group as a learning management system where students can easily navigate learning materials and access learning resources and can use this platform with no subscriptions. Moreover, the FB Group built-in features such as Facebook live, chat rooms, engagement and insight tools, and social learning units make this platform excel among other platforms (Peard, 2020).

The Facebook group as a learning management system improved student involvement, motivation, and academic achievement in many studies (Wang et al., 2012; Chen, 2015; Kalelioğlu, 2016). These studies only examined student performance in higher education. Most students' English, Social Sciences, and Science performances are also assessed. Thus, these gaps prompted the researcher to determine its effect on students' mathematics performance in a primary education learning environment since mathematics education in the Philippines became one of the Department of Education's (DepEd) top priorities due to students' poor math performance, as shown in international, national, and regional math tests such as Trends in International Mathematics and Science Study (TIMSS) and Programme for International.

1.1 Theoretical Underpinning

This study is anchored with two theories namely: Constructivism Learning Theory by Piaget as cited by Kamii and Ewing (1996) and Technology Acceptance Model (TAM) by Davis (1989). Jean Piaget's constructivism theory holds that students construct math operations and number concepts rather than internalize them. Piaget also emphasized that every normal learner is capable of good mathematical thinking provided attention and care are directed to activities of his interest and if emotional inhibitions that too often make him feel inadequate in math sessions are removed. Active children are better able to "inter-coordinate" or incorporate important events into their daily life, according to Piaget. These claims popularized this math teaching theory. In current teaching practice, Piaget's followers believe that active involvement is more important than passive participation for wide learning (Ebert, 2015). Active participation includes discussion, real-time feedback, interactive and collaborative projects (Hrastinski, 2008). Active involvement is crucial in mathematics teaching and learning since it was considered that the best way to learn mathematics is by doing it, discussing it, and synthesizing significant ideas (Prideaux, 2007).

Constructivism also encourages critical thinking and problem-solving, which are crucial math skills. Constructivism also promotes differentiation or active support to allow all learners to engage. Thus, teachers arrange learning activities to meet students' requirements and allow them to construct knowledge at their own speed and style, which is differentiation (Levy, 2010). Thus, as technology dominates mathematics teaching-learning, teachers must use technology to enhance interconnected learning and differentiation. This concept says that technology allows learners flexibility and adaptability in many situations and mathematics areas. E-tivities—online activities that encourage collaboration and engagement—will enable active participation. It promotes modern constructivism since learners construct knowledge with others (Salmon, 2002). Technology-centered curricula allow teachers to differentiate and adapt classrooms to help students learn. Technology can help kids with and without learning difficulties learn constructivistally. Tam (2000) also listed four features of a constructivist learning environment: knowledge will be a collaboration between instructors and students, teachers and students will share authority, the teacher will facilitate, and learning groups will be small and diversified. Thus, using a learning management system to teach mathematics supports constructivism.

The proposed technology acceptance model was based on various published studies on technology acceptance in information systems and perceived usability in e-learning. The technological acceptance model included eight usability factors (TAM). Studies show that usability attributes (content quality, learning support, visual design, system navigation, ease of access, system interactivity, instructional assessment, and system learnability) affect perceived ease of use, perceived usefulness, and attitudes toward technology, which are TAM's main constructs. This study opens up LMS usability and usefulness studies. In fact, several multidisciplinary studies have used the TAM as a framework, either in its original form or in the extended model (Venkatesh & Davis, 2000), to determine the level of technology acceptance in the behavioral intention of using LMS. The three major constructs—perceived ease of use, perceived usefulness, and attitudes toward technology—were shown to be associated and commonly used attributes among the 8 attributes (Alghamdi & Bayaga,2 016). The research showed that although the model had limited power for inexperienced online learners or learning management systems (Arbaugh, 2002), the TAM has emerged as a grounded paradigm for explaining LMS utilization and satisfaction with the technology as an educational delivery medium (Arbaugh,2002). Thus, utilizing the Technology Acceptance Model's perceived ease of use, perceived usefulness, and attitude toward LMS, the Facebook group's Technology Acceptance was determined. Based on these assumptions, the study will examine Facebook groups as an alternate learning management system for math instruction. The study also analyzed Facebook group LMS technology acceptability.

2. Literature Review

2.1 Facebook Group and Learning Management System

Kurtz (2014) characterized the Facebook Group as a virtual communication environment that can serve as a venue for knowledge sharing and discussion. Similarly, Wang et al. (2012) indicated that Facebook groups might serve as a learning management system to facilitate the sharing of content and the maintenance of relationships between teachers and students. Siddike et al. (2015) offered the following six stages for using Facebook Group as a learning platform: Creation of a Facebook group, posting of announcements, distribution of course materials, coordination of weekly tutorial sessions, facilitation of online conversations, and other administrative tasks. As a result, Kurtz et al. (2012) described the components of the Facebook Group that make it a learning platform, where the Facebook group's homepage is the wall. Members can share content, respond to queries, publish statuses (plain text messages) and links to safe and secure websites, as well as upload images and videos to the group's wall. Each item submitted to the wall can receive reactions by clicking the "like" button or any other respond button, or by leaving a comment. The organization of the posted and uploaded information was from most recent to oldest.

Recent research indicates that the use of a learning management system increases students' academic

achievement. For example, Tselios et al. (2010) evaluated the relationship between Moodle LMS usage and student performance at the University of Patras in Greece. It was discovered that LMS usage has a substantial favorable impact on student performance. In addition, Ahmed and Mesonovich (2019) discovered that students' grades in Pre-Calculus improved when they utilized Connect LMS, and that they outperformed their peers studying in a conventional environment. In addition, Murad et al. (2019) found that students' performance improves after being exposed to Facebook, concluding that Facebook has a substantial effect on the academic performance of undergraduate students in Quetta. Dzvapatsva et al. (2014) also found that students who used Facebook for e-learning reported greater contact time with peers and teachers and scored higher than those who did not use Facebook as a learning tool.

Moreover, Ebardo and Valderama (2009a) discovered in their study on the use of a Learning Management System in a higher education setting that information technology improves academic achievement. In his research, he employs two groups of students, one of which has access to a learning management system (LMS) and the other of which does not. Several Asian research shows the good effects of learning management system installation. This is supported by the research undertaken at Ewha Women's University by Jo et al. (2014). Researchers discovered that continuous use of learning management systems improves student performance. Similar to Chen's (2015a) findings on computer engineering students at a Taiwanese institution, where the use of Learning Management Systems improves student performance. In addition, study done by Han and Shin (2016) at an online institution in Korea revealed that the use of a mobile LMS positively impacted the academic achievement of online students. Madar and Ibrahim (2011) examined the association between E-Learning (EL) and student academic achievement in Malaysia (SAP). The more the EL involvement and engagement, the more favorable and substantial the relationship was discovered to be with SAP. Therefore, E-learning enhances the overall academic performance of students.

In addition, Qing and Lin (2010) described the favorable impact of computer technology, particularly when combined with a constructivist approach rather than a traditional one. Consequently, numerous research in the Philippines have investigated e-learning through the use of a Learning Management System. In the study conducted by Ebardo and Valderama. (2009b) on the performance of Information, Technology students enrolled in two parts at Jose Rizal University, it was found that students performed better in the second section. The first section was studied in a conventional learning setting, whereas the second section was studied in a blended or online learning environment. After using qualitative analytic methodologies to assessment results from both parts, the study's findings indicate that the intervention of LMS increased students' knowledge acquisition skills. Alday and Panaligan's (2010) studies on the effects of e-learning, notably in analytic geometry, on undergraduate students found that math anxiety decreased and academic performance in the subject improved due to the usage of e-learning to teach the subject. In the study conducted by Brioso (2017) on the implementation of e-classroom management systems at the University of Pasig, it was discovered that the proposed learning management system is effective as perceived by the respondents based on the given criteria, including the characteristics of the information's content, instructional design and presentation, class interaction aspects, methodological aspects, and learning outcomes.

2.2 Technology Acceptance of a Facebook Group as LMS

Davies identified three important elements influencing technology adoption in TAM that led to the deployment of a learning management system: perceived ease of use of technology (PEOU), perceived usefulness of technology (PU), and attitudes towards the use of Technology (ATU). Perceived ease of use is defined by Trayek and Hassan (2013) as the extent to which an individual believes that utilizing an LMS involves less effort. In contrast, perceived usefulness relates to the extent to which an individual believes that utilizing a Learning Management System would enhance their performance. In contrast, attitude toward use is described as a person's evaluation and association of the target system with their employment; an individual's reaction may be positive or negative.

Several studies demonstrate Facebook Group's adoption as a Learning Management System. According to the findings of Kalelioglu's (2016) study on students' experiences using Facebook Group as a learning management system at a university in Turkey, the majority of students were pleased with their Facebook-based learning experiences in terms of sharing course materials, instant messaging, the ability to upload files, engaging in discussions, and receiving instant notification. In addition, they had nothing but nice things to say regarding synchronous and asynchronous communication. In general, students viewed Facebook as an LMS due of had similar functionality. Ingalls (2017) assessed the Facebook group as a learning management system (LMS) for teaching developmental writing at a Mississippi institution. Facebook is a fantastic means to introduce developmental students to the eventual adoption of technology in their classes, particularly as a segue to Blackboard Vista and the new social networking site ConnSCU Commons, also known as LMS.

Moreover, Kurtz et al. (2012) did a case study at an Israeli institution. On the basis of the students' self-evaluations and reflections on their experiences, it was determined that they were satisfied with their Facebook learning experiences and willing to continue using Facebook groups in the future. Additionally, Albayrak and Yildirim (2015) propose Facebook as a Course Management System that can boost student participation in debates and out-of-class interactions between students and instructors. In addition, Beard et al. (2020) found that the Facebook group improved students' preparation for course evaluations, was convenient, facilitated appropriate communication, and facilitated learning. Moreover, Sánchez et al. (2014) surveyed college students regarding their perceptions of using Facebook for academic purposes and discovered that the majority of students believed Facebook would facilitate communication and collaboration with peers.

Multiple studies in Southeast Asia investigate Facebook Group's adoption as a learning management system. For example, Tananuraksakul's (2014) study at a university in Thailand showed that Facebook groups can be used as a blended learning and learning management system for students to learn with one another, rather than from the instructor. Moreover, they perceived Facebook group usage positively as a practical, trendy, and beneficial teaching medium, which motivated them to study English virtually and enhanced their positive views toward language comprehension. Similar to the findings of Omar et al. (2012) theme analysis conducted at a Malaysian institution. Facebook was discovered to be a platform for sharing information and a virtual tool for interaction. Chen (2015b) also performed research on Taiwanese computer engineering students using a Facebook group as a learning management system. It was discovered that the Facebook group surpassed other LMS academically and had a more positive outlook on learning, interaction, and motivation than the other LMS. Additionally, LaRue (2012) examined the impact of utilizing Facebook as the sole classroom management tool for a nursing course. Facebook proved to be a successful medium for blended learning and online learning, as was revealed. Facebook group is acceptable to students because it is a convenient, user-friendly learning management system on a platform with which they are already acquainted.

Facebook is a useful tool for increasing the delivery of a distant education course, according to a study conducted by Esteves (2012) among students registered in the University of the Philippines Open Education in the Philippines. The students effectively repurposed the social networking site (SNS) as a tool for distance education due to its friendliness and the clear guidelines and instructions provided. Student engagement increased, as shown by voluntary postings, ongoing debates, and sharing without professor compulsion

2.3 Objectives of the study

The study aimed to determine the effects of Facebook Group as a learning management system in the mathematics performance of students in Mathematics 10 and the level of acceptance of the Facebook Group as LMS. Specifically, it sought to answer the following questions:

- Is there a significant difference between the mathematics performance of students from experimental and control group in terms of pretest and posttest.
- Is there a significant difference between the mathematics performance pretest and posttest of the

experimental group?

- Is there a significant difference between the mathematics performance pretest and posttest of the experimental group?
- What is the level of technology acceptance of Facebook group as a Learning Management System in terms of perceived ease of use of technology, perceived usefulness of technology, and attitudes toward the use of technology.

3. METHODOLOGY

Research Design **-** The research used a quasi-experimental design with two intact groups since there are already existing sections of participants. Quasi-experimental research involves manipulating an independent variable without the random assignment of participants to conditions or orders of conditions (Cook & Campbell, 1979). Thus, two groups were formed and identified as the control group and the experimental group. Both groups took a mathematics performance test before and after the implementation of the intervention. Moreover, the experimental group was subjected to using the Facebook group as a learning management system in learning mathematics. In contrast, the control group used digital self-learning modules accessed from the created private Facebook group. In addition, both groups were taught by the same teacher with the same topics and the same duration of time during the conduct of the study. Lastly, at the end of the implementation of Facebook Group as LMS, both groups were subjected to take Mathematics Performance Test and answer a survey questionnaire about their experiences during the experiment.

Participants **-** The target population of the study was two sections of Grade 10 in a university. Since the study was a quasi-experimental research design, subjects were not randomly selected. Hence, one section was used as the experimental group and the other section will be the control group. However, to avoid bias in deciding the section to be either experimental or control, a "toss coin" was done. Moreover, the two groups were subjected to four (4) weeks or sixteen (16) class sessions, with one (1) hour per session.

Research Instruments **- The** researcher used four research instruments in the conduct of the study, namely Digital Self Learning modules, Facebook Group as LMS, Mathematics Performance Test, Technology Acceptance Questionnaire. Digital Self Learning Modules (SLM) consisted of four learning modules that cover Grade 10 Mathematics topics. Specifically, the Module 1 and Module 2 covers the topic in Permutation, and the Module 3 and 4 covers the topics involving Combinations. This instrument was used to deliver instruction to students in the control group, which is also the current modality used by students at the chosen school. Also, SLM served as a basis for the content, tasks, and assessment published in the Facebook group.

Facebook Group Learning Management System was the platform used by the experimental group in the four-week session in learning mathematics. This platform was used to chunk the parts of the SLM and published in the Social Learning Units of the Facebook Group. The Facebook group was also embedded with Web 2.0 tools to facilitate the assessments, and tasks found in the SLM.

The Mathematics Performance Test (MPT) was a teacher-made test consisting of forty (40) items. Since the MPT was used for both pre-test and post-test, items were parallel and identical. The MPT covers topics aligned with the "Most Essential Learning Competencies" for the Third Quarter in Mathematics 10 issued by DepEd, namely, *it illustrates the combination and permutation of objects, solves problems involving permutations and combinations, and differentiates permutations from combinations.* To follow the generally accepted test construction, a Table of Specifications (TOS) was created before constructing and designing the test. To ensure the content validity of the teacher-made test, it was validated by the adviser and two (2) subject specialists who teach Mathematics 10 for at least two years already. Suggestions from the adviser and the validators were incorporated. Since the MPT is a researcher-made instrument, it also underwent a test of reliability. Thus, a pilot testing of the questionnaire was undertaken. After conducting the pilot testing, the data gathered for the test was

tallied and underwent an item analysis procedure. Then, a test of reliability was conducted after the item analysis. The MPT obtained a Cronbach's alpha value of 0.73 with a verbal interpretation of acceptable. This signifies that the Mathematics Performance Test has a high internal consistency (Wesolowski, 2020).

Technology Acceptance Questionnaire (TAQ) consisted of twenty-one items that measure "perceived ease of use" (8 items), "perceived usefulness" (5 items), and attitude toward LMS (8 items). The questionnaire items were constructed on a four-point Likert scale from totally acceptable (=4) to unacceptable (=1). The TAQ was adapted from the study of Wichadee (2015) on the Factor's Related to Faculty Members' Attitudes and Adoption of a Learning Management System with the following modifications: (a) The variables age, gender, teaching field, educational level, and years of teaching experience were omitted. (b) The subsection of "actual LMS use" was removed as a subsection in the second section. Moreover, the items focus on students instead of instructors.

Data Analysis - The data were recorded and analyzed using the Statistical Package for Social Sciences (SPSS) Version 26. To identify if there is a significant difference between the pre-test of the two groups and also the significant difference between their posttest, independent sample t-test was utilized. To compare the pretest and posttest scores of each of the control and experimental groups, Paired Sample T-test was used. To determine the level of technology acceptance of Facebook Group as an alternative LMS in terms of the three sub-variables stated in the statement of the problem, the following range scale with their descriptive interpretation was utilized

4. Results

Table 1 shows that an independent sample t-test was conducted to compare the pretest students' pretest scores in both groups. As can be seen from the table, the p-value is equal to 0.617, which is greater than 0.05.

Table 1

Results of the t-test of difference between the pretest mean scores of the experimental and control groups.

Group	N	Mean Score	Sd	diff.	t-value	p-value
Experimental	37	18.65	4.46	.52	.502	.617
Control	39	18.13	4.57			

This suggests that the null hypothesis is accepted. This shows that the pretest mean scores of students in the experimental group (M=18.65, SD=4.46) are not significantly different from the pretest mean scores of students in the control group (M=18.13, SD= 4.57); t(74)=0.502 p>0.05. It can be inferred from the results that the students in the experimental and control groups were comparable in terms of their performance in Mathematics before they were exposed to the respective treatments.

Table 2

Results of the t-test of difference between the posttest mean scores of the experimental and control groups.

Group	N	Mean Score	Sd	diff.	t-value	p-value
Experimental	37	27.35	4.08	7.45	6.471**	.000
Control	39	19.90	5.77			

Legend: ** significant at $p<.01$

Table 2 shows that an independent sample t-test was conducted to compare the posttest scores of the students in both groups. As can be seen from the table, the p-value is equal to 0.000, which is less than 0.05. This suggests that the null hypothesis will be rejected. This means that the pre-test mean scores of students in the experimental group (M=27.35, SD=4.08) are significantly different from the pre-test mean scores of students in the control group (M=19.90, SD= 5.77); t(74)=6.471 $p>0.01$. This data implies that the posttest mean score of the experimental group is significantly higher than the posttest mean score of the control group. This further indicates that using the Facebook Group as a treatment in the experimental group is very effective in improving the performance of the students in the experimental group. Thus, teaching with the use of Facebook Group as a

learning management system is more effective than teaching with the traditional method or teaching without the use of a learning management system. This finding supports the findings of Basil et al. (2020) that students taught using LMS performed better than those exposed to the CAI4ME Package, a learning packet. This is also parallel to the study of Dzvapatsva et al. (2014), which revealed that students using Facebook for e-learning scored higher than those who are not using Facebook as a learning tool.

Table 3

T-test of difference between the pretest and posttest mean scores of the control group and experimental group

		N	Mean Score	Sd	diff.	t-value	p-value
Experimental Group	Pretest	37	18.65	4.46	8.70	11.121**	.000
	Posttest		27.35	4.08			
Control Group	Pretest	39	18.13	4.57	1.78	-1.915	.063
	Posttest		19.90	5.77			

** significant at $p<.01$

Table 3 shows the paired sample t-test to compare the pretest and posttest scores of the students in both groups. Since the p-value for the experimental group is less than 0.05, then the null hypothesis is rejected. This result indicates that there is a significant difference between the pretest scores (M=18.65, SD=4.46) and posttest scores (M=27.35, SD=4.08) of the experimental group; t(36)=11.121. $p<0.01$. On the other hand, the p-value for the control group is greater than 0.05, which signifies that the null hypothesis will not be rejected. This shows that there is no significant difference between the pretest scores (M=18.13, SD=4.57) and posttest scores (M=19.90, SD=5.77); t(38)=-1.915. $p>0.05$. These results imply a remarkable improvement in students' mathematics performance in the experimental group from the pretest to the posttest after they were exposed to using Facebook Group as a learning management system. However, in the control group, there was no improvement from the pretest scores to the post-test scores. These findings corroborate the findings of Chen (2015) that using the Facebook group as a learning management system improves the mean scores of students from pretest to posttest compared to the other control group. This proves that using a learning management system has a positive impact on students' mathematics performance compared to those who were not engaged in a learning management system (Ahmed, 2019).

Table 4

Level of technology acceptance of Facebook group as Learning Management System

Statement	Mean	DI
PERCEIVED EASE of USE of FACEBOOK GROUP as LMS		
It is easy to upload or download files in Facebook wall.	3.30	Totally Acceptable
It is easy to post and reply messages in the Fb Group forum	3.27	Totally Acceptable
It is easy to chat with my teacher and classmates using Facebook Messenger.	3.35	Totally Acceptable
It is easy to take the quiz on the Facebook group.	3.16	Acceptable
Interacting with the Facebook group does not require a lot of mental effort.	3.35	Totally Acceptable
Facebook Group is convenient to use.	3.32	Totally Acceptable
It is easy to find information on Facebook Group.	3.30	Totally Acceptable
Facebook Group allows easy return to previous display pages.	3.27	Totally Acceptable
Composite Mean	3.29	Totally Acceptable
PERCEIVED USEFULNESS of FACEBOOK GROUP as LMS		
Using Facebook Group would enhance my effectiveness in learning.	3.35	Totally Acceptable
Using Facebook Group would improve my subject performance.	3.32	Totally Acceptable
Using Facebook Group would increase my productivity in my subject.	3.30	Totally Acceptable
Using Facebook Group enables me to have more accurate information.	3.22	Acceptable
Using Facebook Group makes it easier to do my tasks.	3.11	Acceptable
Composite Mean	3.26	Totally Acceptable
ATTITUDE TOWARDS THE USE OF FACEBOOK GROUP as LMS		
The use of Facebook Group provides the instructor with many different tools to assess learning.	3.30	Totally Acceptable
The use of Facebook Group enables the material to be organized in a structure planned by the instructor.	3.46	Totally Acceptable

The use of Facebook Group makes communication more convenient.	3.35	Totally Acceptable
The use of Facebook Group provides a space where learning can take place independently.	3.14	Acceptable
The use of Facebook Group increases interaction among students and teacher.	3.16	Acceptable
The use of Facebook Group increases motivation for learning Mathematics	3.11	Acceptable
The use of Facebook Group produces new models of teaching and learning.	3.35	Totally Acceptable
The use of Facebook Group makes learning easier.	3.13	Acceptable
Composite Mean	3.26	Totally Acceptable
Overall Mean	3.27	Totally Acceptable

Legend: 3.26-4.00=Totally Acceptable; 2.51-3.25=Acceptable; 1.76-2.50=Unacceptable; 1.00-1.75=Totally Unacceptable

Table 4 presents the level of acceptance of Facebook group as a learning management system. Moreover, the table shows that perceived ease of use registered the highest composite mean (3.29). This indicates that the Facebook Group is convenient and a user-friendly learning management system since it is a platform that students already used and familiar with (Prescott et al., 2013). It can also glean from the table that the two remaining indicators, perceived usefulness, and attitude of use, have a composite mean score of 3.26. This validates the results on students' mathematics experiences exposed to the usage of a Facebook group that their collaboration, interaction, and performance were enhanced. This only implies that students' attitudes and perception of the Facebook group as a platform in learning mathematics are *totally acceptable*. This corroborates with Omar et al. (2012) that Facebook's effectiveness as a platform has positively impact information-sharing tasks and collaborative works.

It can also be derived from the table that the statement "The use of Facebook Group enables the material to be organized in a structure planned by the instructor" obtained the highest mean (3.46), which indicates that students find Facebook Group *totally acceptable* in the organization of learning material. This only shows that the Social learning units of the Facebook group have a significant impact on the acceptance of the Facebook group as a learning management system (Buchholz, 2019).

On the other hand, "The use of Facebook Group increases motivation for learning Mathematics" registered the lowest mean score of 3.11, which means that Facebook Group is acceptable as a medium for interaction between teacher and student. Aside from the latter statement, it is also known from the table that the statements "Using Facebook Group enable me to have more accurate information," "It is easy to take the quiz on the Facebook group," "Using Facebook Group enables me to have more accurate information," "The use of Facebook Group provides a space where learning can take place independent" are considered acceptable to students. The rest of the statements obtained a *totally acceptable* rating from students.

The data obtained from the table implies that the Facebook group has high acceptability as a technology and learning platform to students. It also denotes that students' performance and productivity improved through the use of the Facebook group. Also, the Facebook group is an effective platform for independent learning since it is revealed that students could learn the lessons easier. It also indicates that the Facebook group is a powerful educational tool to enhance learning. This finding corroborates with Beard et al. (2013) that the Facebook group was beneficial in improving readiness for course assessments, was convenient, provided a suitable means of communication, and enhanced learning.

5. Conclusion and Recommendation

The result of the study complements a considerable number of researches on the effects of learning management systems on the students' performance in Mathematics. It is remarkable to note that the students in the experimental group performed fairly in the pretest but showed very satisfactory performance in the posttest. Their performance improved after their exposure to the Facebook group as their learning platform. In comparison, the students in the control group who were not exposed to the treatment slightly change from fair performance in the pretest to a satisfactory performance posttest. The students' mathematics performance in the experimental group significantly improved due to their exposure to Facebook Group as a learning management system, as manifested by the significant difference in their mathematics pretest and posttest mean scores.

However, in the control group, there was no significant improvement in their mathematics performance. Facebook Group is totally acceptable as a learning management system in teaching mathematics for high school students. Finally, it can be said that Facebook Group is an effective learning management system in improving students' performance towards mathematics. The utilization of Facebook Group in mathematics teaching has been proven to significantly improve students' performance.

Based on the results, it is recommended that Facebook Group can be used as an alternative learning platform in the absence of a learning management system of the school or educational institutions. The use of Facebook Group as a learning management system is recommended to teachers, especially those teaching mathematics in Junior High School. It is also recommended to integrate other third-party applications to the Facebook Group to increase students' engagement, interaction, and motivation and to improve student's performance in mathematics. It is also encouraged to activate the Social Learning Units feature of the Facebook Group to organize learning materials effectively. Further, other research enthusiasts are encouraged to conduct a similar study in a broader scope or on different specializations to validate the findings of the present study. It is also suggested that more studies be performed on the students' performances and other factors related to Mathematics. Moreover, it is recommended to conduct a study that will explore the association of the three indicators of the technology acceptance model and its effect on students' performance. Lastly, qualitative research on students' experiences in distance learning is suggested to gather detailed and more in-depth information.

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