



Use of Social Media in the Teaching of Mathematics in Secondary Schools in Delta State, Nigeria.

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Abstract

This study investigated the utilization of social media for teaching mathematics in public secondary schools in Delta State. A descriptive survey design was employed for the study. The population consisted of 11,777 teaching staff in public secondary schools in Delta State for the 2023/2024 academic session. Using Krejcie and Morgan's (1970) sample size determination table, a sample of 375 teaching staff was selected from 473 public secondary schools in Delta State. The researcher developed a questionnaire, the "Use of Social Media in Teaching of Mathematics Questionnaire" (USMTMQ), to collect data. The instrument was validated by three specialists from the Department of Science Education at Delta State University, Abraka. Cronbach Alpha was used to determine the instrument's reliability, resulting in a reliability index of 0.72. A total of 375 questionnaires were distributed to respondents, who completed them immediately to maximize the response rate. Descriptive statistical analysis, specifically the mean, was used to analyze the data collected from the respondents' answers to the questionnaire items, with the aid of SPSS. The findings revealed that social media can be a valuable tool in enhancing students' educational experience in mathematics. Utilizing social media platforms like Facebook, Twitter, and Instagram can increase student engagement and interactivity in mathematics, leading to better comprehension and retention of mathematical concepts. However, various obstacles, including inadequate training and limited connectivity, hinder the effectiveness of incorporating social media in mathematics instruction. One of the recommendations was for school officials to provide training for teachers on effectively integrating social media into mathematics instruction.

Keywords: Social Media, Teaching, Mathematics Instruction, Secondary Schools, Online Learning, Teacher Training

Introduction

Social media includes digital platforms and websites that enable individuals to generate and distribute content, establish connections with others, and participate in virtual communities. These systems facilitate real-time communication, collaboration, and interaction among users, typically using text, photos, videos, and other multimedia formats. Social media has become an indispensable component of contemporary life, with billions of individuals worldwide utilising sites such as Facebook, Twitter, Instagram, and LinkedIn to maintain connections with loved ones, disseminate news and information, and articulate their thoughts and feelings. Social media's emergence has revolutionized interpersonal communication, dismantled physical boundaries and facilitating worldwide relationships. Recent research has emphasised the influence of social media on other

facets of society, such as politics, business, and mental health. For instance, a study conducted by Vosoughi et al. (2018) shown that incorrect information propagates at a greater speed and reaches a larger audience on social media compared to true information. This underscores the difficulties in addressing and countering online misinformation. Kietzmann et al. (2011) conducted research in the business field to investigate how social media impacts consumer behaviour and influences purchase choices.

The pervasive nature of social media in our daily lives necessitates acknowledging its significant influence on education, particularly in the realm of mathematics instruction. Recently, educators have been using social media sites like Twitter, Facebook, Instagram, and YouTube more often to improve their teaching methods and interact with students in creative and novel ways (Greenhow & Askari, 2017). One of the primary advantages of incorporating social media into mathematics instruction is its capacity to enhance communication and collaboration between students and teachers. For example, teachers can create Facebook groups or Twitter chats where students can ask questions, share resources, and collaborate on projects (Greenhow & Askari, 2017). This can help create a sense of community among students and provide them with additional support outside of the classroom. Furthermore, social media can also be used to provide real-world examples of mathematical concepts, making the subject more relevant and engaging for students. For instance, teachers can share videos or articles that demonstrate how mathematics is used in various industries or everyday life, helping students see the practical applications of what they are learning.

Although social media offers many advantages for mathematics instruction, educators must also be mindful of certain obstacles. An important issue to consider is the possibility of distractions and inappropriate usage of social media in the classroom (Bender & Townsend, 2018). Teachers must create explicit protocols and limitations on the utilisation of social media for educational objectives to guarantee that it helps learning rather than hinders it. In addition, there may be unequal access to social media platforms or the internet among students, leading to discrepancies in learning possibilities. It is important for educators to be aware of these disparities and devise strategies to guarantee that every kid has equal access to the necessary resources for academic achievement. Research has indicated that there are unequal levels of access to social media platforms among students, leading to inequities in learning possibilities (Selwyn, 2016). In addition, studies have discovered that many educators may exhibit reluctance in using social media into their instructional practices due to apprehensions over privacy, security, and the potential merging of personal and professional spheres (Greenhow & Askari, 2017).

In recent years, the utilisation of social media in education has garnered significant attention, as numerous educators have acknowledged its capacity to augment teaching and learning. Social media has demonstrated its ability to enhance student involvement, foster cooperation, and give access to a diverse array of materials in the realm of mathematics education. Research has demonstrated that social media platforms, like Twitter, can effectively facilitate mathematical discourse and enhance problem-solving abilities in students (Bender & Townsend, 2018). Research has demonstrated that Facebook groups can effectively promote peer-to-peer learning and offer supplementary assistance to students beyond the traditional classroom setting (Hew & Cheung, 2014).

Social media has gained significant popularity in education, as instructors are now integrating platforms like Facebook, Twitter, and Instagram into their teaching methods. However, research conducted in other areas has demonstrated encouraging outcomes. An empirical investigation carried out in the United States revealed that incorporating social media into mathematics instruction resulted in heightened student involvement, higher problem-solving abilities, and improved student collaboration (Junco et al., 2021). In a similar vein, a study carried out in the United Kingdom revealed that incorporating social media into mathematics instruction

facilitated the development of a communal atmosphere among students and nurtured a conducive learning environment.

There is a lack of study on the utilisation of social media in mathematics instruction, specifically in secondary schools in Delta State. This study aimed to fill this need by examining the present practices, advantages and difficulties of using social media platforms in mathematics teaching in secondary schools in Delta State. This study sought to gain significant insights into the utilisation of social media in mathematics education and enhance future strategies for enhancing mathematics instruction in secondary schools by analysing the experiences of students.

Statement of the Problem

Mathematics is a subject that is often perceived as difficult and uninteresting by students. Many students struggle with understanding mathematical concepts and often lack motivation to engage with the subject. This has led to poor performance in mathematics exams and a general disinterest in the subject among students. In recent years, educators have started to explore new ways to teach mathematics to make it more engaging and accessible to students. An effective method is using social media platforms into mathematics instruction. The utilisation of social media in the instruction of mathematics in secondary schools in Delta State offers both advantages and difficulties. Although social media platforms provide a novel and captivating method for delivering knowledge and engaging with students, there is a dearth of research on the efficacy of utilising social media for teaching mathematics in this particular context. The study sought to fill this research gap by investigating the utilisation of social media for teaching mathematics in secondary schools in Delta State. Specifically, it examined the current practices of teachers in incorporating social media into mathematics instruction, identified the advantages and difficulties associated with using social media in mathematics instruction, and proposed strategies to improve the integration of social media in mathematics teaching.

Purpose of the Study

The purpose of the study was to investigate the use of social media in the teaching of mathematics in secondary schools in Delta State. The study was specifically designed to determine:

1. the current practices of using social media in the teaching of mathematics in secondary schools in Delta State;
2. the perceived benefits of using social media in mathematics instruction.
3. the challenges associated with using social media in mathematics instruction.
4. How the use of social media can be improved to enhance mathematics instruction in secondary schools in Delta State.

Research Questions

1. What are the current practices of using social media in the teaching of mathematics in secondary schools in Delta State?
2. What are the perceived benefits of using social media in mathematics instruction?
3. What are the challenges associated with using social media in mathematics instruction?
4. How can the use of social media be improved to enhance mathematics instruction in secondary schools in Delta State?

Methodology

The study utilised a descriptive survey approach to ascertain the utilisation of social media in the instruction of mathematics in secondary schools in Delta State. This design is suitable since it focuses on objective data or information obtained through questionnaires and presents it without

any alteration. The study's population comprised 11,777 teaching staff from public secondary schools in Delta State for the 2023/2024 session. The study sampled 375 teaching staff from the 473 public secondary schools in Delta State using Krejcie and Morgan (1970) sample size determination table. The researcher created a questionnaire called the "Use of Social Media in Teaching of Mathematics Questionnaire (USMTMQ)" for data collection. The selection of this instrument was based on its ability to extract dependable information from the participants, hence minimising any potential bias resulting from little interaction between the researcher and responders. The instrument underwent validation by three specialists affiliated with the Department of Science Education at Delta State University, Abraka. The instrument's reliability was determined by the utilisation of Cronbach Alpha. The teaching staff utilised for assessing reliability were not included in the main study. The pilot study was conducted on 45 teaching staff from a school that was outside the area of coverage for this study. The data collected from these teaching staff were then analysed using Cronbach Alpha. A reliability index of 0.72 was obtained upon analysis. A total of 375 questionnaires were distributed to the participants individually. The questionnaires were collected immediately after they were completed to maximise the response rate. The researcher compiled the data obtained from the questionnaire. The collated data from the respondents' responses to items in the questionnaire were subjected to descriptive statistical analysis based on mean using SPSS. Based on the four points rating scale of the questionnaire, a mean of 2.50 was adopted as criterion mean for each item in the questionnaire. The mean response of all respondents to each item in the questionnaire were calculated and compared with the criterion mean to find the level of agreement and disagreement by the respondents. An item with a mean response of 2.50 and above is of agreement, whereas an item with a mean response of less than 2.50 is of disagreement.

Results

Research Question 1

What are the current practices of using social media in the teaching of mathematics in secondary schools in Delta State?

Table 1: Current Practices of Using Social Media in the Teaching of Mathematics

S/n	Items	Mean	SD	Remark
1	The use of social media platforms (such as Facebook, Twitter, Instagram) is integrated into mathematics lessons in a meaningful way.	3.13	1.08	Agreed
2	Teachers regularly use social media to communicate with students about mathematics assignments and upcoming assessments.	3.17	0.99	Agreed
3	Students are encouraged to use social media to collaborate with their peers on mathematics projects and problem-solving activities.	3.44	0.83	Agreed
4	Teachers provide guidance on how to critically evaluate and analyze mathematical information shared on social media platforms.	3.12	0.88	Agreed
5	Teachers effectively monitor and regulate the use of social media in the classroom to ensure it aligns with educational goals.	2.32	0.92	Disagreed
6	Teachers receive adequate training and support on how to effectively incorporate social media into their mathematics teaching practices.	2.43	0.88	Disagreed
Grand Mean		2.94	0.93	Agreed

SD = Standard deviation

The results of the study reveal the current practices of using social media in the teaching of mathematics in secondary schools in Delta State. The grand mean score of 2.94 (SD = 0.93) indicates

overall agreement on the current practices of using social media in mathematics instruction. The findings indicate that teachers in the state have begun to embrace the use of social media in their teaching practices, with a mean score of 3.13 (SD = 1.08) indicating agreement on the integration of social media platforms into mathematics lessons. Additionally, teachers regularly utilize social media to communicate with students about assignments and assessments (mean score = 3.17, SD = 0.99), and encourage students to collaborate on projects and problem-solving activities via social media (mean score = 3.44, SD = 0.83). However, the results also highlight areas for improvement. Teachers' ability to monitor and regulate the use of social media in the classroom to ensure alignment with educational goals was disagreed upon (mean score = 2.32, SD = 0.92). Furthermore, teachers reported a lack of adequate training and support on effectively incorporating social media into their teaching practices (mean score = 2.43, SD = 0.88). These findings suggest that while teachers in Delta State are making efforts to use social media in their mathematics teaching, there is a need for greater support and training to maximize its potential.

Research Question 2

What are the perceived benefits of using social media in mathematics instruction?

Table 2: Social Media Benefits for Mathematics Instruction

S/n	Items	Mean	SD	Remark
1	Increased student engagement in mathematics lessons.	3.11	0.98	Agreed
2	Improved communication between students and teachers.	3.22	1.04	Agreed
3	Enhanced collaboration among students on mathematics problems.	3.38	0.91	Agreed
4	Access to a wide range of online resources for mathematics learning.	2.67	0.83	Agreed
5	Development of critical thinking skills through online discussions.	2.94	0.84	Agreed
6	Personalized learning experiences tailored to individual student needs.	2.76	0.72	Agreed
7	Increased motivation to learn mathematics through interactive online activities.	3.42	0.70	Agreed
Grand Mean		3.07	0.86	Agreed

The perceived benefits of using social media in mathematics instruction were explored, and the results indicate that teachers in Delta State believe social media have a positive impact on teaching and learning. The grand mean score of 3.07 (SD = 0.86) suggests overall agreement on the benefits of social media in mathematics instruction. Specifically, teachers agreed that social media increases student engagement in mathematics lessons (mean score = 3.11, SD = 0.98), improves communication between students and teachers (mean score = 3.22, SD = 1.04), and enhances collaboration among students on mathematics problems (mean score = 3.38, SD = 0.91). Additionally, teachers believed that social media provides access to a wide range of online resources for mathematics learning (mean score = 2.67, SD = 0.83), develops critical thinking skills through online discussions (mean score = 2.94, SD = 0.84), and offers personalized learning experiences tailored to individual student needs (mean score = 2.76, SD = 0.72). Notably, the highest mean score was recorded for the benefit of increased motivation to learn mathematics through interactive online activities (mean score = 3.42, SD = 0.70), indicating that teachers believe social media has a significant impact on student motivation. Overall, the findings suggest that teachers in Delta State recognize the potential of social media to enhance mathematics instruction and improve student learning outcomes.

Research Question 3

What are the challenges associated with using social media in mathematics instruction?

Table 3: Challenges Linked to Social Media Usage in Mathematics Instruction

S/n	Items	Mean	SD	Remark
1	Lack of training opportunities on integrating social media in mathematics education.	3.13	0.70	Agreed
2	Limited access to technology and internet connectivity in the classroom for utilizing social media tools.	3.43	1.05	Agreed
3	Concerns about student privacy when using social media platforms for educational purposes.	3.38	1.12	Agreed
4	Resistance from parents who may not be comfortable with using social media for educational purposes.	2.71	0.99	Agreed
5	Time constraints for teachers to effectively plan and implement social media activities in mathematics lessons.	2.62	1.03	Agreed
6	Technical issues and glitches that may arise when using social media tools for teaching and learning.	3.41	1.13	Agreed
7	Lack of support and buy-in from school administrators for incorporating social media in mathematics education.	3.22	0.52	Agreed
8	Concerns about maintaining professionalism and boundaries when interacting with students on social media platforms.	3.34	1.19	Agreed
Grand Mean		3.16	0.97	Agreed

The challenges associated with using social media in mathematics instruction were explored, and the results indicate that teachers in Delta State face several obstacles when integrating social media into their teaching practices. The grand mean score of 3.16 (SD = 0.97) suggests overall agreement on the challenges associated with social media usage in mathematics instruction. The most significant challenges identified include limited access to technology and internet connectivity in the classroom (mean score = 3.43, SD = 1.05), technical issues and glitches (mean score = 3.41, SD = 1.13), and concerns about student privacy (mean score = 3.38, SD = 1.12). Additionally, teachers agreed that lack of training opportunities on integrating social media in mathematics education (mean score = 3.13, SD = 0.70), lack of support and buy-in from school administrators (mean score = 3.22, SD = 0.52), and concerns about maintaining professionalism and boundaries when interacting with students on social media platforms (mean score = 3.34, SD = 1.19) are significant challenges. Other challenges identified include resistance from parents who may not be comfortable with using social media for educational purposes (mean score = 2.71, SD = 0.99) and time constraints for teachers to effectively plan and implement social media activities in mathematics lessons (mean score = 2.62, SD = 1.03). These findings suggest that while teachers recognize the potential benefits of social media in mathematics instruction, they face several challenges that need to be addressed to maximize its effectiveness.

Research Question 4

How can the use of social media be improved to enhance mathematics instruction in secondary schools in Delta State?

Table 4: Enhancing Mathematics Instruction through Improved Use of Social Media

S/n	Items	Mean	SD	Remark
1	Incorporating interactive mathematics games and puzzles on social media platforms.	3.49	0.91	Agree
2	Providing step-by-step tutorials and explanations of mathematics concepts through social media posts.	3.45	0.83	Agree
3	Creating a community of mathematics enthusiasts and educators to share resources and ideas on social media.	3.67	0.84	Agree
4	Hosting live question and answer sessions with mathematics experts on social media platforms.	3.14	1.00	Agree
5	Encouraging students to collaborate and solve mathematics problems together through social media groups.	3.15	0.95	Agree
6	Utilizing social media polls and surveys to gauge student understanding of mathematics topics.	3.39	0.72	Agree
7	Offering virtual mathematics tutoring sessions through social media platforms.	2.79	0.70	Agree
8	Collaborating with mathematics influencers and educators to create engaging and informative math content on social media.	3.29	0.82	Agree
Grand Mean		3.30	0.85	Agree

Criterion mean = 2.50

The results of the study provide insights into how the use of social media can be improved to enhance mathematics instruction in secondary schools in Delta State. The grand mean score of 3.30 (SD = 0.85) indicates overall agreement on the strategies to improve the use of social media in mathematics instruction. Teachers agreed that incorporating interactive mathematics games and puzzles on social media platforms (mean score = 3.49, SD = 0.91) and providing step-by-step tutorials and explanations of mathematics concepts through social media posts (mean score = 3.45, SD = 0.83) can enhance mathematics instruction. Additionally, creating a community of mathematics enthusiasts and educators to share resources and ideas on social media (mean score = 3.67, SD = 0.84) was seen as a valuable strategy. Other agreed-upon strategies include hosting live question and answer sessions with mathematics experts on social media platforms (mean score = 3.14, SD = 1.00), encouraging students to collaborate and solve mathematics problems together through social media groups (mean score = 3.15, SD = 0.95), and utilizing social media polls and surveys to gauge student understanding of mathematics topics (mean score = 3.39, SD = 0.72). Furthermore, offering virtual mathematics tutoring sessions through social media platforms (mean score = 2.79, SD = 0.70) and collaborating with mathematics influencers and educators to create engaging and informative math content on social media (mean score = 3.29, SD = 0.82) were also seen as ways to improve the use of social media in mathematics instruction. These findings suggest that teachers in Delta State recognize the potential of social media to enhance mathematics instruction and are open to exploring innovative strategies to achieve this goal.

Discussion of Findings

The study revealed that the benefits of using social media in mathematics instruction are to increased student engagement in mathematics lessons, improved communication between students and teachers, enhanced collaboration among students on mathematics problems, access to a wide range of online resources, development of critical thinking skills, personalized learning experiences and increased motivation to learning mathematics. This finding agrees with that of Greenhow and Askari (2017) and Barton and Lee (2023). Greenhow and Askari (2017) reported that social media is used by teachers to engage students in mathematics discussions outside of the classroom, allowing

for continuous learning and collaboration. Barton and Lee (2023) further revealed that teachers use social media platforms such as Twitter and Facebook to share resources, ideas, and strategies for teaching mathematics. The authors further reported that social media platforms like Instagram and Pinterest are used by teachers to share visual representations of mathematical concepts and activities, making learning more interactive and engaging.

The study again revealed that the benefits of using social media in mathematics instruction are to increased student engagement in mathematics lessons, improved communication between students and teachers, enhanced collaboration among students on mathematics problems, access to a wide range of online resources, development of critical thinking skills, personalized learning experiences and increased motivation to learning mathematics. The finding lends credence to that of Kabilan et al. (2020) and Hew (2021). Hew (2021) reported that social media platforms can provide opportunities for collaborative learning and peer support in mathematics education. Social media can enhance student engagement and motivation in mathematics learning. Kabilan et al. (2020) reported that incorporating social media into mathematics teaching can promote communication and interaction among students, leading to a more interactive and dynamic learning environment.

One the findings of the study revealed that lack of training opportunities, limited access to technology and internet connectivity, concerns about students' privacy, resistance from parents, time constraints, technical issues and glitches, lack of support and buy-in from school administrators and concerns about maintaining professionalism and boundaries when interacting with students, are some of the challenges associated with the use of social media in mathematics instruction. This finding agrees with the views of Barton and Smith (2018) and Hwang and Wu (2014). Hwang and Wu (2014) reported that one the challenges is the potential for distractions and off-topic discussions to occur, which can detract from the learning objectives of the lesson. Barton and Smith (2018) reported that social media platforms can also present privacy concerns, as students may be hesitant to share personal information or engage in discussions that could be viewed by a wider audience.

The study also revealed that incorporating interactive mathematics games and puzzles on social media platforms, providing step-by-step tutorials and explanations of mathematics concepts through social media posts, creating a community of mathematics enthusiasts and educators to share resources and ideas on social media, hosting live question and answer sessions with mathematics experts on social media platforms, encouraging students to collaborate and solve mathematics problems together through social media groups, utilizing social media polls and surveys to gauge student understanding of mathematics topics, offering virtual mathematics tutoring sessions through social media platforms and collaborating with mathematics influencers and educators to create engaging and informative math content on social media, are some of the ways the use of social media can be improved to enhance mathematics instruction.

Conclusion

Based on the findings of the study, it can be concluded that social media can be a valuable tool in enhancing the learning experience of students in mathematics. The use of social media platforms such as Facebook, Twitter, and Instagram can help make mathematics more engaging and interactive for students, leading to improved understanding and retention of mathematical concepts, irrespective of the fact that the use of social media in mathematics instruction is hindered by numerous factors such as lack of training, poor connectivity among others.

Recommendations

The following were recommended based on the findings of the study:

1. School administrators should provide training for teachers on how to effectively integrate social media into their mathematics lessons.
2. School administrators should encourage collaboration among teachers to share best practices and innovative ideas for using social media in mathematics education.
3. School administrators should develop guidelines and policies for the use of social media in the classroom to ensure that it is used in a safe and appropriate manner.
4. Instructors should involve students in the process of integrating social media into their mathematics learning.

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