The Effects of Social Media on the Performance in Statistics of Grade 11 Senior High School Students

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Abstract

This study analyzed the effects of social media on students' performance in Statistics at STI West Negros University, Burgos Street, Bacolod City, during the School Year 2018- 2019. Data was gathered through a self-made instrument that had undergone tests of validity and reliability. Eighty (80) Grade 11 HUMSS students were taken as subjects using the quasi-experimental design, categorized as a pretest-posttest non-equivalent control group design. The control group was subjected to the traditional method, the usual discussion method, while the experimental group used social media as the intervention. The initial analysis showed no significant difference in the level of performance (LOP) in the pretests of both control and experimental groups, indicating the homogeneity of groupings before the start of experimentation. Subsequent analysis showed a significant difference between the pretests of both control and experimental groups. Interestingly, the posttest of the control group progressed to a high LOP, while that of the experimental group improved to just an average LOP. These results imply that traditional teaching still delivers the curriculum effectively through its long-accepted teaching methodologies. Likewise, collaborating with others through social media positively affected learning, though at a different level than shown by traditional methods. Given the findings and conclusions just mentioned, this paper calls for a perpetual enhancement of teaching methodologies and creative means for social media integration that enables learners to maximize interaction with mathematical concepts and minimize, if not completely eliminate, its distraction in the classroom.

Keywords: Statistics, social media, student performance, traditional teaching, Bacolod City, Negros Occidental

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Introduction

Nature of the Problem

The emergence of the digital era has created numerous chances for individuals all over the world to connect and access various types of information. The Internet provides rich information resources that are useful for multiple purposes in education, work, business, and keeping up with world trends (Ventayen, 2017).

Social media offers valuable audience and subject-monitoring tools and is one of the best platforms for extracting data. You can find out how most people feel about a particular topic or how experts perceive and advise on specific issues.

The younger generation is obsessed with social media. If to choose between reading textbooks or surfing the net, students would likely choose the latter. There are already more than 800 million active Facebook users, with Twitter and MySpace coming in a close second. According to Tham and Ahmed (2011), 49% of Facebook users are between the ages of 8 and 17.

The notion that social media could be used for education has recently received attention due to the wide use of the platform for communication purposes. Several studies found that students used social media mainly for personal purposes and rarely for education. It is essential to encourage students to use the Internet or social media to gather and share valuable information for their education. The teacher's role in education is not just to define, dictate ideas, and generate or assign content but also to help every learner construct learning paths to help them learn how to learn (Anderson & Dron, 2011). The students must understand each mathematical notion so that the primary goal of instruction is to nurture the development of the essential mental structures rather than to lecture, explain, or in any other way seek to "transfer" mathematical knowledge to the students.

Mathematics teachers discussed, including the researchers, that the academic performance of senior high school students of STI West Negros University in previous years had been decreasing. Based on the GTI system of the institution, in School Year 2016-2017, the average grade of Grade 11 students in Statistics was 87.4 %, but in the School Year 2017- 2018, the average grade of Grade 11 students in Statistics was 84.1%. It is alarming for us mathematics teachers in the senior high school department of STI WNU that these results will not be improved this academic year.

This study focuses on how social networking is slowly making its way into the K-12 educational setting but is not sufficiently researched in mathematics. Most studies in the literature focus mainly on writing and literature-based platforms (Zawilinski, 2012). It will determine the effects of social media on education, specifically on Statistics. Furthermore, it seeks to explore the possible use of social media for the development of learning Statistics. These outcomes could contribute to preparing learning materials to make learning more creative and encourage students to collaborate and develop new ideas.

Current State of Knowledge

According to social learning theory, pupils benefit most from peer-to-peer learning.
Numerous studies have shown that when students collaborate throughout their studies, they perform better academically and are more interested and motivated.
'This group learning approach appeals to younger, socially conscious learners and is based on the idea that many minds are better than one,' says Dr. Richard J. Light of Harvard University's School of Education (Tomaszewski, 2012).

Today's society is deeply embedded with social media. Social media, when used sensibly, can serve as a tool rather than a diversion. According to a recent blog article on the Edutopia website, employing social media in the classroom closes the digital divide for lower-income kids.

Since students already use social media outside of class, including it in the curriculum helps them learn social media best practices and adds a fresh perspective to lessons (Kumar, 2012). Hill (2015) demonstrated that social media might assist center a whole class's collective knowledge, making learning and communication more effective for everyone. According to Acheaw and Larson (2015), the usage of social media sites had a negative impact on the respondents' academic performance and that there was a direct association between the use of social media sites and academic performance. Richard Ng & Latifah

(2011) stated that sharing information and connecting with others has proven to be a powerful tool in education. Learners collaborate through social media to learn more ots, test and share ideas and theories, understand facts, and solve problems among peers. Moreover, Dublin (2015) confirmed that posting students' projects, such as artwork, performances, and other online activities, can also boost students' confidence. Letting them know that many people have viewed and liked their works can be an act of praise. It also connects students from all over the world.

According to Power's (2012) research, there is, to some extent, addiction and attention distraction caused by the use of social media, which could have serious repercussions for students' academic lives. This is true even though students can benefit from social media networks in terms of information sharing, forming relationships, and participating in group discussions with people nearby and around the world, among other things. Furthermore, Morallo and Tamayo (2014) discovered that social networking site usage had no meaningful association with student academic achievement. The grade increase is dependent on other elements in the teaching-learning process and so cannot be attributed to SNS alone.

Finally, Yeo's (2014) research found that students prefer using Facebook and YouTube videos to connect with friends, develop new ones, and be able to learn more on their schedule and in their preferred location.

The research also showed that young people, students, and lecturers have high hopes for using Facebook as a "social" medium to develop strong bonds with one another outside the classroom. However, the survey also showed that professors and students strongly underlined the need for in-person instruction to facilitate communication and academic and formal learning.

In conclusion, while reading, writing, and face-to-face communication skills are still necessary, they are no longer sufficient.

Older technology and literacies are supplemented but not replaced.

In the twenty-first century, social media and social networking tools can be used for teaching and learning in a way that combines traditional and digital literacy.

Objectives

The purpose of this study was to assess the influence of social media on the performance in Statistics of Grade 11 Senior High School Students at STI West Negros University during the 2018-2019 school year. Specifically, this study sought to answer the following questions:

1. What are the performance levels of the control and experimental groups in pre-test and post-test??
2. Is there a significant difference between the levels of performance in Statistics in the pretest and posttest of the control group?
3. Is there a significant difference between the levels of performance in Statistics in the pretest and posttest of the experimental group?
4. Is there a significant difference between the levels of performance in Statistics in the pretests of the control and experimental groups?
5. Is there a significant difference between the levels of performance in Statistics in the posttests of the control group and experimental group?

Hypotheses

1. There is no significant difference between the level of performance in Statistics and Probability in the control group's pretest and posttest.
2. There is no significant difference between the level of performance in Statistics and Probability in the experimental group's pretest and posttest.
3. There is no significant difference between the level of performance in Statistics and Probability in the pretest of the control and experimental groups.
4. There is no significant difference between the level of performance in Statistics and Probability in the control and experimental groups posttest.

Methodology

This section illustrates the supporting structure of this paper in adherence to the stringent requirements of research as a scientific process. Specifically, it includes the subject-respondents as the source of data, the research design used, measures and procedures for validity and reliability testing, data collection, and, eventually, data analysis.

Research Design

This study used the quasi-experimental research design, particularly the non-equivalent pretest-posttest control group design. The quasi-experimental design, by Howard White and Shagun Sabarwal (2014), chooses a comparison group that is as close to the treatment group as is feasible in terms of baseline or pre-intervention characteristics.

The comparison group would depict the results of the program or policy if it were not put into place.

Therefore, any difference in results between the treatment and comparison groups can be attributed to the program or policy. In a pretest-posttest design, the dependent variable is assessed twice: once before and once after the treatment is implemented. The pretest-posttest design is similar to a within-subjects experiment in that participants are tested under control settings first, then under treatment conditions.

Campbell sees quasi-experiments as a helpful adjunct to actual experiments and a fallback when true experiments are not feasible. While other extracts in this collection include inferences to various types of quasi-experiments, the quote by (Cambell and Rieken, 1974) provides the most comprehensive outline and evaluation of the main types of quasi-experiment.

Subjects

Eighty subjects of this study came from 40 students in Sections A and another 40 in Section C of Grade 11-HUMSS. Sampling was no longer used; the subjects were divided into two equal groups for the experimental and control groups.

Research Instrument

The researchers gathered the needed data for this study by constructing a self-made questionnaire which was given as the pretest and posttest to the participants. The questionnaire was divided into two parts. Part one contained the personal profile of the participants, which included the participants' names. Part two was the questionnaire proper. The 30-item test covered the lessons on Random Variables, Mean and Variance of Random Variables, and Normal Distribution. The obtained scores for the level of performance of the participants in Statistics were interpreted using the following guide:

Mean Range	Verbal Interpretation
25 & above	Very High Level
19- 24	High Level
13- 18	Moderate
7- 12	Low
6 & below	Very Low

Procedures

Validity and Reliability of the Data-Gathering Instrument

The self-made instrument was subjected to validity tests with a result of 4.56, interpreted as excellent, and reliability of 0.737, interpreted as acceptable, ensuring the appropriateness of its scope and content and producing consistent results.

Data Collection

After the approval of the proposal to the administration to conduct the study, reliability and validity were approved, and the research instrument was highly ensured that it was reliable and with high validity; the researcher gave a pretest of a 30-item questionnaire about Statistics to both controlled group and experimental grouped on their specific schedule of classes.
In one month, the researchers taught Random Variables, Mean and Variance of Random Variables, and Normal Distribution on a regular Statistics class schedule. The researchers taught the lesson to the control group using the traditional method or a regular classroom discussion.

On the other hand, the experimental group was oriented toward using social media as their primary tool for learning. Social constructivism, connectivism, and computer-mediated communication concerning reflective practices were their basis as a means of instruction with no intervention coming from the teacher.

A daily routine was established for students to be guided in the classroom discussion. Matrix was presented through PowerPoint presentation from the first day of conduct of the study until its last day.

Matrix of the schedule of activities was composed of topics such as Random Variables and Discrete Probability Distribution, Mean and Variance, and Normal Distribution, and their related activities and learning objectives. For the first hour, the students used teleconferencing, group chatting, video calling, collaborating, and interacting through social media accounts and other applications that would benefit the sense of discovery and learning to meet the given competencies. For the remaining 30 minutes, worksheets were provided to answer students individually, which served as an evaluation. After covering all the topics for the given time, the researcher gave the posttest (the same test given as the pretest before the experiment) to both control and experimental groups to determine their level of performance after the experiment.

Data Analysis and Statistical Treatment

The following sections spell out the procedure for analyzing data that sought answers to the research objectives raised in the paper's introductory section.

The researchers analyzed the data collected according to the specific objectives presented in Chapter 1. The statistical tool used in Objective 1, which aimed to determine the levels of students' performance of the control and experimental group of HUMSS Grade 11 students based on the previous test, was used. The mean is usually referred to as an average. It is the sum of all N values divided by frequency. Johnson and Kuby (2013) explained that the mean is the average with which you are probably familiar. The mean is calculated by summing all of the values of the given variable and dividing the total by the number of values.

The acquired mean scores for the levels of students' performance of the control and experimental groups in each area were interpreted using the following scale:

Mean Range	**Verbal Interpretation**
25 & above	Very High Level
19- 24	High Level
13- 18	Moderate
7- 12	Low
6 & below	Very Low

Objective No. 1, which aimed to determine whether a significant difference exists between the level of performance in Statistics in the pretest and posttest of the control group, used the paired-samples

t-test. Objective No. 2, which aimed to determine whether a significant difference exists between the level of performance in Statistics in the pretest and posttest of the experimental group, used the paired-samples t-test. Objective No. 3, which aimed to determine whether a significant difference exists between the level of performance in Statistics in the pretests of the control and experimental groups, also used the paired-sample t-test. Objective No. 4, which aimed to determine whether a significant difference exists between the level of performance in Statistics in the posttest of the control and experimental groups, likewise used the paired-samples t-test. The paired samples t-Test is a parametric test that compares two means from the same individual, object, or related units. The two means typically represent two different times (e.g., pretest and posttest with an intervention between the two-time points) or two different but related conditions or units. The test seeks to evaluate if there is statistical evidence that the mean difference between paired observations on a certain outcome is substantially different from zero (Yeager, 2019). In most studies, an alpha of 0.05 is utilized as the significant cut-off. If the p-value is less than 0.05, we reject the null hypothesis and conclude that there is a significant difference between the means. If the p-value is more than 0.05, we cannot infer that there is a significant difference (Ogee et al., 2015).

Ethical Considerations

Ethical considerations were seriously given throughout the study concerning access, confidentiality, and consent. Due to the sensitive nature of this research, no personal information was collected during the primary research, and respondents were advised to leave the personal information section blank in the questionnaires if they so desired.

Results and Discussion

Descriptive Analysis on the Level of Students' Performance in Statistics of the Control and Experimental Groups in the Pretest and Posttest

Table 1
Levels of Students' Performance in Statistics of the Control and Experimental Groups in the Pretest and Posttest

Group	N	Pretest		Posttest	
		Mean	Interpretation	Mean	Interpretation
Control Group	40	10.35	Low	19.30	High
Experimental Group	40	9.85	Low	15.08	Moderate

Analysis of the data on the level of students' performance in Statistics of the control and experimental groups in the pretest and posttest is presented in Table 2. The experimental group comprised 40 students who had undergone classes using social media as their main tool for learning, while the Control group was composed of 40 students who were not exposed to social media. Results revealed that both control and experimental groups increased their level of performance. The control group improved significantly from a mean of 10.85, which was viewed as a "Low level," to a mean of 19.30, which was seen as a "High Level." On the other hand, the experimental group, with a mean of 9.85 interpreted as "Low Level," improved with the mean of 15.08, which was interpreted as "Average Level."

This implies that both traditional teaching and social media tools improve students' performance in mathematics, specifically in Statistics. According to Richard Ng & Latifah Abdol Latif (2011), sharing information and connecting with others has proven to be a powerful tool in education. Learners collaborate through social media to learn more about certain subjects, test and share ideas and theories, understand facts, and solve problems among peers and teachers, which has improved academic performance.

According to Faruq (2013), when the teacher creates the curriculum, it gets easier to attain the targeted goals, the subject matter becomes psychologically sound owing to its relation with the children's

interests, needs, and level, and the material or subject matter is rationally organized. - Irrelevant material or subject matter is avoided, and teachers feel comfortable and confident in the classroom activities. In addition, the findings of the study support Shivaramaiah (2018), who stated that many students consider lectures the most effective tool for teaching and learning. The professor condenses the vast study material and delivers it to the students in an organized way, significantly reducing the student's burden.

Table 2
Comparative Analysis on the Levels of Performance in Statistics in the Pretest and Posttest of the Control Group

Test	Mean	Degree of Freedom	t-value	Significant Level	P-value	Interpretation
Pretest	10.35	39	10.649	0.05	.000	Significant
Posttest	19.30					

Comparative analysis of the level of performance in Statistics in the pretest and posttest of the control group is summarized in Table 3. The obtained p-value of 0.000 was less than the 0.05 level of significance. This indicates that there is a significant difference in the control group's Statistics performance between the pretest and posttest.

This implies that traditional teaching is still effective in improving students' performance. Formal education adopts a perspective toward education as a forum for socializing pupils toward executing their responsibilities in society through mastery of certain skills and established values, according to Kridel (2014). A teacher-centered curriculum is a set of assumptions about the objectives of education, ideas about knowledge, learners, and learning, and classroom practices that are visible in teacher behaviors and classroom practices. A teacher-centered curriculum is most successfully and efficiently communicated via techniques that enforce curricular order and is distinguished by pedagogical approaches that assume the teacher as an authority, learning by repetition, and learning as a quantifiable output.

Table 3
Comparative Analysis on the Levels of Performance in Statistics in the Pretest and Posttest of the Experimental Group

Test	Mean	Degree of Freedom	t-value	Significant Level	P-value	Interpretation
Pretest	9.85	39	6.89	0.05	.000	Significant
Posttest	15.08					

Comparative analysis of the level of performance in Statistics in the experimental group's pretest and posttest shows that the p-value of 0.000 was less than 0.05 level of significance. This revealed that there is a substantial variation in the experimental group's Statistics performance between the pretest and posttest.

This implies that collaboration through social media can improve students' performance in Statistics. According to Richard Ng & Latifah Abdol Latif (2011), learners collaborate through social media to learn more about certain subjects, test and share ideas and theories, understand facts, and solve problems among peers and teachers. Sharing information and connecting with others has proven to be a powerful educational tool. The main aim of using these social media was to establish social networks by fostering communication and knowledge exchange among learners, peers, and tutors in a more informal manner. Such interaction among learners and tutors offers assistance, orientation, and support and ultimately enhances learning by creating a positive working atmosphere.

In addition, Mei-Ling Yeo (2014) learned additional knowledge in their own time and in their preferred place. They like to learn informally via YouTube videos and Facebook postings, with information and knowledge extending beyond the textbook and the classroom boundaries.

Finally, Hill (2015) demonstrated that social media might assist consolidate a whole class's common knowledge, making learning and communicating more effective for everyone. Students can create a contact list or group for the class to communicate and exchange study advice by designating a course or study group hashtag, such as #Math1019Stat. Students can also invite instructors who use social media to monitor the group discourse or participate in conversations.

Table 4

Comparative Analysis on the Levels of Performance in Statistics in the Pretest of the Control Group and the Experimental Group

Test	Mean	Degree of Freedom	t-value	Significant Level	P-value	Interpretation
Control Group	10.35	39	.768	0.05	.447	Not Significant
Experimental Group	9.85					

Comparative analysis of the level of performance in Statistics in the pretest of the control and experimental groups revealed that the p-value of 0.447 was greater than the 0.05 level. This is reflected in the fact that there is no significant difference in the level of performance in Statistics between the control and experimental groups in the pretest. This result indicates that both groups have the same level of performance in statistics at the beginning of the experiment.

This indicates that students in the control and experimental group had the same poor proficiency in mathematics when it comes to the basic foundation of Mathematics, specifically in Statistics, when they were in junior high school. Thus, factors affecting students' performance in Mathematics, such as motivation in learning the subject in their previous school, may result in poor proficiency in Statistics.

Individual student motivation, according to Sosnowski (2017), influences success in a mathematics course. Individual student motivation may be established as part of the social effect on mathematics performance through support, expectations, and feedback that students get Feedback from students influences their cognitive assessments, which can enhance or reduce motivation. Furthermore, students who have a general lack of interest toward education, such as missing courses or coming to class unprepared, will have a general lack of motivation toward math subjects.

Table 5

Comparative Analysis on the Levels of Performance in Statistics in the Posttest of the Control Group and the Experimental Group

Test	Mean	Degree of Freedom	t-value	Significant Level	P-value	Interpretation
Control Group	19.30	39	5.152	0.05	.000	Significant
Experimental Group	15.08					

A comparative analysis of the level of performance in Statistics in the posttest of the control and experimental groups is presented in table 6. Findings revealed that the obtained p-value of 0.000 was less than 0.05 level of significance. The results showed that there is a significant difference in Statistics performance between the control and experimental groups in the posttest.

This implies that traditional teaching is still effective in improving students' performance. Likewise, collaborating with others through social media positively affected learning. According to Powers (2012), social media influences school performance significantly. It was reported that by interacting online, students could teach other students. If the student is keen to use social media for learning purposes, they could benefit directly from school performance. However, if the intention is to use it to be connected, a direct influence on school performance is not observed. "Social media is a good servant but a hazardous master," and it can also be "characterized as a two-edged sword." As a result, users, particularly students, must be aware of its hazards and utilize it wisely. Despite the benefits that students can derive from social media networks, including the ability to share information, make

connections, and participate in group discussions from a distance, there is some evidence that using social media can lead to addiction and attention-deficit disorder, which could have detrimental effects on students' academic lives. The study's findings contradict Acheaw and Larson (2015). Their research found that using social media sites had a detrimental impact on respondents' academic performance and that there was a clear association between using social media sites and academic performance. It is advised that rather than engaging in the customary constant chit-chat with pals, teachers should encourage students who have access to the internet on their mobile devices to use it to enhance their library research.

Furthermore, Morallo (2014) discovered that use of social networking sites had no meaningful association with student academic achievement. The grade increase is dependent on other aspects within the teaching-learning process and so cannot be ascribed only to the usage of social networking sites.

Conclusion

Despite criticisms, the effectiveness of traditional teaching remains largely undiminished. The fact that student performance in Statistics of both the experimental and control groups increased proves that conventional teaching methods still do wonders inside the classroom. Nonetheless, this paper admits that social media heightens classroom collaboration and engagement, thus, enabling students to learn more from one another. This paper calls for a perpetual enhancement of teaching methodologies and finding creative means for social media integration that allows learners to maximize interaction with mathematical concepts and minimize, if not totally eliminate, its distraction in the classroom.

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