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Social Media Influence and Students' Learning Ability: Implication to Mathematics Education

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Abstract:
This study examines social media for the purpose of improving students' learning ability in Mathematics. The simple random sampling technique was used to select 204 Senior Secondary 2 (SS2) students in 5 public secondary schools from about 4,000 (SS2) students in 14 secondary schools in Ojo local government area, Lagos State. The Students' Social Media Usage Questionnaire (SSMUQ) and Students' Mathematics Examination Scores (SMES) were used to collect the data. The descriptive statistics mean and line graphs were used to answer the research questions while ANOVA was used to test the null hypotheses. The findings show that 88% of students use social media for chatting, video watching or as a hobby. Of all the students that use WhatsApp, Facebook or both, only two use social media for research and three for examination preparation. However, one of the findings shows that social media has significant influence on students' learning ability in mathematics. It also shows that the students' usability of social media in mathematics is independent of their purpose. It was furthermore discovered that students' users of social media differ significantly in mathematics ability. This is evident in the mean ability levels of 1.85, 2.88, 2.02 and 1.8 as computed for Facebook users only, WhatsApp users only, Facebook and WhatsApp users and neither respectively. This indicates that users of WhatsApp only, have the highest ability level and the users of neither Facebook nor WhatsApp are mathematically low in ability level. To this end, the researchers recommended that WhatsApp should be used by mathematics teachers to improve students' leaning ability. Mathematical symbols should be created to improve teaching and learning via WhatsApp. Finally, students should be monitored by teachers and parents as they use the social networking sites so as to create a balance between social media and academic activities for improved ability in mathematics.

Keywords*: Social media, learning ability, Students' Mathematics Examination Scores (SMES), Students' Social Media Usage Questionnaire (SSMUQ), Senior Secondary 2 (SS2)*

1. Introduction

The utility value of Mathematics and its use for technological development all over the world cannot be over emphasized. Mathematics is the source of enlightenment to human understanding in the universe. The technological advancement of any country depends on the volume and quality of Mathematics offered in its school system. Without Mathematics the understanding of national problems would be superficial. Its usefulness in solving all kinds of problems in science and the development of any human society probably explains the reason it is a key subject in our school curriculum and syllabus, (Olisama & Appah, 2010).

Mathematics, been the mother of all science subjects plays a major and significant role in contemporary human society. Science is a dynamic human activity which helps man to know more about it's environ and universe. The world is turning scientific; and all proper functioning of lives depend greatly on science, (Alexander & Sales, 2010). Without the application of science, it would have been difficult for man to explore the other planets of the universe. Science comprises the basic disciplines, such as Mathematics, Physics, Chemistry, Biology, Computer etc. Many investigations have shown that secondary school students are exhibiting dwindling interest in science, (Anasanya & Omosewa, 2011), (Esiobu, 2005). Mathematics as one of the science subjects remains one of the most difficult subjects to the students as recorded by Udemezue, 2012.

Social media is one of the tools of science that facilitate communication and interaction in the universe. Marketers use this tool to share ideas, documents, photos, videos and virtually everything. Social networking sites provide individuals with an in-depth knowledge on how to maintain and strengthen the society, which can be of great benefit to both social and academic settings. However, it is imperative to note that these sites, could also pose great danger to students' reputations if not properly managed, (Ahern et al., 2016).

Social networking is a platform for people to know one another and share ideas, making the world more open and connected. Nowadays, social networking has a vital influence on our lives as it helps in every field of life such as political, economic and educational. As more people participate in social networking, the question is, is it merely a social activity or does it involve learning and development? Social networking websites are very popular among the youth. They constitute the largest percentage of the users of these sites. In this age, almost all students are connected to one or two social networking sites. Another important question is: what influence does that have on their studies?

1.1. Types of Social Network Sites

Social Network Sites (SNS) have been popular since the year 2009 and have attracted and fascinated billions of internet users. According to Boyd and Ellison (2014), SNS help people to gain worldwide publicity and attention. There are over 200 different social networking sites. People who are members of these SNS such as Face book and MySpace are very many. There is opportunity for anybody to create a web page or profile in order to have the ability to share information.
The following are some common types of SNS:

1.1.1. Face book

This is the most famous social network in the world for posting information and pictures which enables individuals to create profile for the purpose of meeting friends. It is also used for chatting. The approximate number of active users per month is 1.59 billion.

1.1.2. Twitter

This social network site is mainly for short text messages called (tweets), containing limited number of characters (up to 140). It enables people to share piece of advice and communicate with one another. The approximate number of active users per month is 320 million.

1.1.3. WhatsApp

Acquired by Facebook in 2014 is an instant messaging platform which still exists as an independent entity. WhatsApp also enables people to chat with friends and also share post and pictures. Number of active users per month is 1 billion approximately

1.1.4. Instagram

This is a SNS which involve playing of videos, sharing files and also sending pictures to family and friends. Instagram allows people to apply filters to your photos and you can easily post them to other popular social networking sites. Number of active users per month is 400 million.

1.1.5. e. MySpace

This is music-focused social networking site that provides an interactive and user-submitted network friend. It provides an opportunity for one to create his or her own profile which is supposed to be seen as reflection of that person's personality. Number of active users per month is 20 million approximately.

1.1.6. Skype

This is owned by Microsoft. It is mostly for voice calls, video calls (using a webcam) and message chat. It can be used for group conference calls. Number of active users per month is 300 million approximately.

1.1.7. Linkedin

This is one of the most popular professional social networking sites available in over 20 languages. It is used by all types of professionals to connect with different businesses, locate and hire ideal candidates. Number of active users per month is 100 million approximately.

1.1.8. Meetup

This enables you to find groups of like-minded people who have similar interest as you anywhere in the world. It also facilitates offline group meetings and one can become a part of such groups and their problem solving discussions, Boyd and Ellison (2014).

1.2. Impact of Social Networking Sites (SNS) on Academic Performance of Students in Mathematics

According to Ellison et al., (2007), academic performance is not a concept that is new, many social scientists and researchers' defined academic performance in various ways. The impact of social media on the academic performance of students as reflected on students' abilities, mastery of content and skills in applying learned knowledge to a particular situation in mathematics cannot be over emphasized. The relationship between students who are involved in social networking and their academic performance is that social networking helps to improve the rate at which such students learn and use their cognitive domain to solve a given problem in mathematics enables them to obtain a better result, (Kuss & Griff, 2011).

Social networking sites could have positive or negative impact on students' study habits. Bowen (2012) says that there have been many social economic and environmental factors that have been added to the pressure of secondary school students in learning mathematics whereby social networks helps in improving the students' learning ability based on the use of social media which enables the students to make research on their own on the internet to solve their academic problems.

According to Ekanem & Erukusin (2017) social networking sites help students to construct frequency table to calculate a given set of number using a Microsoft Excel Word (MSEW) which is based on mathematics. Social networking allows students to share a variety of technical features that allows individuals to construct a public or semi–public of their profile which enables them to share list and files of connection within the system. Social networking site provides opportunity for the students which help to improve their academic performance; they have the ability to make research on the internet in order to generate a fundamental knowledge for solving mathematics problems. This improves students' quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for the purpose of learning.

Social networking sites play an important role in mathematics, for example computing and investigating real world problems which enable students to have interest in developing mathematical methods to solving problems in computer. This improves students' academic performance in mathematics. It is nice to be able to work on systems which enlighten the students to make research to improve their studies, (Peter et al., 2012).

1.3. Disadvantages of Social Networking Sites

SNS are disadvantageous for the following reasons: They

- Perpetuate false and unreliable information can spread to millions of people within hour or days. Hence in social media not all information is reliable.
- Cause major relationship problems: online social interactions with social networking can start new relationships but end many relationships in a painful manner.
- Use profile and discrimination in the job world: just about everyone has a social media account that shows what they look like, the type of life they live and how old they are. Employers can use this as their advantages for unsetting their jobs.
- Lead to real addiction: one of the biggest problems with the social media is that people can become addicted to using social network without considering the time being wasted on line.

2. Statement of Problem

Students tend to spend most of their time on social networking sites at the detriment of their studies (Kuss & Griff, 2011). They use social media inappropriately which have a negative effect on their achievement in mathematics (Olisama et al., 2011). The students' attention is often distracted therefore causing poor academic performance. However this paper tries to highlight the use of social networking in education with respect to students' learning abilities in mathematics and to discover how best to use social media to improve students' achievement in mathematics and to identify which social media is more academically profitable to the students. It also intends to assist the students to strike a balance between their social networking activities and their studies.

2.1. Research Questions

The research questions developed are:

- What are the mathematics ability levels of senior secondary school mathematics students who use Facebook, WhatsApp, both and neither?
- Which among assignment, class preparation, examination preparation, research, chat, video watching and hobby facilitates the use of Facebook, WhatsApp, both and neither?
- What are the ability levels of senior secondary school mathematics students by gender who use Facebook, WhatsApp, both and neither?

2.3. Research Hypotheses

The following research hypotheses were tested at 0.05 level of significance:

- H01. There is no significant difference in the ability levels of senior secondary school mathematics students who use Facebook only, WhatsApp only, both and neither.

- H02. There is no significant difference in the ability levels of senior secondary school mathematics students by purpose who use Facebook only, WhatsApp only, both and neither.
- H03. There is no significant difference in the ability levels of senior secondary school mathematics students by gender who use Facebook only, WhatsApp only, both and neither.

3. Research Methodology

This describes the systematic approach adopted in carrying out the study.

3.1. Research Design

The descriptive research of the survey type was used for the study. This was adopted by using questionnaire to obtain information from the students about their usage of social media. The Students' Mathematics Examination Scores (SMES) were observed through their mathematics teachers and transformed to three ability levels using percentile. Students within 25th percentile were considered low, those between 50th percentile were taken as average while scores in 75th percentile were grouped as high. These ability levels, low (1), average (2) and high (3) were cross-tabulated with gender (male or female).

3.2. The Participant

The population of this study comprises of the entire second year students in public senior secondary school in Ojo local government area in Lagos state. Out of about fourteen public schools in this local government area, five were randomly selected to participate in the study. And from about 4000 students, 204 were randomly selected. Out of the 204 students, 41 students were selected from 4 schools and 40 students from the 5th school. There were 85 male students and 119 female students sampled.

3.3. Research Instruments

A self structured instrument, tagged Students' Social Media Usage Questionnaire (SSMUQ) was used for collection of data and to determine the relationship between social media and students' learning ability. SSMUQ was in two sections, A which consists of the questions that seek name of students' school, class, sex and age. Section B consists of 18 items seeking information on students' usage of Facebook, WhatsApp, both or neither. SSMUQ was designed in Likert type in the following order: strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). The scoring ranges from 4-1 mark if positively worded but reverse if negatively worded. The reliability coefficient of the instrument was obtained by applying Cronbach' Alpha reliability coefficient method which is equal to 0.79. On the students' response to SMUQ, out of the 204 students sampled, 33 used Facebook only, 32 used WhatsApp only, 119 used both, 20 neither. On the other hand, 2 used social media for research, 3 exam preparations, 5 lesson preparations, 15 assignments, 40 video watching, 55 chatting and 84 hobbies.
The Students' Mathematics Examination Scores (SMES) were used to determine the ability level of the students. SMES were obtained from each school and analyzed using 25th percentile, 50th percentile and 75th percentile for low, average and high ability levels respectively.

3.4. Data Collection Procedure

The researchers visited the five randomly selected schools one after the other and with the help of SS2 mathematics class teachers; they obtained the SMES to determine the students' ability levels. The researchers also distributed SSMUQ to each of the 204 respondents after giving them a brief orientation on the importance of giving sincere information. The completed copies of SSMUQ were collected from the respondents and scored by the researchers.

4. Data Analysis

The statistical tools that were used to analyze the data gathered to answer the research questions or test the hypothesis and represent the data, were the average mean, line graph and Analysis of Variance (ANOVA). These were used to estimate the influence of the use of social media on students' ability level including the purpose of usage.

5. Results and Discussion of Findings

Here, the researchers present and discuss the results. These results are shown in Figure 1, 2 and 3 as well as Tables 1, 2 and 3.

- Research Question 1. What are the mathematics ability levels of senior secondary school 2 mathematics students who use Face book, WhatsApp, both and neither?

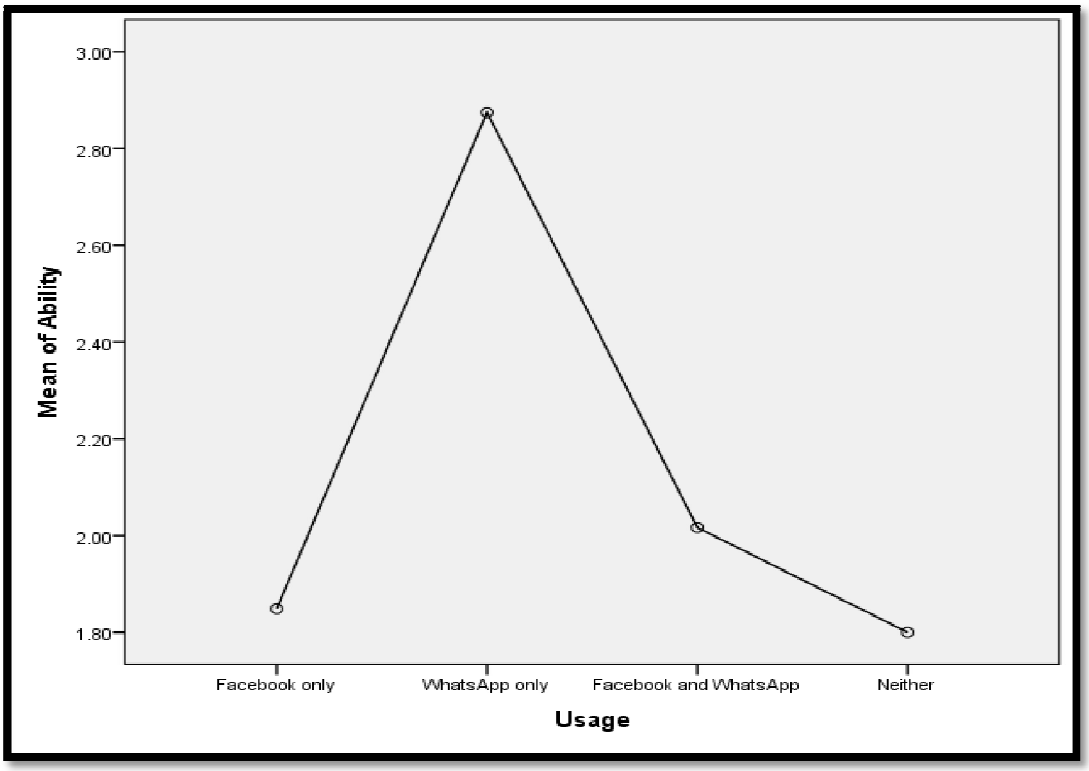

Figure 1: Ability Levels of Student Users of Social Media in Mathematics by Type

The results in Figure 1 portrayed that students who use neither Facebook nor WhatsApp are mathematically low in ability level, users of Facebook only are fair in mathematics ability or slightly above low ability, and those who apply both are average in mathematics ability level, while users of WhatsApp only have high ability in mathematics.

- Research Question 2. Which among assignment, class preparation, examination preparation, research, chatting, video watching and hobby facilitates the use of Facebook, WhatsApp, both or neither?

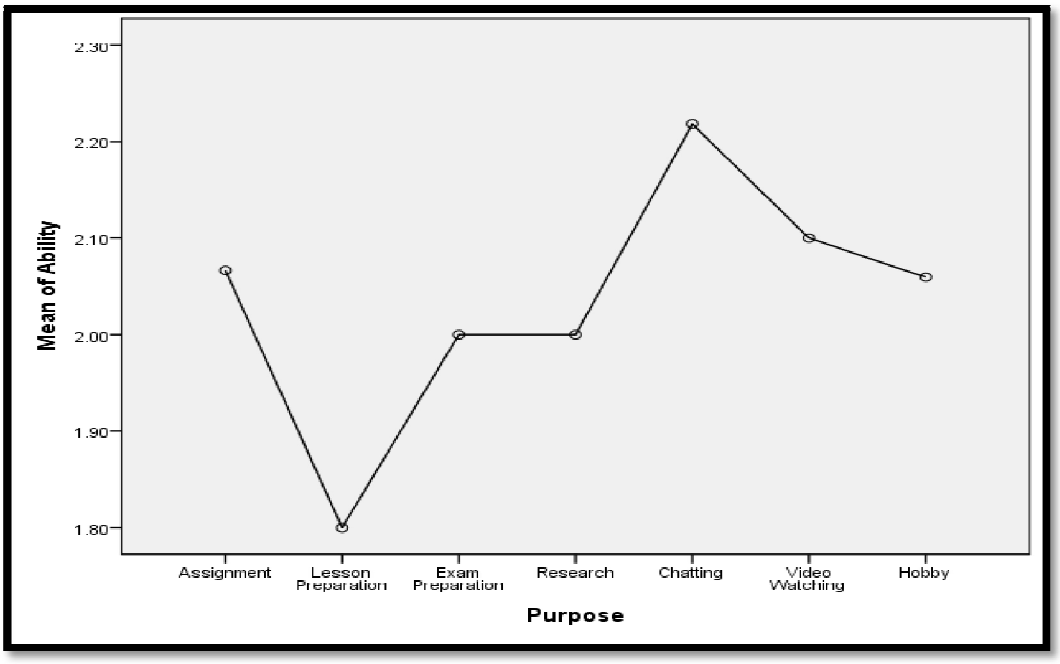

Figure 2: Ability Levels of Student Users of Social Media in Mathematics by Purpose

The results in Figure 2 show chatting as the most prevalent facilitator of students' use of social media. Next in rank include video watching, hobby and assignment, while research, examination and lesson preparations are the least reasons students make use of social media.

- Research Question 3. What are the ability levels of senior secondary school 2 mathematics students by gender who use Facebook, WhatsApp, both and neither?

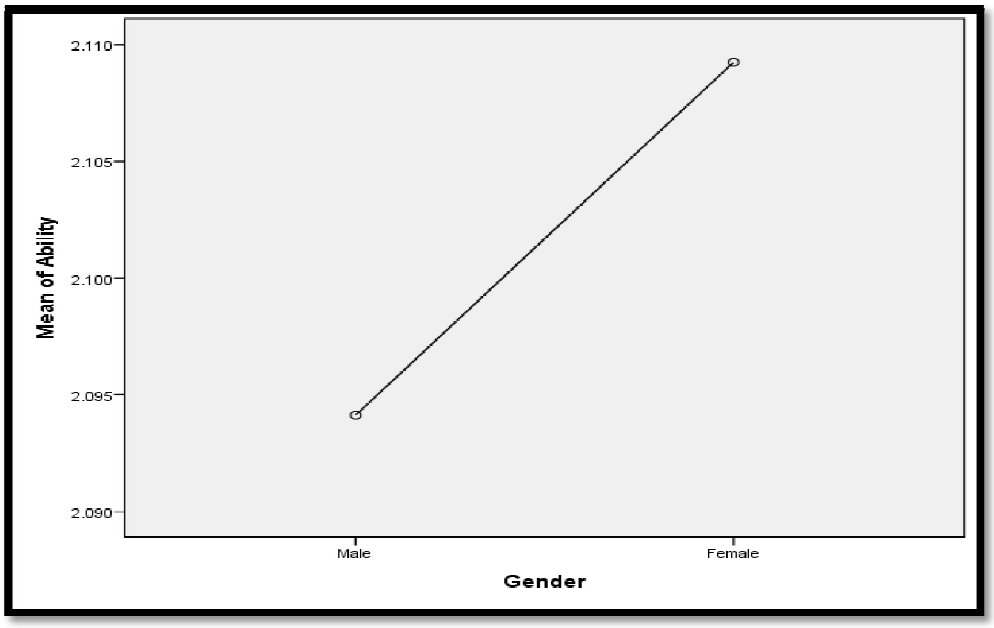

Figure 3: Ability Levels of Students' Users of Social Media by Gender

The results show that female users of social media accounts are slightly stronger in mathematics ability level.
The discussion of the results obtained in this study is in accordance with the hypotheses formulated for the study.

- H1. There is no significant difference in the ability levels of senior secondary school mathematics students who use Facebook only, WhatsApp only, both and neither.

	Sum of Squares	Df	Mean Square	F	Sig. Or P
Between Groups	23.93	3	7.98	107.00	.00
Within Groups	14.91	200	.08		
Total	38.84	203			

Table 1: Ability Levels of Student Users of Social Media

Note: Df stands for degree of freedom, F stands for Analysis of Variance (ANOVA) while sig. or p stands for the level at which the influence is significant. Letter p is the criterion which is used to make the decision, i.e., either to reject the null hypothesis or not. If $p < 0.05$, the null hypothesis is rejected, but if $p > 0.05$, the null hypothesis is not rejected.

The result F (3, 200) =107; $p< 0.05$ in Table 1 shows that student users of social media differ significantly in mathematics ability. This is evident in the mean ability levels of 1.85, 2.88, 2.02 and 1.8 for Facebook users only, WhatsApp users only, Facebook and WhatsApp users and neither respectively. This means that users of WhatsApp only have the highest ability level mathematically, while those that use Facebook only and those that use WhatsApp and Facebook are average in mathematics ability. The students who neither use WhatsApp nor Facebook have the lowest ability level in mathematics. Therefore, the null hypothesis which states that there is no significant difference in the ability levels of senior secondary school mathematics students who use Facebook only, WhatsApp only, both and those who use neither was rejected.

H2. There is no significant difference in the ability levels of senior secondary school mathematics students who by purpose use Facebook only, WhatsApp only, both and neither.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.42	6	.24	1.25	.28
Within Groups	37.42	197	.19		
Total	38.84	203			

Table 2: Ability Levels of Students' Users of Social Media by Purpose

The result F (6, 197) =1.25; $p> 0.05$ in Table 2 shows that users of social media differ insignificantly in purpose of using social media. This is evident in their average mean ability levels of 2.07, 1.80, 2.00, 2.00, 2.22, 2.10, 2.06 and 2.10 for assignment, lesson preparation, examination preparation, research, chatting, video watching and hobby respectively. This means that usability in mathematics is independent on the purpose of using social media. Therefore, the null hypothesis which

states that there is no significant difference in the ability levels of senior secondary school mathematics students who by purpose use Facebook only, WhatsApp only, both and those who use neither was not rejected.
H03. There is no significant difference in the ability levels of senior secondary school mathematics students by gender who use Facebook only, WhatsApp only, both and neither.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.01	1	.01	.06	.81
Within Groups	38.83	202	.19		
Total	38.84	203			

Table 3: Ability Levels of Students' Users of Social Media by Gender

The result F (1, 202) = 0.06; p > 0.05 in Table 3 shows that students do not differ significantly in their use of social media by gender. The descriptive analysis shows that the displayed mean ability value of the male and female students are 2.09 and 2.11 respectively. This means that users' ability in mathematics is equally independent of gender. Therefore, the null hypothesis which states that there is no significant difference in the ability levels of senior secondary school mathematics students by gender who use Facebook only, WhatsApp only, both and neither was not rejected.

6. Discussion

The finding of this work revealed that the users of WhatsApp have the highest ability level in mathematics while those that do not use any social media have the lowest ability level in mathematics. The implication of this study is that the use of social media has a positive effect on the ability level of the students. Precisely, the use of social media does not reduce the quality of students' ability in mathematics. Thus, the use of social media has the prospect of improving mathematics education if appropriately used. Tetteh et al., (2018) also agreed that the use of internet is of great benefits to the students and should be integrated into the teaching learning process. Similarly, our result is in line with the finding of Alhassan (2015) which revealed that social media reduces learning and research capabilities if not used wisely. It can result in time wastage and loss of motivation to study. It means positive and proper use of social network assist students academically but when used negatively and excessively, it affects negatively the students' academic performance in mathematics.

In addition, the finding support the work of Dutta & Ray (2010), who asserted that students' academic performance reflects the impact of social media in students' ability, mastery of content, skills in applying learned knowledge to a particular situation. Alhassan (2015) also noted that studies have shown that boys have been online more than girls in previous decades because of the earlier forms of technology such as games and sports. But recently, the findings of Tetteh et al., (2018) reveal that female students visit the internet more than the male students. In this work, it was revealed that girls that go online have higher ability level in mathematics than boys that go online. The implication is that girls are wiser in the use of social media than boys in the sense that girls are more academically conscious even when on social media.

Furthermore, the result of this work shows that most SS2 students use social media for chatting, while very few students use social media either for assignment, examination, lesson preparation or research. Of all the academic activities, assignment received the most important reason students use the social media and lesson preparation received the lowest students' support. This agrees with the research of Rithika & Selvarag (2013) which revealed that students spent most time in social media chatting and entertaining. Students were encouraged to grab the usefulness of social media to improve their ability level in mathematics and teachers should give assignment through WhatsApps.

7. Recommendations

Based on the findings above, the following recommendations were made:

- Schools should organize lectures, at least once in every term, on how to use social media for an improved academic performance (especially in mathematics) for all students. Smart phones having internet facility should be part of the list of items required to provide on resumption and the use of WhatsApp should be encouraged.
- Teachers should at every lecture brief the students the pros and cons of social media, and advice to always use this media to improve their studies in terms of assignment, projects, organizing academic materials, etc. Parents and teachers should encourage and monitor the students on the use of social media to improve their achievement in mathematics.
- The students should also be discouraged from spending too much time on chatting with friends, watching movies and other activities that are not related to improving their academic performance in mathematics.
- Social networking sites should be expanded and new pages be created to enhance mathematics study habit so that students can have varieties to choose from.
- Social media has both positive and negative effect therefore students should be taught to have the spirit of self control and embrace the positive aspect, like studying, doing assignment, participating in group discussion which can improve their performance in mathematics.

8. Conclusion

The result from the findings of this study shows that, though social media can have negative effect on students such as lack of privacy, distraction from study, time consuming and such like. The use of social media also have benefits if used appropriately; for instance, students can form online communication in order to plan for a project, have group discussions about class materials, or keep in contact with students who has been absent and need to be updated on current academic information especially in mathematics. It is worthwhile to note that students are influenced to a great extent by the social media negatively because attentions are focused on chatting and entertainment activities, neglecting their academic works. However, social media is useful for better understanding of mathematics concept not understood in class and its use is capable of decreasing students' level of dependence on teachers.

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