UNIVERSITY OF NAIROBI

EFFECT OF FACEBOOK SOCIAL NETWORKING PLATFORM ON ACADEMIC ACHIEVEMENT IN COMPUTER PROGRAMMING AMONG LEARNERS IN PUBLIC SECONDARY SCHOOLS, NAIROBI CITY COUNTY, KENYA

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DECLARATION

This Ph.D. thesis is my original work and has not been presented for award of degree in any other University.

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To the Almighty God, my parents, my Wife Jackline and our children Onesmus, Victor and Leon.

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ABSTRACT

The Facebook Social networking platform (FSNP) has gained popularity among users of all ages. However, it is seldom used for academic purposes among 21st-century learners. Its effect on academic achievement in computer programming among learners in public secondary schools in Kenya has not been studied and documented. The purpose of this study was to establish the effect of FSNP on academic achievement in computer programming among learners in public secondary schools, in Nairobi City County, Kenya. The study targeted Computer Studies students and the subject teachers. The objectives of the study aimed at establishing the differences in academic achievement between learners who were exposed to learner-interface interactions, participated in collaborative learning and spent different amounts of time on FSNP; the relationship between learners' attitude and teachers' perception of the use of FSNP as a learning and an instructional resource respectively and academic achievement. The study was guided by the social constructivism and connectivism learning theories advanced by Vygotsky (1978) and Siemens & Downes (2005) respectively. The study adopted a quasi-experimental design involving control and treatment groups. Quantitative data was obtained from pre-test and post-test scores, while qualitative data was collected using students' and teachers' questionnaires, lesson observation, and teachers' interview schedules. The study employed a purposive sampling technique to obtain two hundred and fifty (250) students from three boys' and three girls' public secondary schools in Nairobi City County which offer Computer Studies as an examinable subject by the Kenya National Examinations Council and thirty-two subject teachers. Data was analysed using SPSS version 20 and Microsoft Excel version 2016 tools. Descriptive statistics computed included frequencies, means, and variances, while inferential statistics included T-test, ANOVA, and Pearson's product-moment coefficient. The key findings of the study were that there were statistically significant differences in learner academic achievements between learners who were exposed to FSNP learner-interface interactions, participated in collaborative learning on FSNP, and spent different amounts of time on FSNP and those who did not. The study findings also established that there was a statistically significant relationship between academic achievement and learners' attitudes towards the use of FSNP as a learning resource and teachers' perception of the use of FSNP as an instructional tool. The study concluded that the use of FSNP as a learning resource and an instructional tool had a significant positive effect on academic achievement in Computer Studies among students in public secondary schools in Nairobi City County, Kenya. The study recommends the integration of FSNP in teaching and learning in schools in Kenya, engaging learners in collaborative learning on FSNP, regulating time learners spend on FSNP, review of the existing educational policy framework for adoption of ICT-based curriculum delivery and assessment techniques to allow learners and teachers to use SNPs such as FSNP in schools. The study recommends further studies to establish; the effect of FSNP on learner academic achievement in other subjects at all levels of learning across the country; the effect of FSNP on other dependent variables such as learner self-efficacy, motivation, mental health, and the effect of other social networking platforms like WhatsApp and Telegram on academic achievement in different subjects among learners in all levels of education in Kenya.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ANOVA: Analysis of Variance

BECR: Basic Education Curriculum Reforms

BECF: Basic Education Curriculum Framework

CAL: Computer Aided Learning

CAI: Computer Aided Instruction

CG: Control Group

CS: Computer Studies

FSNP: Facebook Social Networking Platform

GPA: Grade Point Average

ICT: Information Communication and Technology

KCSE: Kenya Certificate of Secondary Education

KIE: Kenya Institute of Education

KICD: Kenya Institute of Curriculum Development

KNEC: Kenya National Examinations Council

LMS: Learning Management System

MoEST: Ministry of Education Science and Technology

NACOSTI: National Commission of Science, Technology & Innovation

SAT: Student Achievement Test

SNS: Social Networking Sites

SNP: Social Networking Platform

SPSS: Statistical Package for Social Sciences

STEM: Science, Technology, Engineering and Mathematics

OSNP: Online Social Networking Platform

TG: Treatment group

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Computer Studies (CS) is an applied and technical subject offered in the Kenya secondary curriculum. Computer studies entail studying theories and principles of computing, algorithmic processes, hardware and software designs, applications, and the impact of computers on society. It equips learners with knowledge and skills for solving problems. Moreover, the subject provides learners with an understanding of current and emerging computing technologies, as well as career development and growth (Ontario MoE, 2008). According to KICD (2017), computer studies impart the competence and skills needed to attain the big four agenda and achieve Vision 2030. The Computer Studies curriculum offered in secondary schools in Kenya was developed in the year 1996 and revised in 2002 in alignment with the emerging information communication and technology (ICT) trends and socio-economic needs of the country (KIE, 2002).

One key topic taught in Computer Studies in secondary schools in Kenya that greatly contributes to building competencies in problem-solving among students is "Elementary programming principles". The topic is meant to equip learners with programming skills for developing computer software (KIE, 2002). Teaching programming skills in this topic requires seldom used innovative instructional resources such as the Facebook Social Networking Platform (FSNP) that support problem-solving and collaborative learning approaches. Despite the high academic achievement of learners in the Computer Studies subject at the Kenya Certificate of Secondary Education (KCSE), learners have persistently recorded poor performance in the questions that are tested from the topic "Elementary Programming Principles". The Kenya National Examinations Council (KNEC) annual reports for the last five years (KNEC Report, 2015, 2016, 2017, 2018 & 2019) indicate that compulsory questions, that is, question sixteen (16) of Computer Studies Paper 1 (451/1) as well as the entire Paper 3 (451/3) are based on this topic. However,

an analysis of the annual reports indicate that learners consistently posted poor performance in question sixteen (16) in section B of Computer Studies Paper 1 (451/1) in the KCSE examinations as shown in Table 1.1.

Table 1.1: Analysis of the KNEC Performance Rating of Question 16 in Computer Studies Paper 451/1

Year	**2015**	**2016**	**2017**	**2018**	**2019**
Question 16 Tested in Paper 1 (451/1)?	Yes	Yes	Yes	Yes	Yes
Average score for question 16 (X/20)	4.594	4.601	3.915	4.833	4.721
KNEC's Annual Report Performance Rating of Question 16	Poor	Poor	Poor	Poor	Poor

The analysis of the reports provide evidence that if learners posted good performance in the compulsory questions, the overall learner academic achievement in Computer Studies over the years would be higher than as shown in Table 1.2.

Table 1.2: Trend in Learner Overall Academic Achievement in Computer Studies Subject

Year	**2015**	**2016**	**2017**	**2018**	**2019**
Overall Mean (X/100)	55.62	57.67	60.42	57.37	61.49

The poor performance in the Computer Studies KCSE questions drawn from the skill-based topic "Elementary programming principals" can be attributed to the failure by teachers to use innovative instructional and learning resources when handling the topic. While alluding to this, in a study on the impact of the project method on learner's academic achievement in Physics in public secondary schools in Kenya, Muriithi (2013) attributed low learner academic achievement in skill-based subjects to the teachers' failure to devise and adopt innovative teaching methods and learning resources. In recent years, social networking platforms such as Facebook have emerged as such innovative instructional and learning resources.

Whereas the secondary Computer Studies curriculum in Kenya proposes adoption of such emerging technology innovations in teaching and learning the subject (KIE, 2002), Kiplagat and Ombiro (2016) observe that most online innovations are seldom utilized in public secondary schools for academic purposes. Kiplagat and Ombiro (2016) point out that despite the emerging 21st century instructional resource innovations, Computer Studies teachers continue to use the more teacher-centered traditional methods of teaching such as lectures, demonstrations, discussions, questions and answers without utilizing these innovations which enhance learning. As reported by Kiplagat and Ombiro (2016), learners have performed poorly in programming questions over the past five years in the Computer Studies national examination, which focuses on skill-based topics such as "Elementary programming principles".

Further, despite the Ministry of Education's (MoE) sessional paper no. 1 of 2019 (MoE, 2019) providing a policy framework for adoption of ICT-based curriculum delivery and assessment techniques, it does not explicitly specify which emerging technologies should be integrated in teaching and learning of the subject. In Kenya, emerging technologies like social networking platforms (SNPs) have not been mainstreamed across all levels of education. This is despite the continued use of the platforms by teachers and learners both at home and at school in Kenya. While this may contribute significantly to learner academic achievement in programming among students studying Computer Studies in Nairobi City County's public secondary schools, its effect has not been empirically established in Kenya.

Social networking platforms such as the FSNP are interactive computer-mediated technologies that aid in the creation and sharing of information, opinions, knowledge, interests and general communication through virtual communities and networks (Obar and Wildman, 2015). In a survey to determine the distribution of SNP users in Kenya by age group, Clement, (2020) observed that Facebook social networking platform (FSNP) is the most popular among others like WhatsApp, Tweeter and Pinterest.

The observation by Clement (2020) suggests that learners in secondary schools in Kenya are using these platforms which might be having an effect on their academic achievement.

While reviewing the reasons why many people would not stay away from FSNP, Kormos (2019) described the platform as a website where users share photographs, links to other websites, ideas, chats and access to live videos, hence the urge to remain connected through the platform. FSNP accounts for 2.45 billion SNP users across geographical, social, political and economic borders (Clement, 2020). Based on statistics, demographics, and facts about FSNP, Aslam (2020) concluded that 88% of the subscribers are youth between 18-29 years of age and that FSNP continues to gain popularity among younger users around the world. Clement (2020) observed that 38.6% of FSNP users in Kenya are learners in secondary schools and colleges aged between 13 - 24 years. Further, Clement (2020) indicated that Computer Studies learners in public secondary schools in the Country use this platform. However, despite its infiltration into schools and its appeal to 21st century learners, FSNP is used for non-academic purposes in Kenya (Kiplagat and Ombiro, 2016), resulting in concerns among educationist and parents about how this affects learners' academic achievement in Computer programming among learners in public secondary schools in Nairobi County, Kenya.

In instances where FSNP has been adopted as a learning resource, it is credited for enhancing communication, collaboration, creativity, flexibility, language and digital skills (Shaw, 2015). FSNP is further credited for promoting critical thinking, problem-solving skills and supporting learning beyond the classroom (Alkhalaf and Amasha, 2017). Learning beyond the classroom is made possible by the interactive tools offered by FSNP. Tools such as these enable learners to be connected online from anywhere and at any time for academic purposes. In support of this view point, Kormos (2019) noted that FSNP offer tools for sharing information, knowledge and ideas in the form of text, photos, graphics and documents, recorded and live audio and video conferences which make it popular among teachers

and learners. As a result, it is demonstrated that FSNP provides a synchronous and asynchronous computer-based instruction platform that would be ideal for teaching and learning Computer programming in public secondary schools in Kenya, whose impact on academic achievement can be assessed empirically.

While FSNP may offer tools ideal for teaching and learning, studies worldwide hold different viewpoints on its effect on learner academic achievement. For instance, while focusing on the effectiveness of FSNP in improving learning practices in Computer Science in the Philippines, Callo and Baguna (2017) observed that FSNP provided an interactive platform which facilitated learning interactions among learners resulting in improved individual achievement. Similarly, in a study on the academic use of FSNP in Japan, Abrahim, Mir, Suhara and Sato (2018) linked improved learner achievement in English to the collaborative interactions on the platform. Further, while analyzing the penetration and reception of SNPs in higher educational institutions in India, Vivakaran and Neelamalar (2018) opined that FSNP use boosts pedagogical interactions among learners and teachers that translates to gains in learner achievement. Whereas these studies were carried out on college and university students, there is an indication that adoption of FSNP as an instructional resource may have an effect on learner academic achievement in Computer Studies in public secondary schools in Nairobi County, Kenya thus the need to establish its effect through this study.

Similar findings on the effect of FSNP have been reported in Africa. For instance, in a study on the effect of FSNP on learner academic achievement among polytechnic students in Nigeria, Ekechukwu (2017) concluded that learner engagement and collaboration on the platform yielded to improved academic achievement. Ekechukwu (2017) opined that learners leveraged the technology affordances offered by FSNP for learner-learner, learner-content and learner-teacher interactions which contributed to their improved academic achievement. In support of this claim, Chawinga (2017) linked the academic

achievement among university learners who use FSNP in Malawi to its technology affordances suitable for online learner collaboration. Further, Langat and Bett (2018) opined that learner academic achievement among university students who use FSNP for learning purposes in Kenya is due to collaborative learning engagement on the platform.

While these studies in Africa and other parts of the world involved polytechnic and university students, it is imperative to conduct a study involving learners at lower levels of education. This is echoed in a desktop study focusing on use of Facebook SNP among secondary school learners in Kenya where Mulwa and Muriithi (2018) recorded eminent effect of FSNP on learner academic achievement in secondary schools and the need to include learners at lower levels in similar studies. For this reason, this study will seek to establish how learner-interface interactions on FSNP, online collaborative learning on FSNP, time spent on FSNP, learner attitude and teacher attitude and perceptions towards use of FSNP contribute to its effect on learner achievement in Computer Studies in public secondary schools in Nairobi County, Kenya.

Learner-interface interactions occur between the learner and the digital learning platform. Johnson and Cooke (2016) posit that learner-learner, learner-teacher and learner-content interactions are mediated by the learner-interface interactions a learning management system (LMS) provides. On analyzing discussion board postings to understand students' online interactions, Song and McNary (2011) observed that learner-interface interactions on SNPs are flexible, user-friendly and facilitate ease of access to content shared on them. Similarly, Duff (2011) observes that SNPs offer effective and superior learner-interface interactions to that of conventional online learning management systems (OLMSs) such as Moodle which are less interactive.

Effective learner-interface interactions offered by a platform determine how a learner interacts with subject content, colleagues and teachers. While agreeing to this premise, Wang, Woo, Wuek, Yang and

Liu (2012) posit that learner-interface interaction on SNPs facilitates learner interactions with subject matter and other learners just as on conventional OLMSs. In addition, Jumaat and Tasir (2016) concluded that SNPs offer learner-interface interaction tools that enhance learner achievement by presenting content in a compelling manner that motivates learners. Further, Phiyapa, Weerachat, Sunti and Achara (2018) affirm that learner-interface interactions on SNPs contribute to learner academic achievement by enabling timely access to content and feedback between the learner and teachers. Drawing from these affirmations, this study will seek to establish the effectiveness of learner-interface interactions on a specific SNP, Facebook and its contribution to learner achievement in Computer Studies students in public secondary schools in Nairobi County, Kenya.

Learner's academic achievement is linked to online collaborative learning on SNPs. Online collaborative learning takes place when learners work together virtually to share ideas, solve a problem, complete a task or create a product. While agreeing with this position, Alkhalaf and Amasha, (2017) and Lorcher (2019) point out that collaborative learning enhances learner motivation, problem-solving, social interactions, communication and critical thinking skills. These skills are key determinants of learning success. Asserting this position, Kalpidou, Costin and Morris (2011) argued that collaborative learning on SNP supports sharing of knowledge and skills in a more efficient manner that motivates students to work hard, ultimately resulting in improved academic achievement. While concurring to this argument, Raut & Patil (2016) observe that collaborative learning on SNP enables the learner to control the learning process which lead to mastery of the subject matter hence improved learner academic achievement.

More still, while focusing on the influence of social media on collaborative learning, Wandera, James-Waldon, Bromley & Henry (2016) affirm that collaborative learning on SNP enhances learner achievement through efficient learner-learner, learner-content and learner-teacher interactions. On a similar vein, Sarwar, Zulfiqar, Azizi & Chandia (2018) posit that collaborative learning on SNP leads to

improved academic achievement because learners share content and get instant feedback on content being discussed online. However, these findings were premised on qualitative research, did not focus on achievement in computer studies, hence prompting this empirical study to establish how FSNP's online collaborative learning would contribute to learner academic achievement in programming among Computer Studies students in public secondary schools in Nairobi City County, Kenya.

Time spent by a learner on an online learning platform determines his or her achievement. The effect varies depending on whether a learner spends time on the platform for learning or entertainment purposes. The ability to balance the time spent on SNP for learning or entertainment purposes is the main challenge among learners which may result in a decline in academic achievement. Alluding to this, Kirschner & Karpinski (2010) observed that learners using SNP take less time studying and get lower GPAs. While the study by Kirschner & Karpinski (2010) focused on Facebook and academic performance among undergraduate students in a Midwestern University it did not indicate any deliberate engagement of learners on the platform for learning purposes. However, the findings by Kirschner & Karpinski (2010) were affirmed by Datko (2015) in a study on the benefits and drawbacks of using SNPs in higher education who noted that spending a lot of time on SNPs led to decline in learner achievement.

On the contrary, while proposing a model for understanding educational use of FSNP, Celik, Yurt & Sahin (2015) contend that learners who frequently use FSNP but prudently manage time spent on it report positive gains in academic achievement. However, on the impact of FSNP usage on academic performance, Moghavvemi, Aziz, Sulaiman and Wai (2017) suggest that time spent on FSNP has no effect on learner achievement. While the studies cited here inform the effect of time spent on FSNP on learner achievement among college students, a generalization of a similar effect in programming among Computer Studies learners in public secondary school in Nairobi City County in Kenya cannot be made without an empirical study. This is because Computer Studies students in public secondary school in

Nairobi City County in Kenya may be spending less time or a lot of time on FSNP for academic or non-academic purposes which could be having some effect on their academic achievement in the subject.

Learner attitude towards the use of FSNP have been linked to academic achievement. According to a study using the mixed methods approach to investigate the attitudes and perceptions of Japanese university students' use of Facebook in an educational setting and the platform's capacity to be used in a way similar to a traditional learning management system for various specific language-learning activities, Gamble and Wilkins (2014) noted that students have positive attitudes towards using FSNP for educational purposes. Gamble and Wilkins attributed the positive attitude to the platform's capacity to offer a flexible learning community environment. This is because multimedia learning materials can be presented, access is not limited by time and geography, and learners are actively engaged in their learning. However, Gamble and Wilkins (2014) did not specifically focus on the effect of the learners' attitude towards Facebook on academic achievement.

Additionally, in an investigation concerning students' attitudes towards knowledge and skills in Facebook among students in the University of Hail's English department Salameh (2017) established that students had a positive attitude towards usability, efficacy and satisfaction of knowledge and skills other than adequacy of the education content shared on the platform. However, Salameh's study did consider the attitude of the learners and academic achievement. The findings in this study further complimented the results of a study involving undergraduate students in Morocco in which Faizi, Afia and Chiheb (2018) investigated students' attitude towards using Facebook as an educational tool. While Faizi, et al. did not focus on learner academic achievement, they observed positive students' attitude towards use of the platform not only for social interactions and entertainment but also for learning purposes in different subjects.

However, according to Williams and Adesope (2017), no significant differences were observed between students in different faculties regarding their attitude towards social media and increased learning. Williams and Adescope (2017) conducted a descriptive survey research at the University of Port Harcourt that investigated undergraduate students' attitude towards the use of social media for learning purposes. Despite their study involving university students and not focusing specifically on FSNP, Williams and Adesope (2017) attributed the findings to the fact that students had existing social media (SM) accounts and were using them for other purposes other than educational.

A teacher's perception of an instructional tool affects whether he/she will effectively use it during lesson delivery, which may ultimately impact his/her students' academic achievement. While alluding to this view point, Okika and Chinwe (2015) in a study that investigated how teachers' perception of television screen time influences academic performance of secondary school students in Awka Educational Zone in Nigeria argued that teachers' negative perception towards time student spent viewing television resulted in a negative impact on learner performance. The observations of Okika and Agbasi (2015) suggest that teachers would avoid the use of an instructional tool if it were perceived as one that would negatively affect student achievement. This would deny learners the benefits of utilizing the tool.

As such, while the use of FSNP as an instructional tool may have a positive effect on learner academic achievement, the teacher's perception of the platform would determine its utilization and whether learners would get an opportunity to benefit from the instructional affordances offered by the technology. In support of this viewpoint, Prescott (2014) observed that teachers' positive attitudes towards the FSNP have contributed to online learner engagement and improved teacher-learner interactions. In the study aimed to gain an understanding of how teaching staff at one UK university use Facebook and their perception and attitudes towards Facebook and online professionalism, in terms of the student-staff relationship, Prescott (2017) observed differences in attitude among teachers who used teacher-centred

style and those who used learner-centred style. However, Prescott (2017) did not focus on the relationship between teachers' perception and attitude affected learners' academic achievement despite involving university teaching staff.

On a similar vein, the findings in a quantitative survey research aimed at exploring the Iranian language teachers' attitude and perception towards social media and technology-based interaction conducted by Rezaei and Meshkatian (2017) established that English Language Teaching (ELT) teachers had a positive attitude and perception towards the use of social media. In this study Rezaei and Meshkatian (2017) intimated that use of social media such as FSNP in teaching promotes blended learning, supports teachers' professional development and, engages learners inside and outside the classroom. However, Rezaei and Meshkatian (2017) did not reveal details of how the teachers' positive perception towards use of social media such as Facebook influenced learning outcomes. Again, the results of a quantitative survey made to observe the use, attitudes, motivation and perceptions among Moroccan English teachers' towards FSNP as a pedagogical and instructional tool, Soulaymani and Alem (2019) observed that teachers have an inclination towards FSNP because it helps them to develop their professional skills which benefit learners through motivation and improved academic achievement. Still, the study by Soulaymani and Alem (2019) did not provide an insight into whether the teachers' attitude and perception towards the use of social media had an effect on learners' academic achievement.

While FSNP may have an eminent effect on learner academic achievement, none of the reviewed literature points to its effect on learner academic achievement in programming among Computer Studies students in public secondary schools in Nairobi City County, Kenya. Despite the country experiencing an explosion of social networking platforms (SNPs) and uncontrolled use among learners at all levels of education, learners have registered poor academic achievement in computer programming questions tested in the Kenya Certificate of Secondary Education (KCSE) for the last five years (KNEC, 2018).

This could be attributed to the fact that platforms such as FSNP are not used to support teaching and learning of Computer programming. Furthermore, the reviewed studies are exploratory in nature and involve college and university students. Therefore, their findings cannot be used to generalize the effect of FSNP in all subjects across all levels of education.

In support of this, Ogundijo (2014) recommends the use of experimental designs with a focus on particular subjects to establish the effect of FSNP on high school learners' academic achievement. Additionally, Albayrak & Yildirim (2014) suggest that such studies be carried out in developing countries involving learners at different levels to investigate the effect of specific SNPs on learner academic achievement. Further, Delello, McWhorter & Camp (2015) recommend an in-depth analysis of students' reflection on the appropriateness and effectiveness of specific SNPs like Facebook within particular disciplines to determine their usefulness in achieving learning objectives. Therefore, it was imperative that this study be carried out to establish the effect of FSNP on learner academic achievement in computer programming among learners in public secondary schools, Nairobi City County, Kenya.

1.2 Statement of the problem

Computer Studies (CS) is an applied and technical subject offered in the Kenya secondary schools curriculum as an elective subject. The subject equips learners with the knowledge and skills needed to tackle problems in life. According to Akwee, Toili, and Palapala (2012), Computer Studies not only prepares students for everyday computing and problem-solving skills, but also for learning other subjects such as sciences, humanities, and languages. Furthermore, according to Kenya's basic education curriculum reforms, Computer Studies is viewed as a strategic subject that will continue to impart skills that are critical in driving the country's big four agenda and achieving Vision 2030 (KICD, 2017). Notably, in the last five years, the subject posted impressive results in the Kenya National Examination Council (KNEC, 2019) as shown in Table 1.2. However, while the subject has continued to produce

remarkable results, the performance ratings analysis in the Kenya National Examinations Council's (KNEC) annual reports (2015 - 2019) show that learners perform poorly (average scores of less than 5 out of a maximum of 20 marks) in question 16 of the computer studies examinations, Paper 1 (451/1), as shown in Table 1.1.

The mandatory question has always come from the form three computer programming topic "Elementary programming principles". According to the Kenya secondary education Computer Studies syllabus, this skill-based topic is of strategic importance in the subject because it imparts programming skills that a learner would find useful in developing computer programs to solve day-to-day problems. The poor performance in the questions tested drawn from this topic might be attributed to the failure of teachers and learners to adopt emerging pedagogical approaches and instructional technologies which if utilized might contribute to improvement in the overall learner academic achievement in Computer Studies in the national examinations. One such instructional technology seldom utilized for academic purposes in Kenya is the Facebook social networking platform (FSNP), yet it could be the solution to the poor performance in question 16 in paper 1 (451/1) in Computer Studies KCSE examinations.

Additionally, while SNPs could provide an alternate platform for ongoing learning in the event of a natural disaster like the current Covid-19 outbreak, most developing nations like Kenya lack rules that explicitly support the deployment of such platforms in teaching and learning. The lack of empirical studies that inform the effect of FSNP and other social networking platforms on learner academic achievement have also led to non-adoption and non-utilization of the platforms among teachers and learners for academic purposes. Furthermore, despite the Kenya Ministry of Education's (MoE) 2019 sessional paper no. 1 offering a policy framework for the use of ICT-based curriculum delivery and assessment innovations, FSNP has not been integrated into teaching and learning. As a result, an

empirical study to determine FSNP's impact is required to justify the adoption of FSNP as an instructional tool.

1.3 Purpose of the study

The purpose of this study was to determine the effect of Facebook SNP on academic achievement in computer programming among learners in public secondary schools in Nairobi City County, Kenya when the Computer Studies learners interact with the platform's interface, collaborate and spend time on it; as well as the relationship between learner attitude towards use of FSNP as a learning resource and academic achievement, and teachers' perception towards the use of the platform as an instructional tool and academic achievement.

1.4 Research objectives

The specific objectives of the study were to:

i) Examine the difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not

ii) Assess the difference in learner academic achievement between learners who collaborate on FSNP and those who do not

iii) Establish the difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not

iv) Determine the relationship between learner attitude towards use of Facebook SNP for learning and learner academic achievement;

v) Determine the relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement.

1.5 Research hypotheses

Based on the above objectives, the following null hypotheses were tested in relation to the use of FSNPs in teaching and learning of Computer Studies in Kenya;

HO_1: There is no significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not;

HO_2: There is no significant difference in learner academic achievement between learners who collaborate on FSNP and those who do not;

HO_3: There is no significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not;

HO_4: There is no significant relationship between learner attitude towards use of Facebook SNP for learning and learner academic achievement;

HO_5: There is no significant relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement.

1.6 Significance of the study

The study attempted to provide empirical evidence on the effect of FSNP on learner academic achievement in computer studies. The study findings are expected to guide the ministry of education (MoE) and Kenya Institute of Curriculum Development (KICD) in policy formulation towards adoption and implementation of SNPs such as FSNP as instructional technologies for teaching and learning in secondary schools. It is anticipated that the study findings will make a significant contribution towards improving instructional competences of teachers across all levels of education. Further, it is hoped that the findings will promote adoption of emerging computer-based instructional technologies to bridge the geographical and digital divide that hinder learner access to education, reduce the cost of access to

education and promote equity in access to education. Further still, it is hoped that the study findings will spur further research on emerging educational technologies.

1.7 Delimitation of the study

This study focused on the use of FSNP as an instructional resource for teaching Computer Studies in sampled six (three boys and three girls) public secondary schools in Nairobi County in Kenya which offer the subject up to KCSE level. Nairobi County was chosen for the study because most students in the county are exposed to ICTs at an early age and that their schools enjoy robust ICT infrastructures. Only form three Computer Studies students and teachers participated in the study since at this level they take Computer Studies as an elective and specialization subject.

1.8 Limitations of the study

There were several constraints that may have influenced the outcomes of the study. Such constraints were treated as confounding variables since they were not considered in the study because the researcher did not have control over them. Such constraints included fluctuating Internet connection speeds and downtimes, power interruptions, change of school schedules, dropping or absenteeism of some learners and lack of teachers' experience in integrating FSNP in teaching and learning of computer studies. To address this, teachers were trained on how to create discussion topics, assignments, quizzes, posts and provide feedback that learners could access later at their convenience. Further, there were challenges in keeping the learners within the boundaries of the experimental conditions without them realizing they were taking part in a study. This was addressed by not informing them that they were participating in a study and by ensuring that lessons were conducted during their regular timetabled Computer Studies lessons and later given extra time outside the lesson schedules to interact and collaborate on FSNP over the topic taught. Further, the topic taught in this study was outlined as part of the teachers' schemes of work, and students were expected to study it as outlined by the Computer Studies curriculum in term two

of their academic year. It was assumed that the teachers' awareness of participating in the study did not in any way affect the outcomes and that they adhered to the instruction given.

1.9 Assumptions of the study

The study assumed that teachers and learners were able to use FSNP and adhere to the instructions and experimental conditions prescribed in the study. More precisely, first it was assumed that the Computer Studies students who were taught the topic "Elementary Programming Principles" did not realize that they were participating in a research study. Secondly, it was assumed that the Computer Studies teachers who participated in the study adhered to the experimental conditions prescribed by the researcher and that their awareness of the research activities did not affect the results. Thirdly it was assumed that the Computer Studies teachers had acquired the necessary knowledge and skill sets that were required to integrate FSNP in teaching and learning of Computer Studies. Lastly, it was assumed that the type of school, age of learner and gender did not affect the study results.

1.10 Definition of operational terms

Computer Studies - An applied and technical subject offered in the Kenya secondary schools curriculum as an elective subject

Emerging Pedagogical Approaches – In this study refers to the 21st century innovative and learner-centered teaching techniques that leverage on ICTs to promote seamless learner-learner, teacher-learner and learner-content interactions

Facebook – In this study refers to web-based social networking application that supports online collaboration between Computer Studies learner and teachers for learning purposes

Facebook Social Networking Platform (SNP) – In this study refers to social networking applications running on an Internet enabled computer or mobile devices that support online collaboration between Computer Studies learners and teachers for learning and instructional purposes.

Instructional tool – in this study refers to Online Social Networking Platform (SNP) running on an Internet enabled computer or a mobile device to support teaching and learning of Computer Studies in public secondary schools in Nairobi County, Kenya.

Learner academic achievement – In this study it refers to scores obtained from pre-test and post-test administered to Computer Studies students in public secondary schools in Nairobi County, Kenya

Learner-interface interactions – In this study refers to the actions that influence learner-learner, learner-content and learner-teacher interactions on Facebook SNP instructional tool

Online Collaboration – In this study refers to online meeting over the Internet of Computer Studies learners and teachers in for learning and instructional purposes

Programming - In this study refers to the process of solving problems by developing a computer program/software

Traditional method of teaching Computer Studies – In this study refers to the use of teacher-centered methods of teaching Computer Studies such as lecture, discussion, demonstration and question and answer.

Virtual Learning Community (VLC) – In this study refers to learners and teachers' Online meeting on Social Networking Platform for purposes of teaching and learning Computer Studies

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this literature review, the focus was on Computer Studies subject in Kenya, methods of teaching Computer Studies, learner achievement in Computer Studies in Kenya, use of FSNP in education, learner-interface interactions on FSNP, collaborative learning on FSNP, time spent on FSNP, learners' attitude towards the use of FSNP and teachers' perception towards the use of FSNP as an instructional tool and learner academic achievement. The theoretical framework and the conceptual framework are also discussed in this section including the summary of the chapter.

2.2 Computer Studies

Computer Studies (CS) is a technical subject offered in the Kenya secondary schools curriculum as an elective subject (KIE, 2002). Masumba (2019) describes Computer Studies as the study of computer education processes, including computer principles, hardware, and software designs and applications. In the study that focused on the success and challenges of implementing the computer science curriculum in Zambia, Masumba (2019) underscored the need for teachers to employ the latest teaching methods and learning resources. According to the Ontario Ministry of Education, Computer studies is a strategic subject that prepares learners not only for career development and growth but also provides an understanding of the current and emerging computing technologies (Ontario MoE, 2008). Alluding to this, Akwee, Toili & Palapala (2012) opined that Computer Studies not only equip learners with computing and problem-solving skills essential for day-to-day life but also in learning other subjects such as sciences, humanities, and languages.

Additionally, Bennett (2013) observes that Computer Studies impart problem-solving skills and techniques such as logical thinking, creative design, synthesis, and evaluation, which are useful to the learner in tackling day-to-day life challenges. The observations by Akwee, et al. (2012) and Bennett

(2013) illustrate the strategic importance of Computer Studies. The observations affirm that the subject equips learners with the knowledge and skills needed to solve problems in life. Thus, it is imperative for teachers to adopt the best innovative instructional and learning resources to ensure absorption of the skills taught. This will result in high learners' academic achievement in the subject. Various innovations in this area include the use of SNPs such as FSNP in teaching and learning.

2.2.1 The Computer Studies Syllabus in Kenya

The Computer Studies syllabus offered in secondary schools in Kenya was developed in the year 1996 and revised in the year 2002 in alignment with the emerging information communication and technology (ICT) trends and socio-economic needs of the country (KIE, 2002). Due to the technical nature of the subject, innovative pedagogical approaches are needed to teach it. The key learning outcomes of the subject are to equip learners with computational skills relevant in the world of complex systems and prepare learners for further studies not only in Science, Technology, Engineering and Mathematics (STEM) but also in other pathways such as social sciences and creative arts. One topic in the subject that contributes significantly to the learning outcomes is "Elementary Programming Principles" which develop problem-solving skills in learners.

The basic education curriculum framework (BECF) implemented in Kenya, KICD (2017) recognizes the strategic importance of Computer Studies and has renamed the subject Computer Science. However, the curriculum currently in use has not been revised since 2002. Further, according to the basic education curriculum reforms in Kenya under implementation, the subject is viewed as a strategic subject that will continue to impart skills that are essential in driving the country’s big four agenda and attainment of Vision 2030 (KICD, 2017). There is thus a need to explore various innovative approaches to teaching the subject. One such innovative approach could be the use of the Facebook social networking platform (FSNP) as an instructional and learning resource.

2.2.2 Methods of Teaching Computer Studies

A method of teaching Computer Studies can be described as the general principles, pedagogy, and class management techniques used during lesson delivery. The choice of the teaching method to be used during a lesson is determined by several variables, including availability of instructional resources, teacher preferences, learner characteristics, class size, learning environment, and content covered. The Kenya secondary school Computer Studies curriculum suggests methods of teaching the subject such as field trips, lectures, practical, demonstrations, discussions, simulation software, questions and answers, and computer-aided learning (CAL), among others (KIE, 2002). As per Raha & Khan, (2018), most of these teaching methods employ traditional approaches of teaching that do not offer innovative alternatives to delivering content. Therefore, there is a need to adopt emerging pedagogical approaches, teaching methods, instructional resources, and creative forms of assessment in teaching Computer Studies across all levels of education. This will empower and equip learners with the 21st-century skills and competencies needed to stay afloat in an ever-changing economic and technological landscape. Mynbayeva, Sadvakassova & Akshalova (2018) identify some 21st-century pedagogical approaches as blended learning, collaborative learning, teach-back, place-based learning, and flipped classroom learning. However, Herodotou, et al. (2018) asserts that these emerging pedagogical approaches are technology-driven, and depend on digital devices and applications such as computers, smartphones, and robots which require the teacher and learner to be equipped with technological skills which are less challenging with current digital natives. Thus, there is an increasing need for Computer Studies instructors to explore the various emerging pedagogical approaches and instructional resources to impart the relevant knowledge, attitude, skills, and competencies.

2.2.3 Learner Academic Achievement in Computer Studies

A learner's academic achievement measures the amount of curricular content a student learns in a determined amount of time. Several factors that have been found to influence learner achievement

include the learning environment, learner characteristics, teacher characteristics, nature and availability of instructional resources, and instructional method used (Abuya, Ngware, Oketch & Mutisya, 2016). Upon examining the influence of the classroom and school environments on students' educational motivation and achievement, Meece, Anderman & Anderman (2005) asserted that high academic achievement is evident where school settings emphasize mastery, comprehension, and improving skills and knowledge by providing a conducive environment for learning that motivates students to achieve learning success. This indicates that the learning environment to which learners are exposed may determine their academic achievement. In support of this viewpoint, a study conducted in Ekiti State in Nigeria to establish how school location is related to academic achievement, Owoeye & Yara (2011) established that learners in urban areas registered better achievement than those in rural areas. Owoeye & Yara (2011) asserted that most schools in urban areas were better equipped with educational facilities that are potent to high academic achievement than those in rural areas. This indicated that the availability of learning resources employed in teaching and learning determines the learner's academic achievement. Therefore, schools should provide the necessary facilities to support learning.

The integration of technology such as information and communication technologies (ICTs) into teaching and learning has been found to have an effect on students' academic achievement. Learning resources such as those offered by ICT should be availed to learners to support self-regulated learning and motivate them to achieve high academic achievement. In support of this viewpoint, a study conducted in Gauteng Province in South Africa involving grade 8 learners by Bester and Brand (2013) concluded that learners exposed to technology posted significant improvement in academic achievement than those who were not. Bester and Brand asserted that technology contributes to high learner academic achievement because it enhances learners' attention and motivation during a lesson. However, in their study, learners were exposed to different technologies such as Microsoft PowerPoint presentations, audio tapes and smart boards to learn English, Geography and Mathematics. While these findings imply the technology used

may have an effect on academic achievement in Computer Studies, the conclusion does not indicate how each technology contributed to learners' academic achievement in each specific subject, hence the findings were general. Furthermore, with the advance of ICTs such as social networks, more research is imperative to determine the effect of each technology on academic achievement in subjects such as Computer Studies at various learner academic achievement in a specific topic in subjects such as Computer Studies at different levels of learning.

Learner academic achievement in Computer Studies like any subject raises concerns on how to maintain it high. When the subject was introduced in 1994 in the Kenya secondary school curriculum, enrolment was left to those schools from geographical regions with appropriate infrastructure, particularly urban areas and only bright students would be allowed to take the subject (Lukalo, 2008). Further, Lukalo (2008) notes that the first KNEC examination in this subject was done in 1998 with only 22 students examined, but the numbers have since increased. This could be attributed to the fact that subsequent governments have been addressing the cultural, social, political, infrastructural and economic issues influencing the implementation of the curriculum. Additionally, the relevance of the subject to students' lives has increased their interest in it. Nevertheless, teacher characteristics such as perception, attitude, level of training, gender, age, and experience may have been overlooked, yet they may have a significant impact on a learner's academic achievement.

Leaner academic achievement in most subjects is also influenced by the teaching approaches and methods employed by the subject teachers. For instance, in a study carried out in Nakuru district in Kenya, to examine how the cooperative class experiment teaching method affects learner academic achievement, Wachanga and Mwangi (2004) concluded that Chemistry students exposed to the method attained high academic achievement. Similarly, in a quasi-experimental study carried out in Nyeri district in Kenya aimed at finding out the effect of Mastery Learning Approach (MLA) on learner academic

achievement in physics, Changeiywo & Wambugu (2008) concluded that Physics students exposed to the method posted high grades. Changilwa (2012) affirms this by noting that teacher characteristics such as attitude, level of education, level of training, and teaching experience have been found to influence learner achievement in computer studies.

The main factors that have been found to influence learner academic achievement, particularly in computer studies, are the instructional resources and strategies used in implementing the curriculum. Chikumba (2011), in a survey study designed to establish learner academic achievement in Computer Studies in Malawi, posited that the inefficient pedagogical technologies and strategies adopted by teachers were to blame for low academic achievement in public schools compared to private schools where teachers used emerging computer-based technologies and strategies. Similarly, in a study to establish causes of failure of students in computer programming courses among first-year undergraduate students at the Institute of Computer Science of Valley View University in Ghana, Adu-Manusarpong, Arthur & Amoako (2013) observed that low learner academic achievement resulted from the use of ineffective and inappropriate teaching methods and instructional resources.

Further, while examining the extent of implementation of the Computer Studies curriculum in secondary schools in Arusha Municipality in Tanzania in a survey study, Olan'g (2015) concluded that low learner academic achievement was due to poor instructional technologies and strategies employed by teachers. This indicates that high learners' academic achievement in Computer Studies can be attained and maintained through the adoption of innovative teaching strategies and instructional resources. Adoption of emerging technologies such as the FSNP and pedagogical approaches can lead to quality teaching and learning of Computer Studies, thus indicating the need for this study. In concurring with this viewpoint Abuya, et al. (2016) observe that learner high academic achievement can be improved through the quality of teaching even when other factors such as class size are not conducive to learning if teachers will adopt

emerging technologies and pedagogical approaches. The poor learner academic achievement in the compulsory question drawn from the topic on Fundamentals of Programming in Kenya as shown in Table 1.1 could therefore be associated with the failure of teachers to employ such innovative instructional resources and pedagogical approaches, hence the need for this study aimed at establishing the effect of FSNP on learner academic achievement in Computer programming among learners in public secondary schools in Nairobi City County, Kenya.

2.3 Integration of Information Communication Technology in Computer Studies Education

Information Communication Technology (ICT) has continued to transform and shape the way of doing business in all sectors of life. In a case study that identified the factors that influenced economic prosperity and how they related to social development in Singapore, Finland and Egypt, Kozma (2005) concluded that more than other factors, ICT was the economic development drive that heavily contributed to social change not only in the three countries that were under study but worldwide than any other factor. The sentiments by Kozma (2005) were echoed in a study that explored the main arguments used to critique the relevance of new ICTs for development and the role they play in the attainment of sustainable development goals (SDGs) on education for all in which Leach (2008) noted that ICT heavily continues to impact on the education sector like any other sector. The views by Kozma (2005) and Leach (2008) imply that the use of ICTs in teaching and learning is inevitable across all levels of education, for it influences what, when, where, and how content is taught or learned.

Similarly, Oliver (2008) posited that the increased use and development of ICTs within education strongly impacts what is being studied, how it is acquired, when and where the learning takes place, who is studying, and who is teaching. Studying the role of ICT in transforming teaching and learning in higher education, Oliver (2008) concluded that technology will continue to have a profound impact on the way academic programs can be offered. While highlighting the role of ICT in higher education in the 21st

Century, Sukanta (2012) held the view that the importance of ICT in education continues to grow and develop as the world was moving rapidly into the digital media era, indicating the need for teachers and learners to embrace technology in teaching and learning across all subjects. Similarly, Tarantino, McDonough and Hua (2013) argued that the rapid development of ICT has sparked the creative incorporation of social networking platforms into current pedagogical applications and processes, which has resulted in enhanced learner engagement and improved attainment of academic outcomes. It thus elicits the need for empirical studies to establish the effects of specific social networking platforms on specific subjects at different levels. This will inform educators on how to integrate the technologies into their classroom.

As the relevance of ICT in education continues to grow, the increased access and use of ICTs among school-going children is notable and inevitable. In his reflections on learning in the digital age, Brown (2004) echoes these sentiments in observing that, "Many of the current, and certainly most of the next generation of students who reach college age are remarkably immersed in technology, far more so than we or other members of any older generation can likely fathom. Today's digital kids think of information and communications technology (ICT) as something akin to oxygen: they expect it, it's what they breathe, and it's how they live. They use ICT to meet, play, date and learn. It's an integral part of their social life; it's how they acknowledge each other and form their personal identities. Furthermore, ICT to some degree has been supporting their learning activities since their first Web search and surf years ago" (p. 6). Brown (2004) emphasizes that the 21st-century learner has embraced ICT in all aspects of life. This implies that both content developers and teachers across all levels must factor in the use of ICT in the content to be taught. They must also factor in the teaching approach and the learning resources to be employed during lesson delivery.

While underscoring the importance of ICT in education, Bolaji, Longe and Odefunso (2014) posited that being literate in the 21st century means being digitally knowledgeable and able to embrace the power of ICT. This makes it necessary to allow school-going children to have access to various ICTs at their disposal, including emerging social networking platforms such as Facebook. The UNESCO report on education 2014 emphasizes that ICTs play a pivotal role in achieving the Education for All (EFA) goals, broadening access, eliminating exclusion, and improving quality equitable access to education for both young people and adults (UNESCO, 2014). In Kenya, the Ministry of Education, Science and Technology through the Sessional Paper No. 1 of 2005 recognizes the direct role of ICT in education by underlining the benefits of integrating ICT in education and training (MoEST, 2005). This is in order to provide new opportunities for teaching and learning.

Such opportunities include more student-centered teaching, reaching more learners, teacher-to-teacher and student-to-student communication and collaboration, multiple technologies delivered by teachers, enthusiasm for learning amongst students, and offering access to a wider range of courses. Emerging ICTs such as Web 2.0 technologies have found their way into the classroom and are linked to increased learner academic achievement. For instance, in a quasi-experimental study aimed at exploring the effects of Web 2.0 technologies, Ananta, Satarupa, Somnath, Joy and Rajib (2018) observed a significant effect on learning performance and self-regulation among secondary school students in Silchar, India. This implies that embracing the innovative and emerging ICTs such as the Web 2.0 technologies and integrating them in the teaching and learning of programming in Computer Studies in secondary schools in Kenya, as alluded to in the subject's curriculum, may lead to improved learner academic achievement in the subject.

2.3.1 The Use of Web 2.0 Technologies in Computer Studies Education

Web 2.0 technologies are a replacement for Web 1.0 technology and provide a "read/write" venue for discussion, creation, collaboration, and peer-to-peer interactions which helps users to participate in content creation on these platforms other than being consumers of published content. In their handbook on e-learning and social networking, Mason & Rennie (2008) acknowledge that the Web 2.0 revolution has certainly entered the education sector and created a lot of interest among educationists and learners just as any other new technology would. This anxiety has led learners to be fascinated by the use of Web 2.0 technologies in the classroom. However, educationists express concern about the effect such platforms would have on the academic achievement of the learners. While Mason & Rennie (2008) and Yoo & Huang (2011) identify some of the Web 2.0 technologies/resources that have found their way into the classroom as blogs, wikis, podcasts, e-portfolios, social networking platforms photo sharing, Second Life, online forums, video messaging, Skype, games and simulations, mashups, mobile learning among others, they do not elaborate on the effect such tools have on learner academic achievement. Therefore, this research aims to establish whether the tools have an impact on learners' academic achievement.

The studies by Mason & Rennie (2008) and Yoo & Huang (2011) pointed out that Web 2.0 technologies promote learning through novel forms of exploratory, cooperative, collaborative, and inquiry-based learning. The research shows that Web 2.0 technologies enhance communication skills, creativity and co-creation, thus contributing immensely to learner academic achievement. For instance, in quasi-experimental research to examine the influence of media richness properties on learning performance and user acceptance of web 2.0 technologies as learning tools, Peñalba (2020) asserts that the tools were useful, easy to use, and contributed to high learner performance. However, despite this study involving different experimental groups using varied tools, Peñalba (2020) did not examine the effect of each tool on learner academic achievement in specific subjects. In a related study, Sonmez and Cakir (2021) affirmed that Web 2.0 technologies have a positive but moderate effect on learner academic achievement.

However, the results from the meta-analysis study done by Sonmez and Cakir (2021), which considered nineteen (19) quasi-experimental studies with treatment and control groups utilizing pre-test and post-tests, did not point out how specific Web 2.0 technologies impacted learner academic achievement in specific subjects and at different levels of education. Thus, the study elicited the need for further studies to establish the effect of specific Web 2.0 technologies, such as social networking platforms like FSNP, on learner academic achievement in computer programming among learners in public secondary schools in Nairobi County, Kenya.

2.3.2 Social Networking Platforms' Relevance in Education

Social Networking Platforms (SNPs) like most other Web 2.0 technologies have found their way into the learning environment. SNPs range from general purpose to more specialized platforms which serve the specific interests of the owners or the users. Boyd and Ellison (2007) opine that different SNPs share common characteristics, mainly the ability to enable users to construct profiles and build a network of connections. In an exploratory study that examined college student behaviors in the vast world of social media, Williams, Crittenden, Keo & McCarty (2012) pointed out that SNPs have become the major media through which millions of people, young and old develop and maintain their personal online networks. The increasing number of youth users of SNP annually implies that students in secondary schools and lower levels are among the subscribers. Statista.com (2021) estimated that over 2.85 billion people use Facebook in the World with other social network platforms registering between 300 million–2.29 billion users. Facebook is the most subscribed social network platform with over 2.853 billion active users, followed by YouTube with 2.291 billion. Quora has the least subscribed SNP with about 300 million active users. In looking at Facebook SNP subscribers, it is evident that among its users are youths in schools and colleges. Its effect on learner achievement in programming among Computer Studies students in Nairobi County, Kenya, should be investigated.

Folorunso, Vincent, Adekoya and Adewale (2010) pointed out that in Africa, social networking platforms are more widely used than they have ever been before and the number of users increases annually. According to the American Marketing Association report, it was projected that SNP penetration in the Middle East and Africa from 2012 to 2018 would be 76.6% of the Internet users and 23.4% of the population (Statista.com, 2015). The report by Statista (2020) pointed out that the penetration of SNP is highest in Eastern Asia countries (29.6%) and lowest in Central African Countries (0.3%). The report further shows the growth of SNP users in most African regions is higher than that in Central America and Northern Europe. With the exponential growth of the SNP's subscriber base, their penetration in the education section and subsequent effect on learner academic achievement cannot be ignored. Thus, empirical studies are essential to establish the effect of the SNPs on learner academic achievement, especially among secondary school learners in developing countries like Kenya.

According to ResearchAndMarkets.com (2019), the South African Social Media Landscape report, 2019, indicated the most popular SN platform Facebook has 21 million users, which represents 22% of the population, followed by YouTube and Twitter. The report indicates that the 13-18 age group continues to be the single largest segment of Facebook users in the country, further confirming that the majority of Facebook users are students. In Kenya, the most popular social networking platforms are Facebook, Twitter, Skype, WhatsApp, Google Plus, Instagram, YouTube, and Blog sites. Faria (2021) puts Facebook as the most frequently used SNP in Kenya as of 2020 and accounts for 85% of the users. The second most used SNP is YouTube at 73% followed by Instagram at 63%, Twitter at 61% with TikTok, Snapchat, and blogs being the least frequently used (Faria, 2021). As of the measured period, 18 to 24-year-olds accounted for 35.7% of Facebook users in Kenya, whereas just 2.2% of users were aged between 55 and 64 years old (Statista.com, 2021). SNP usage among the youth both in Kenya and South Africa would be of interest to researchers to establish how students in the age brackets are able to balance academic work and the use of the platforms and if this has an effect on their academic performance.

In a study to explore the use of the Internet environment for enhancing creativity among learners, Shoshani & Hazi (2007) pointed out that SNPs provide environments that help learners to develop higher-level learning skills like creative thinking which contributes to learning outcomes. Similar sentiments were shared by Nikbakht & Boshrabadi (2015) who in a quasi-experimental study involving Islamic Azad University students established that SNPs such as Facebook have a positive role as an instructional tool in enhancing students' acquisition of English as a foreign language. Despite the study not showing how collaboration among learners and the time they spend on the SNP contributed to learners' academic achievement, it was evident that SNP had a positive effect on the retention level of newly learned words by students in the interactive environment offered by the SNP. In their study Nikbakht & Boshrabadi (2015) asserted that social and cognitive learning environments offered by SNPs can influence learners' learning outcomes positively if used appropriately for academic purposes.

In instances where SNPs have been adopted for learning purposes, the platforms have been found to enhance understanding and retention of the content learned. In a qualitative study that explored the use of SNPs among instructors in the US teaching Public Administration, Chen & Bryer (2012) concluded that integrating informal learning using SNPs into the formal learning environment would lead to enhanced learner engagement, interactions, and enriched discussions. Despite the fact that this study does not provide insight into the impact of the SNPs on learner academic achievement, the findings confirm that the platforms can be designed to facilitate teaching and learning by blending them with face-to-face instruction and e-learning systems. Observations from Chen & Bryer (2012) indicating that such a blend results in increased learner engagement are a strong indication that such platforms would have an effect on academic achievement. The importance of integrating SNPs was further underscored by Eikenberry (2012) whose study that explored the implications of using social networking for learning, professor-student relationships, and civic engagement pointed out that SNPs can be used as pedagogical tools in the classroom to improve learner academic achievement. However, Eikenberry posited that the

integration of the SMP in formal learning should be done thoughtfully with clear learning outcomes and process models in mind. This would enable meaningful learning outcomes to be achieved, thus implying the importance of planning for using SNPs for learning purposes.

2.3.3 Social Networking Platforms and Pedagogy

Social networking platforms have made the development and adoption of emerging pedagogical approaches, such as blended learning, online collaborative learning, and flipped classroom learning possible. While Coates, James & Baldwin (2005) point out that the conventional learning management systems (LMS) used in most universities to provide a web presence for course instruction and assist with the organization and management of course material, the adoption of social software such as SNP in teaching and learning could be more involving for learners. Social networking platforms, wikis, and blogs among others serve as examples of educational social software that enables learners to collaborate, share content, participate in knowledge creation, and have self-regulated learning. While alluding to this viewpoint, in a study that focused on the potential of social software to support e-learning beyond the conventional learning management systems (LMS), Dalsgaard (2006) urged the need for adopting e-learning platforms that promote students' self-regulation, active engagement, interactive and collaborative learning. Dalsgaard (2006) asserted that social software such as social networking platforms have the potential to offer better support for self-governed, problem-based, and collaborative learning processes than institutional-based learning management systems (LMS).

According to Oradini & Saunders (2008), social networking platforms engage students and tutors in online learning communities using technologies familiar to and accepted by their generation. However, the study by Oradini and Saunders (2008) focused on an institution-based social networking platform at the University of Westminster. The qualitative study did not find out whether the use of the platform had an effect on learners' academic achievement. The study, however, emphasized the need of engaging

learners and tutors on a more interactive and collaborative platform as offered by SNPs, hence making the platforms viable for pedagogical purposes. In the same vein, Ouf, Nasr, & Helmy (2010) asserted that incorporating social network platforms into pedagogical strategies opens up new avenues for improving academic instruction and student learning experiences. Further, in a case study that explored the adoption of Web 2.0 technologies such as the SNP in teaching and learning at universities in the national capital region of India, Tyagi (2012) asserted that when such platforms are directed at learning, they impact the learner's social and cognitive dimensions. While this study by Tyagi (2012) opined that such platforms are viable for adoption in learning institutions to support teaching and learning, it did not point out how specific platforms would impact learner academic achievement.

2.3.4 Social Networking Platforms and Learner Academic Achievement

Social networking platforms have been found to encourage learners to interact online and integrate course content materials into their daily lives. This in turn influences their learning experiences and academic achievement. In empirical research that investigated the effect of SNPs on undergraduate learners at the college of applied sciences in Nizwa, Orman, Mehmood & Taswir (2013) observed that the platforms have the potential to influence learner academic achievement if they are prudently utilized for academic purposes. However, while this study did not illustrate how specific SNP influence learners' academic achievement in specific subject areas, the sentiments of Mehmood & Taswir (2013) were shared by Hamid, Waycott, Kurnia & Chang (2015). The study by Hamid, et al (2015) examined learners' experiences with social networking platforms in Malaysian and Australian universities and revealed that learners and tutors adopt SNPs to benefit from the affordances offered by the technology to assist with learning. Hamid, et al (2015) argued that the SNPs provide a platform for tutors and learners to interact and collaborate which in turn yield numerous positive outcomes, including improved learner academic achievement. However, Hamid, et al. (2015) did not elaborate on how the attitude of learners and tutors toward the use of the SNPs for academic purposes would impact learner academic achievement.

While recommending the integration of SNPs in teaching, in a study that investigated the challenges of integrating the platforms in the classroom, Gavin and Thai (2015) opined that instructors and students can reap from the technology affordances offered by the platforms such as environments that support self-controlled, self-paced and collaborative learning which contribute to effective learning and improved learner academic achievement. Similarly, in a survey study conducted in Malaysia involving university students on the influence of SNPs on student performance, Helou and Rahim (2014) observed that most learners admitted that the use of SNPs had a positive impact on their academic achievement. The observation by Helou and Rahim (2014) was confirmed by Mensah and Nizam (2016) in another survey study involving students from Erican College in Malaysia which concluded that SNPs have a positive effect on learner academic achievement, however training was necessary to optimize the benefits of the platforms. While these two studies done in Malaysia involved college and university students, the studies did not provide empirical evidence on how user-interface interactions on specific SNPs such as Facebook, time students spend on the platform, the attitude of the learners, and teacher perception towards the use of the platforms as instructional resource impact on learner academic achievement, thus necessitating this study.

According to Ozer, Karpinskia & Kirschner (2013), most of the U.S and European students involved in their study reported that SN platforms had neither positive nor negative impact on their academic performance and were willing to use them alongside their studies, indicating a positive attitude towards the use of SN platforms for academic purposes among the students. This is supported by Karpinski et al. (2013) who in a separate study reported that European students who utilized SN platforms in a less disruptive manner had higher grade point averages (GPA). However, the lack of enough empirical studies to identify the effects of the SN platforms on learner achievement as argued by Adabzadeh (2013) and Albayrak & Yildirim (2014) indicates the need for more studies to be carried out in other parts of the World to determine how different types of SN platforms, amount of time of exposure to SN platforms,

learner attitude and teacher perception and acceptance towards SN platforms use in education affect learner achievement in different subjects and at different levels of study, an idea supported by Bosch (2009).

There has been an increase in the use of SNPs among high school students (Adabzadeh, 2013). In support of this viewpoint, Nyagah, Asatsa, and Mwania (2015) confirm a significant increase in the use of SNPs among secondary school students in Kenya, with learners accessing these sites for a variety of reasons. According to Boyd and Ellison (2011), the increased use of SNPs among high school students is due to improved access to mobile phones and desktop computers connected to the Internet at school and at home. The SNPs have become an integral part of student life and, rather than wishing them away, the students should be educated on responsible, ethical, and safe ways of using them (Bolaji, Longe & Odefunso, 2014; Almu & Buhari, 2014; Nyagah et al., 2015). In this case, if SNPs are adopted as instructional tools to augment conventional teaching and learning methods, learner achievement can be greatly impacted.

According to Nyagah, et al. (2015), the uses of SN platforms among secondary school students in Kenya affect their self-esteem and psychological well-being, implying that this could positively or negatively affect their academic achievements. Ogunijo (2014) observed that SN platforms did not have a significant influence on academic performance among secondary school students in Nigeria. However, he recommended different methodologies such as experimental design with a focus on specific SN platforms or performance on specific subjects. The opinion by Ogunijo (2014) was supported by Delello, McWhorter & Camp (2015) who recommended an in-depth analysis of student reflections on the appropriateness and effectiveness of specific social media technologies within particular academic disciplines to determine their usefulness in achieving certain learning objectives.

2.4 Facebook Social Networking Platform and Learner Academic Achievement

The infiltration of FSNP in education has led to its adoption in teaching and learning, which has eminent impact on learner academic achievement.

2.4.1 Use of Facebook in Teaching and Learning

Over the years, the face-to-face mode of learning has been practiced in many education tiers all over the world. This mode implies a situation where students sit in a classroom environment as the teacher manages the learning process. However, it is now inevitable to use 21st-century pedagogical approaches and technologies appropriate to the current digital age. Such technologies which include online social networking tools like Facebook, WhatsApp, MySpace, Twitter, and Telegram among others have led to a paradigm shift in pedagogical approaches. The use of these emerging technologies is gaining momentum in education. In a study to investigate whether there is a role for social networking sites in education in Singapore, Santos, Hammond & Chou (2009) observed that social networking tools have been accepted by teachers and students for instructional purposes. Further, in a related study in the University of Cape Town exploring student use of Facebook and lecturer involvement, Bosch (2009) observed that despite certain challenges like ICT literacy levels, and difficult access to the Internet among other challenges, SNPs had become popular and beneficial in teaching and learning especially in establishing educational micro-communities. As Bosch (2009) notes, the popularity of SNPs, such as Facebook, WhatsApp, and Twitter across all ages in Kenya, cannot be ignored. Even though there is no policy supporting the integration of these technologies in teaching and learning, their usage among school-going youth is evident. This necessitated the investigations in this study to establish the effect of FSNP on learner academic achievement in programming among Computer Studies learners in public secondary schools in Kenya.

In an online survey study involving the department of computer education undergraduate students of Near East University from the Department of Computer Education and Instructional Technologies (CEIT) in Northern Cyprus that aimed at investigating Facebook usage, Bicen and Cavus (2011) opined that Facebook SNP provides learners with a platform for establishing, maintaining and strengthening social collaborations which can be of benefit to learners. While Bicen and Cavus (2011) did point out the effect of FSNP on learner academic achievement, their study recommended further investigations to investigate the effect of the platform on the academic achievement of learners. Similarly, without pointing out the pedagogical implications of FSNP, in exploratory research that involved medical students and their tutors and examined the use of SNPs in developing countries, Pimmer, Linxen and Gröhbiel (2012) demonstrated students and professionals approved Facebook as a learning tool suitable for sharing educational content and building virtual communities for academic and professional interactions in informal contexts similar to the formal context. The study by Pimmer, et al. (2012) recommended more systematic research to establish how such SNPs impact learners' academic achievement.

Similarly, in a study involving teacher trainees and their tutors in institutions offering Bachelor of Education in Delhi, India, Singh (2013) concluded that students and their tutors used Facebook SNP to share news, classroom updates, presentations, photos, events, and any other information related to their campuses. However, Singh (2013) did not explore whether the use of Facebook could influence student academic achievement. In agreeing that the use of FSNP among students has an effect on their academic achievement, Celik, Yurt & Sahin (2015) in a study involving undergraduate students in the college of education at an Anatolian University in Turkey that examined the variables that affect the use of FSNP in teaching and learning, argued that when employed for educational purposes, FSNP could have an effect on the academic achievement of learners. Further, in line with the findings by Celik, et al. (2015), the findings of a study that used focus group discussion involving students from Malaysian and

Australian Universities by Hamid, Waycott, Kurnia and Chang (2015) observed that technologies such as Facebook when used for educational purposes are beneficial to the learner because it enables learners to engage more with content, engage in peer learning, promote critical thinking, support self-directed learning, enable self-monitoring of learning progress, provide a platform to interact with instructors, make learning entertaining and create an interactive learning environment. However, the study by Hamid, et al. (2015) did not point out how the use of the technologies impacted learner academic achievement.

While the use of FSNP in education has gained traction in developing countries like Kenya, this is not without challenges. For instance, Bosch (2009) observed low ICT literacy levels and uneven access to instructional resources as the key to these challenges. In investigating the negative effects of SNPs such as FSNP among Asia Pacific University students through a survey study, Abdulahi, Samadi and Gharleghi (2014) agreed with Bosch (2009) by pointing out other challenges that hinder the adoption of FNSP in teaching and learning that are related to health issues, addiction, privacy and security due to overexposure to FSNP. Abdulahi, et al. (2014) highlighted the challenges of incorporating SNPs such as FSNP in teaching and learning. Even though Abdulahi, et al. (2014) did not highlight the nature of the effect of FSNP on academic achievement, it is evident that the benefits of using FSNP outweigh the challenges. Therefore, teachers, students, and other educationists should have no excuse to shy away from embracing the platform and other emerging technologies in teaching and learning. In supporting this viewpoint, Bolaji, Longe, and Odefunso (2014) observed that, though the use of social networking sites like FSNP has a lot of concerns and challenges, the benefits far outweigh the challenges, and rather than ban the use of the platforms by students, they should rather be educated on responsible, ethical and safe ways of using them. In the survey study conducted in Nigeria which examined the benefits and challenges of integrating SNPS in secondary education, Bolaji, et al. (2014) underscored the benefits among them stimulating learner engagement, collaboration, discussion, and understanding. However, the study by Bolaji, et al. (2014) did not also point out the effect of the SNPs on learner academic

achievement, and the basis for approving or disapproving the use of the platforms among learners in secondary schools, a gap this study sought to address.

2.4.2 Use of Facebook SNP as a Virtual Learning Community Technology

In a study involving undergraduate students, Sarsar and Harmon (2011) observed that FSNP could facilitate e-learning in higher education and learners liked to be part of the learning environment offered by the platform. Supporting this, in the mixed research design study that assessed the use of FSNP as an informal learning environment, Cain & Policastri (2011) concluded that Facebook has the capacity to offer an informal learning environment where up-to-date academic content can be exchanged between teachers, learners and guest experts through collaborations. According to the Pew Research Centre's report on teens, social media and technology overview, Lenhart (2015) concurred with Cain and Policastri (2011), by observing that Facebook has a high potential to be used by students to converge, collaborate, share and learn and as such, educationists should devise methods of harnessing the potential of this platform. Alluding to this, in the Education Technology Solutions Magazine, Stanley (2017) argued that with the recent advent and deployment of virtual learning communities, Facebook is an ideal platform for supporting such learning communities where students and teachers can manage and share educational materials. Even though this reviewed literature does not emphasize the effect of Facebook on learner academic achievement, it is evident that institutions that offer courses through distance modes can leverage on the potential of Facebook virtual learning communities which are widely accessible and affordable to students and instructors. Such institutions should explore the most effective approaches for adopting Facebook and other online platforms that can support virtual learning communities for optimal pedagogical interactions.

It is evident from the literature reviewed that Facebook can be used to establish virtual learning communities where teachers and learners can interact for academic benefits. According to an

experimental study that examined the effects of teacher self-disclosure via FSNP on anticipated college students' motivation, affective learning, and classroom climate, Mazer, Murphy & Simonds (2007) posited that the teacher-learner relationship can be nurtured through Facebook for positive learning. In similar findings, Lampe, Wohn, Vitak, Ellison & Wash (2011) in their study on students' use of Facebook to organize collaborative class activities, observed that learners collaborate on learning activities through Facebook but recommended further studies to establish whether such collaborations could influence learning outcomes like learner motivation, self-efficacy and the levels of learner content interactions.

In a separate study in South Africa, Mbodila, Ndebele and Muhandji (2014) observed that the use of Facebook enhanced students' interactions and collaborations, making it a viable tool for creating virtual learning communities. Similarly, in a study in Canada on Facebook intervention to teach Introduction to Psychology students, Dyson, Kristin, Turtle, Cowan & Tassone (2015) observed that, unlike students who actively interacted through Facebook, those who did not register lower engagement, low comprehension of the content discussed and low appreciation of Facebook content and lecture materials. This is an indication that Facebook can be helpful in establishing virtual learning communities where pedagogical interaction can take place, just like through other online learning management systems. While FSNP would be acceptable as a virtual learning environment, empirical studies are necessary to establish how learner-interface interactions, collaboration, time spent on the platform, learner attitude and teacher perception towards the use of the platform as an instructional tool would impact learner academic achievement.

2.4.3 Effect of Facebook Pedagogical Interactions on Learner Academic Achievement

Pedagogical interactions enhance student involvement, increase learning opportunities, motivate learners and affect learning outcomes. According to Hay, Hodgkinson, Peltier and Drago (2004), even though there are studies indicating that learners who learn online feel isolated, such learners optimize the

opportunities offered through online platforms to interact more than counterparts in face-to-face sessions. Hay, et al. (2004) asserted that such interactions yield more collaboration and effective learning, resulting in better outcomes. In spite of the fact that the study by Hay, et al. (2004) was not empirical, there are indicators that the facilitation of pedagogical interactions through virtual learning communities on Facebook can have positive or negative effects on learning outcomes.

In a study involving university students in the United States, Kirschner and Karpinski (2010) affirmed the impact of the FSNP by reporting the negative effect on academic performance among its learners who recorded lower GPAs and spent less time studying using the platform. Similar findings were reported by Ogedebe, Emmanuel and Musa (2012) who in a survey study on Facebook and academic performance in Nigerian Universities, observed that students who used Facebook had lower GPAs than those who did not. These findings by Kirschner and Karpinski (2010) and Ogedebe et al. (2012) were further affirmed by Karpinski, Kirschner, Ozer, Mellott and Ochwo (2013) who noted that learners who had disruptive use of Facebook for academic work had significantly lower GPA compared to the non-users. However, despite the fact that Karpinski, et al. (2013) analyzed the effect of multitasking on the relationship between SNPs and GPA in U.S. and European university students, their study suggested that the use of FSNP for educational purposes should involve minimal disruptions for significant improvement in GPA to result. Similarly, in a study involving Sri Lankan University Students on the influence of Facebook on their academic performance, Thuseethan & Kuhanesan (2014) observed that most of the frequent users of Facebook recorded lower academic performance than the less frequent users.

However, in a slight deviation from these findings by Karpinski, et al. (2013) and Thuseethan and Kuhanesan (2014), through an experimental study on the use of Facebook to teach computer science, Ku, Lin and Tsai (2012) observed that interactions through the Facebook virtual learning community

affected students' attitude towards computer science and there were no significant differences in academic achievement between those who heavily used Facebook and those who did not. Similarly, Amukune (2014) in an unpublished thesis on the perceived effects of social networking on learning behavior among regular undergraduate university students in Mombasa County in Kenya, observed that Facebook did not have an adverse effect on learner academic performance.

On the contrary, results from a study by Celik, Yurt & Sahin (2015) involving undergraduate students in the College of Education at an Anatolian University in Turkey, showed that students who used Facebook for educational purposes had higher academic achievement because they used it more often, had fewer friends and spent less time on it. From this literature, it is evident that the use of Facebook as a platform for virtual learning communities may not or may positively or negatively affect learning outcomes. The study by Celik et al. (2015) indicates that if the use of Facebook among learners is controlled, a positive impact on learning outcomes can be realized. Controlling the use would ensure meaningful pedagogical interactions take place through the Facebook virtual learning communities. This is a clarion call to teachers, learners, and other education stakeholders to embrace Facebook as a technology that can be used to create formal virtual learning communities in educational institutions to leverage the benefits that accrue from it and extend access to education beyond the classroom setting. Even though reviewed literature points at an eminent effect of SNPs such as FSNP on learner academic achievement and involved university students, empirical studies are imperative to establish how different SNPs would impact on different subjects at the secondary school level in developing countries like Kenya. To close this gap, this quasi-experimental study investigated the effect of FSNP on learners' academic achievement in computer programming at public secondary schools in Nairobi City County, Kenya. The study focused on how learner-interface interactions, collaboration, and time spent on the platform, as well as learner attitude and teacher perception of the platform's use as a learning resource and

instructional tool, impacted learner academic achievement in computer programming among secondary school students.

2.4.4 Learner-Interface Interactions and Academic Achievement

In a technology-driven learning environment, a learner interacts with the content, fellow learners and the instructor. However, little attention is given to the interactions that take between the learner and the technology's interface. These type of interactions are known as learner-interface interactions. Such interactions take place before the other types of interactions occur and determine the learner experiences and achievement.

2.4.4.1 Learner-Interface Interactions

Learner-interface interactions on a technology-driven learning platform play a vital role in determining its adaptability and effectiveness. According to the editorial publication of the panel discussion organized by divisions of Independent Study and Educational Telecommunications of the National University Continuing Education Association at its annual meeting in Salt Lake City in the United States, which discussed the types and levels of interactions effective for supporting distance learning, Moore (1989) identified three types of interactions suitable for distance learning, that is, learner-learner, learner-teacher, and learner-content. While Moore (1989) asserted that the three types of interaction were suitable for effective distance learning to take place, he did not take into account the technology-driven interactions.

In technology-driven interactions, the learner interacts with the technology's interface before other types of interaction are successful. A technology interface that is not attractive and easy to navigate determines the learner's motivation to learn through the technology platform. In responding to this gap, Hillman, Willis and Gunawarda (1994) asserted that a learner interacts with the technology before he or she successfully interacts with the content, instructor, and other learners. Hillman, et al. (1994) affirmed that

a technology interface interaction determines successful learner-learner, learner-teacher, and learner-content interactions. While recommending instructional design strategies that can enable learners to gain relevant skills critical for effective participation in an electronic classroom, Hillman et al. (1994) further suggested learner-interface interaction as the fourth form of technology-driven distance learning and learner interactions. In a psychological literature review of online social networking and addiction, Kuss and Griffiths (2011) supported this view by opining that learner-interface interactions enable the learner to control the learning environment through active communication and feedback. It is necessary to provide evidence through empirical studies to determine how different technologies facilitate learner-interface interactions and how such interactions impact learning outcomes through this study.

2.4.4.2 Learner-Interface Interactions and Learner Academic Achievement

Learner-learner, learner-teacher, and learner-content interactions influence academic achievement. In a study on technology and instructor-interface interaction in distance education, Danesh, Bailey and Whisenand (2015) submitted that successful learner-interface interactions on an online learning management system (LMS) play a significant role in the learning process thus influencing learner academic achievement. Danesh et al. (2015) focused on learner interaction on the conventional LMS built on the less interactive Web 1.0 technologies. However, the development of Web 2.0 technologies such as SNPs has seen the infiltration of platforms with features that are more interactive. In a study that explored the use of Facebook as a LMS and the student perception in a teacher training institute in Singapore, Wang, Woo, Quek, Yang, and Liu (2012) established that such platforms like FSNP have pedagogical, social, and technological affordances that can support instruction and learning due to their in-built features and functions. Wand, et al. (2012) affirmed that SNPs offer more learner-interactive platforms with the potential to supplement traditional learning management systems.

Accordingly, Johnson and Cooke (2016) proposed that online interactions between learner-learner, learner-content, learner-teacher, and learner-interface are more effective on SNPs than on conventional learning management systems. While Johnson and Cooke (2016) did not focus on the effect of the Facebook learning ecosystem on learner academic achievement, it is evident that SNPs offer opportunities to the learner to control the learning environment for communication, socialization, and receiving feedback within a bounded network, hence making online learner-interface interaction more effective. Effective learner-interface interactions facilitate an environment where a learner can interact with other learners, teachers, and content which results in effective learning. However, there is a need to determine through empirical studies the effect of learner-interface interaction of SNPs such as FSNP on learner academic achievement.

2.4.4.3 Facebook SNP Learner-Interface Interactions and Learner Academic Achievement

Emphasis on learner-interface interaction in online learning environments such as FSNP has been put on the affordances the technology offers. In a study that examined students' online interaction patterns on the Blackboard platform and how that related to their performance in graduate online courses offered through Blackboard, Song and McNary (2011) observed that flexibility, user-friendliness, and ease of access were the technology affordances with which learner-learner, learner-teacher, and learner-content interactions take place on an online platform. Song and McNary (2011) concluded that effective online interactions lead to improved learning experiences that translate to superior performance in the course done. Facebook's SNP provides such technology affordances for online learner-interface interaction in an innovative platform that is superior to traditional online learning management systems (Duff, Johnson & Cherry, 2013). Wang et al. (2012) posited that Facebook SNP offers learner-interface interaction tools that position it as a possible supplement to conventional learning management systems.

Similarly, in a study on Facebook as a platform for academic-related discussion and input on students' success, Jumaat and Tasir (2016) observed that Facebook offered learner-interface interaction tools similar to those of conventional LMSs that enhanced learner interactions and achievement. Further, in a survey study on the Effects of Facebook usage on the English learning behavior of Thai English teachers, Phiyapa, et al. (2018) observed positive gains in English language learning behaviors among Thai teachers who interacted on Facebook SNP. While the study by Jumaat and Tasir (2016) and that by Phiyapa, et al. (2018) suggests that FSNP has features that are similar to those of other LMSs and that it contributes to learners' academic achievement; they did not detail how the learner-interface interactions differ in terms of adaptability, desirability, comfortability, and the value they add to the learning experience.

It is imperative that the platform for the learner-interface interactions be adaptable to the learner's needs. The adaptability of instructional technology is concerned with its flexibility and ability to fit different learner needs and preferences. Therefore, it is pertinent to examine FSNP's ability to offer such learner experiences. Yang, Spector, and Huang (2019) posit that the adaptability of an instructional technology must account for learners' learning preferences, resulting in the need to treat learners individually. Therefore, instructional technology should provide pedagogical affordances that facilitate learners' perceptions, responses, and performances through the use of an educational environment, educational products, and resources that support adaptable learners-interface interactions.

Learning platform interactions should be comfortable for learners. While concurring to this viewpoint, Mutungwe & Tsvere (2014) posit that, unlike other learning environments, technology-driven learning environments should provide the "space" where students learn effectively because they are comfortable enough to discuss and share information and opinions which support lifelong learning. In a similar vein, a study involving professors, undergraduate, and graduate students to examine the role of technology in

communication and interactions to support distance learning concluded that learner-teacher and learner-learner interactions when done synchronously or asynchronously through a technology intervention whose learner-interface interactions are comfortable, learners participate more in discussion than in a face-to-face classroom (Danesh, Bailey and Whisenand, 2015).

A technology's learner-interface interaction platform determines learners' sense of learning, and in turn, their motivation to collaborate and support each other in solving problems. In an empirical study involving university students in the U.S that investigated Facebook's effect on learning in higher education, Duncan and Barczyk (2016) observed that the Facebook SNP provides a desirable platform for a community of learning where students experience more sense of learning and connectedness leading to more engagement. However, Duncan and Barczyk (2016) involved university students and did not point out how the desirability of the platforms influence academic achievement, a gap that this study sought to address. Further still, the value of instructional technology plays a key role in meeting the learning needs of a learner. Observations made in a pilot study using technology that combined DyKnow software with a hardware platform of pen-enabled HP Tablet notebook computers by Sinha, Khreisat and Sharma (2009) indicated that learner-interface interactions on the platform provided an adaptable learning environment, promoted a hands-on approach, and offered real-time feedback that enabled active learning which boosted learners' academic performance in basic and advanced computer courses. In support of these observations, Stosic (2015) asserted that the integration of instructional technology in teaching and learning should add value to learning because it not only enhances the acquisition of knowledge and skills but also the cognitive and affective development of the learner.

For an instructional technology to have value to the learning experience, its features should be aligned to the cognitive and affective learning needs of the learner. An instructional platform should therefore offer learner-interface interaction features that facilitate value addition in the learning process, thus

improving learners' academic achievement. In a study involving ICT students in University of Forestry – Sofia to establish the role of student interaction interface in web-based distance learning, Mladenova and Kirkova (2014) observed that learner-interface interactions on an LMS play a key role in learning outcomes when the platform is well structured, robustly built, and easy to use. In agreeing with this viewpoint, Jong, Lai, Hsia, Lin and Liao (2014) in an exploratory study of the potential educational value of Facebook, opined that FSNP has an edifying value of motivation, convenience of sharing learning content, teacher and learner immediate feedback, review of previous discussion posts and offers a better platform for learner-learner, learner-content, and learner-teacher interaction. Further, concurring with this viewpoint, Voivonta and Avraamidou (2018) in a desktop research the reviewed existing literature to establish the educational value of FSNP observed that FSNP provides a valuable pedagogical tool that enhances learning and academic achievement. However, the studies by Mladenova and Kirkova (2014), Jong, et al. (2014) and Voivonta and Avraamidou (2018) were exploratory in nature, involved college and university students and the findings cannot be used to generalize the value of FSNP on learning among computer studies students, a gap this empirical study involving high school learners sought to bridge.

Similarly, through literature searches of electronic journal databases to review types of student interactions with online social collaborative and problem-based learning environments, Hussin, Harun and Shukor (2019) identified learner-interface interactions alongside learner-learner, learner-instructor, learner-content and learner-self interactions as key elements of LMS such as FSNP that enhance learner academic achievement. While evaluating the future of learner-interface interactions in the advent of artificial intelligent (AI) driven educational technology models, Silva (2020) points out, many components determine learner-interface interactions in the present and future of instructional technologies, including: the 2D and 3D intelligent multimedia interfaces; usability and learner experiences; the capability of intelligent educational agents; and the scope of predictive algorithms such

as deep learning and big data. This suggests that the next generation of adaptive learning platforms including SNPs will embed smart tools that will enhance improved learner-interface interactions on Facebook SNP and learner academic achievement in all subjects across all levels of education. Understanding the desirability, usability, comfortability, adaptability, and value of learner-interface interactions on FSNP in meeting learner experiences and its effect on academic achievement is important before deciding on its adoption for use as a LMS.

2.4.5 Collaborative Learning on Facebook SNP and Learner Academic Achievement

Collaborative learning takes place when a group of learners works together to solve a problem, complete a task or create a product. In an exploratory study to investigate collaborative tele-learning, Alavi, Wheeler & Valacich (1995) observed that collaborative learning requires an interactive environment for meaningful learner-learner engagement and high learner achievement. Such an interactive environment supports virtual collaborative learning, which enhances problem-solving skills, improves social interactions, and communication skills, and inspires critical thinking among learners, resulting in improved learner achievement (Lorcher, 2019). This indicates that collaborative learning plays an influential role in determining academic success. While collaborative learning can take place face-to-face or digitally, with the advent of SNPs such as FSNP, the focus of this research shifted to determining the effect of learner-interface interactions on the platforms' environments, time spent online, attitude of learners towards the platforms' use for educational purposes, and perception of teachers regarding the platforms' effectiveness as a learning tool for students.

In a study on how Facebook affects undergraduate college students' wellbeing in Thailand, Kalpidou, Costin, and Morris (2011) found that collaborative learning on FSNP allowed learners to exchange knowledge and build skills just like they would in a face-to-face setting. Similar to this, from a survey study they conducted at Griffith University's Gold Coast campus, Irwin, Ball, Desbrow, and Leveritt

(2012) found that FSNP has the potential to promote learner and teacher interactions and engagement. The study focused on students' perceptions of using Facebook as an interactive learning resource. Irwin et al. (2012) suggested that FSNP could be used as a platform for collaboration and cooperative learning, but they did not discuss how it affects students' academic achievement. Furthermore, in a desktop research study that explored the positive and negative effects of using SNP in education, Raut and Patil (2016) concurred with Irwin et al. (2012) in asserting that the use of FSNP collaborative learning environments places the learner in control of their learning.

Concurring to the viewpoints by Irwin, et al. (2012) and Raut & Patil (2016), a literature review on the role of social media for collaborative learning to improve academic performance of students and researchers in Malaysian higher education done Al-rahmi, Ohman and Yusuf (2015) concluded that collaborative learning on SNP improves learner productivity, satisfaction, engagement and academic achievement. Further still, in a study to establish the influence of SNP on collaborative learning among environmental doctorate students at Wilmington University in USA, Wandera, Waldon, Bromley and Henry (2016) observed that collaborative learning via SNP enhances academic achievement. Further still, Sarwar, Zulfiqar, Azizi and Chandia (2018) in a survey on the usage of social media tools for collaborative learning among students at the University of Science and Technology of China concur that there is a significant positive relationship between collaborative learning on an SNP such as Facebook and learner academic achievement.

In addition, a study on the effects of collaborative learning on problem-solving abilities among senior secondary school physics students in simple harmonic motion conducted in the Port Harcourt City and Emohua Local Government Areas in Rivers State of Nigeria by Adolphus, Alamina, and Aderonmu (2013) found improvements in problem-solving abilities among students taught using technology platforms like FSNP. In support of the viewpoint by Adolphus, et al., a study on the overview of problem-

solving skills through online social networking platforms conducted at Universiti Teknologi Malaysia, Jamari, Zaid, Mohamed, Abdullah and Aris (2015) concluded that the use of FSNP in teaching and learning enable learners to participate in collaborative learning which helps them to improve their problem-solving skills and academic achievement.

Additionally, Júnior, Kruistum, Kontopodis, and Oers (2019) found that, with teachers' guidance, FSNP functions as a collaborative learning environment where students readily comprehend the issue at hand and conceptualize solutions. The study by Júnior et al. (2019) involved teachers and secondary school students from the Minas Gerais countryside and the So Paulo metropolitan area, and examined how secondary school students' agency evolves over time across offline and online spaces. This suggests that instructors should use educational tools like FSNP, which provide conducive settings for collaborative learning and problem-solving. The studies by Jamari, et al. (2015) and Júnior, et al. (2019), however, failed to address how collaborative learning on SNPs affects students' academic progress, leaving a gap that this study sought to bridge.

While alluding to the capacity of contemporary digital media to support collaborative engagements among young people, Ziegler (2007) observed that digital media influence the development of their knowledge, attitudes, beliefs, and values. In the desktop research which focused on the influence presented by today’s contemporary media on the development of young people, Ziegler (2007) argued that such media including SNPs such as the FSNP has the capacity to engage, motivate and sustain the concentration of young people. However, Ziegler (2007) did not focus on how such media impact learner academic achievement, a gap that was addressed in this study. Similarly, Wang and Vasquez (2012) opined that FSNP has the capacity to promote enhanced interactive learning opportunities through genuine communication and social interaction among learners. These viewpoints concur with the findings by McCarthy (2012) who observed that FSNP offers opportunities for students to collaborate

and share knowledge. Further, in a study involving software engineering students at a Turkish university that evaluated the effect of using Facebook on enriching students' programming learning experiences, zyurt and zyurt (2016) concluded that FSNP provides a collaborative learning environment and increases learner motivation; however, they study did not inform how learners' collaboration on the platform influenced their academic achievement. In addition, Filgona, Sakiyo, Gwany and & Okoronka (2020) assert that highly motivated learners make the learning environment interesting to teach and learn readily while unmotivated learners make teaching unenjoyable and learn very little, however, did not point out on how learner engagement in collaborative learning on technology platforms such as FSNP impact learning outcomes. However, Filgona, et al. (2020) underscore the need to establish how learner motivation as a result of collaborative learning on technology platforms impact on academic achievement.

Further still, while contributing to collaborative learning and communication, in a study to establish how teachers from different cities in Brazil used groups on FSNP and how communication between teachers and students was affected by using such groups, Cunha, Kruistum and Oers (2016) observed improved communication between teachers and students which led to effective engagement in collaborative learning activities. While agreeing with the findings by Cunha, et al. (2016), Dweikat (2016) in an experimental study that investigates the effect of using FSNP on improving communication skills in English through a blended teaching approach among students in the Al-Quds Open University observed statistically significant differences in achievement between the experimental groups. Dweikat (2016) concluded that learner discussions, and sharing ideas, documents, photos, videos, chats, and links to relevant websites on FSNP may have played a significant role in improving their communication skills and academic achievement. Further, in a study to examine the ways of utilizing FSNP as a medium of enhancing communication skills among students, Vivekha and Babu (2020) observed that collaborative learning on FSNP is an entertaining mode of unconscious learning in that, students express their ideas,

thoughts, and feelings freely, thus enabling them to acquire communication skills and learn content shared unconsciously.

In an empirical study on online assessment that implemented a blended approach combining peer assessment on FSNP with face-to-face instruction for an English writing course that involved learners from Sunway University, Mahmud and Wong (2018) asserted that collaborative learning induces learner participation and engagement enabling them to replicate, act, learn from each other and create significant knowledge and skill leading to improve academic achievement. However, this study involved college students and did not inform how the collaborative learning on the learners' academic achievement in the subject studied. In a related study involving students at university in eastern India which explored the role of social media in collaborative learning as the new domain of learning, Ansari and Khan (2020) observed that the use of online social media such as FSNP for collaborative learning has a significant impact on interactivity among learners, teachers and online knowledge sharing behaviors which ultimately impact on the learners' academic achievement. While the reviewed literature indicates the possible effect of Facebook SNP collaborative learning on learner academic achievement, these studies involved college students and cannot be used to generalize the effect of collaborative learning through the platform on other subjects such as Computer Studies and at lower levels of education such as secondary schools in a developing country like Kenya.

2.4.6 Time Spent on Facebook SNP and Learner Academic Achievement

The amount of time spent on SNP contributes to learner academic achievement. This is because of the interruptive and addictive nature of the platforms, which may make learners not concentrate on learning but on other purposes such as entertainment, chatting with friends, or getting updated with what is happening around them. In a survey study involving undergraduate and graduate students in a larger public Midwestern university that explored the use of Facebook for academic purposes and its impact on

academic performance, Kirschner & Karpinski (2010) in supporting this viewpoint concluded that learners who use FSNP spend less time studying and get lower GPAs. Datko (2015) alluded to this through a meta-analysis study of the potential benefits and drawbacks of SNPs in higher education by opining that spending a lot of time on FSNP may have a negative effect on learner academic achievement.

On the contrary, in a survey study to establish a model for understanding educational Facebook use among undergraduate students in the College of Education at an Anatolian university in Turkey, Celik, Yurt & Sahin (2015) opined that learners who prudently manage time spent on FSNP report a positive gain in academic achievement. In line with this viewpoint, in a study to investigate the influence of self-regulation of Facebook usage on academic performance among university students in Kenya, Wanjohi, Mwebi and Nyang'ara (2015) revealed that students with a high level of self-regulation control the time they spend on FSNP and have a likelihood of posting high academic achievement.

Conversely, Moghavvemi, Aziz, Sulaiman and Wai (2017) in a study on the impact of SNP usage on learner academic achievement among undergraduate students in TATI University College in Malaysia contended that time spent on FSNP has no effect on learner academic achievement. However, in a related study that analyzed the effects of Facebook usage by undergraduate students at Luleå University of Technology in Sweden Rouis, Limayem & Salehi-Sangari (2017) observed that extensive use of FSNP by students with extraverted personalities led to poor academic achievement while students with self-control and self-regulation ably controlled the amount of time they spend on the platform, had better cognitive absorption that translated to high academic achievement. This indicated that, while time spend on FSNP may have a negative or positive effect on learner academic achievement, there is a need for teachers to supervise learning through FSNP to minimize multitasking by learners on the platform which inhibits cognitive absorption which may lead to low academic achievement irrespective of whether the access time is regulated or not.

In agreeing with this position, Muthui and Sirera (2017) in a survey study to establish the implications of time spend on social media on academic performance by adolescents in public day secondary schools in Nakuru East constituency observed that most adolescents spent most time on social media including FSNP for social interactions which had the potential of contributing to their low academic achievement. Furthermore, Muthui and Sirera found that learners resisted school rules and regulations by sneaking mobile devices in to use for social interactions rather than academic tasks. Muthui and Sirera (2017) opined that to avoid this resistance, schools should allow learners to carry such devices and train them on responsible use of FSNP to avert negative effects on their academic achievement. However, the survey study by Muthui and Sirera (2017) did not point out how specific SNPs such as FSNP impacted on learner academic achievement. The gap was addressed through this empirical study which narrowed on the effect of FSNP on learner academic achievement in computer programming among secondary school students in public schools in Nairobi City County, Kenya. Similarly, a study to investigate the relationship between self-regulated learning and academic achievement among undergraduate medical students of Universitas, Warmadewa, Ningrum by Kumara & Prabandari (2018) revealed a positive correlation between self-regulated learning and academic achievement. Kumara & Prabandari (2018) opined that students who have good self-regulated learning post high academic achievement because they are able to concentrate on the content being learned.

Further, in a study involving college students drawn from Gwalior or nearby places in India which examined the impact of FSNP usage, Mathur, Nathani, Sharma, Modi and Arora (2019) affirmed that the use of FSNP might have a positive impact on learning outcomes. However, Mathur, et al. (2019) noted that if not regulated, students would use the platform for entertainment, relaxation, and passing time but not for academic purposes, which would affect their academic performance negatively. Mathur, et al (2019) proposed that teachers and other educationists should be involved in the learning process involving the usage of FSNP for optimal utilization of the platform and acceptable learning outcome to

be realized. In a related study involving student in a Finnish University which examined the connection between students' teamwork experience, self-regulated learning, technology self-efficacy, and performance in an online educational technology course Oyelere, Olaleye, Balogun & Tomczyk (2021) emphasized the need to control the time learners spend online by observing that right self-regulated learning strategies in online courses motivate students to strive for a positive teamwork experience, leading to increased interest in online learning and increased academic achievement. In the same breath, a study conducted by Alwreikat & Shehata (2021) in Sultan Qaboos University in Muscat, Oman which explored the determinants of Facebook use among students and its impact on collaborative learning suggested that the more time spend on Facebook the better learning students achieved through collaborative learning. They emphasized on the need for teachers to regulate the time in order to control concentration. The findings from the reviewed studies inform the potential effect of FSNP on academic achievement among higher education learners. However, the findings of the survey study by Alwreikat & Shehata (2021) involving university students was not empirical and cannot generally inform the effect of FSNP on learner academic achievement in computer programming among learners in public secondary schools in Nairobi City County, Kenya.

2.4.7 Learner Attitude Towards Facebook SNP and Its Effect On Achievement

Facebook SNP has been appreciated by learners who use it for academic and non-academic purposes as an interaction tool. Concurring to this viewpoint, in a study on the SNP's effect on academic achievement of learners in Malaysia, Helou and Rahim (2010) revealed that learners appreciate the use of SNPs such as FSNP and freely extend interactions with their instructors beyond the classroom which translate to improved academic achievement. Similarly, in a study involving US and European learners, Ozer, et al. (2013) concluded that the willingness of learners to use Facebook SNPs alongside their studies improved their academic achievement. Further, in a qualitative study using action research to examine the use of SNP-supported LMSs in distance education at Firat University in Turkey, Özmen, and Atici (2014)

established that learners had a positive attitude towards the use of SNPs which facilitated interactions with colleagues, course content and instructors.

In a related mixed method approach study to investigate the attitudes and perceptions of Japanese university students' use of Facebook in an educational setting and the platform's capacity to be used in a way similar to a traditional learning management system for various specific language-learning activities, Gamble and Wilkins (2014) heeded that students had a positive attitude towards FSNP which could be associated with the platform's capacity to offer a flexible learning community environment where multimedia learning materials can be presented, access is not delimited by time and geographical location and learners are actively engaged in the learning activities. Similarly, ElsayyedSanad (2016) in a study which investigated undergraduate the students' perceptions and attitudes towards Facebook as an educational learning tool among undergraduate students at the Majmaah University in Saudi Arabia taking English as a Foreign Language (EFL) attributed the students' high attitude toward using Facebook as a learning resource to the platform's capacity to provide an environment for social and academic engagement which is a significant predictor of learner academic achievement.

In a similar vein, a study involving undergraduate students in Morocco which investigated students' attitudes toward using Facebook as an educational tool where Faizi, Afia and Chiheb (2018) observed positive students' attitude towards the use of the platform not only for social interactions and entertainment but also for learning purposes in different subjects. Further, the findings of Khatun and Halder (2018) in a study to explore the difference among post-graduate students' attitude towards the use of Facebook in terms of their gender, locality and disciplines in the University of Gour Banga, pointed out that there was a statistically significant difference between the male and female of post-graduate students in their attitude towards the use of Facebook, however, the study did not reveal which gender of the students had a more positive attitude than the other.

Furthermore, Moghadam and Shamsi (2021) confirmed that students had a positive attitude toward the implementation of FSNP as a medium of learning in a recent study conducted in a language center for college students in Fasa, Iran, to explore learners' attitudes towards Facebook as a medium of engagement during the Covid-19 quarantine. According to Moghadam and Shamsi (2021), the students' positive attitude toward using FSNP for learning purposes was due to the platform's ability to increase students' confidence; engage students in motivating ways using chats, knowledge sharing through posts, document sharing, and live videos; provide an interpersonal and interacting learning community for both students and teachers; promote collaborative learning and support virtual learning in the aftermath of lockdown. However, the studies by Gamble and Wilkins (2014), ElsayyedSanad (2016), Faizi, et al. (2018), Moghadam and Shamsi (2021) were exploratory, involved university students who tend to use the SNPs more responsibly than those in high schools and did not address the relationship between learner attitude and academic achievement in specific disciplines, particularly among students in public secondary schools in developing countries such as Kenya. This study aimed to bridge these gaps by empirically determining how learners' attitudes toward using FSNP as a learning resource were related to their academic achievement by including Computer Studies students from such schools.

2.4.8 Teacher Perception Towards the Use of Facebook SNP and Learner Academic Achievement

Teachers may be slow at adopting cutting-edge technologies for teaching and learning due to obvious reasons, such as fear of loss of a job or increased workload. The success and uptake of new technology can be associated with the teachers' perception towards it. For instance, in a Web-based survey that examined user perceptions towards different SNPs in the U.S, Chan-Olmsted, Cho & Lee (2013) concluded that the use of SNPs in education is perceived differently depending on usage patterns, gender, and age of users. Notably, the study by Chan-Ohmsted, et al. (2013) did not focus on teacher perceptions towards SNP such as FSNP and learner academic achievement. However, a doctoral dissertation taken

at Linnaeus University in Sweden on the use of digital technologies in education focusing on the complexity of teachers' everyday practice by Sadaf (2016) revealed that teachers' use of emerging digital technologies in teaching and learning depends on their perception. Even though Sadaf (2016) did not concentrate on any specific emerging instructional technology, successful adoption of emerging technologies, such FSNP as an instructional resource, depends on how teachers perceive it.

Alluding to this viewpoint Chen and Bryer (2012) in a qualitative study to explore the use of Social Media (SM) such as FSNP among faculty in public administration in the United States (U.S) established that instructors perceived the use of social media as instructional tools have the capacity to enrich lesson discussions, increase learner engagement and broaden connectedness between learners and teachers leading to increased learner academic achievement and should be integrated into formal learning. In a related study aimed at providing an insight into instructors' perceptions towards the utilization of FSNP in an instructional context at one UK university, Prescott (2014) observed a positive attitude and perception towards the platform among the instructors which ultimately play a role in online learner engagement and improving teacher-learner interaction. Similarly, Rezaei and Meshkatian (2017) in quantitative survey research aimed at exploring the Iranian language teachers' attitude towards social media and technology-based interaction averred that English Language Teaching (ELT) teachers had a positive attitude towards the use of social media including FSNP as a media and perceived it as a tool which promotes blended learning, supports teachers' professional development, engages learners inside and outside the classroom thus positively influencing learning outcomes.

Further, in a quantitative survey made to observe the use, attitudes, motivation, and perceptions among Moroccan English teachers' towards FSNP as a pedagogical and instructional tool, Soulaymani and Alem (2019) asserted that teachers have an inclination toward FSNP because it helps them to develop their professional skills which benefit learners through motivation and improved academic achievement.

Further still, in a study that explored the possibility of Social Media use in online learning, teachers' attitudes, and perceptions towards the platforms, Jogezai, et al. (2021) reported increased use of social networking platforms such as FSNP during the COVID-19 pandemic, primarily in developing countries, and positive attitudes towards the platforms among teachers. Jogezai, et al. (2021) revealed that teachers perceived SNPs as a viable instructional tools which have the ability to contribute positively toward learner academic engagement. The reviewed literature, however, showed that the studies involved university or college students and exploratory in nature and did not reveal how teachers' attitudes toward the use of specific SNPs, such as FSNP in teaching and learning impact on learner academic achievement. Furthermore, the reviewed literature did not point out to any empirical evidence of the relationship between teachers' perception towards the use of FSNP as a instructional tool and learner academic achievement in computer programming at the secondary school level in Nairobi City County, Kenya, a gap that this study aimed to bridge.

2.5 Theoretical Framework

The use of social networking platforms for educational purposes can be traced back to the socio-constructivist learning theory in the 1960s (Chen & Bryer, 2012). The basic principle of this theory, as proposed by Vygotsky (1978), is that students learn most effectively by engaging in carefully selected collaborative problem-solving activities under the close supervision of instructors. Years later, Siemens (2004) and Downes (2007) launched the Connectivism Theory, where social learning is integrated with social media technologies. According to Siemens (2004) the true competence for a lifelong learner would be the ability to "stay connected" and "belong" to digital communities with which interests are and can be continuously shared. Thus, this study was guided by the socio-constructivist learning theory advanced by Vygotsky (1978) and the Connectivism learning theory advanced by Siemens and Downes (2005).

In socio-constructivist constructivism learning theory, both the teacher and the learner are viewed as active players in the learning process. The quality of teacher-learner interaction determines the quality of learning. This theory borrows from the social learning theories advanced by Vygotsky (1978) and the constructivism theories advanced by Piaget and Vygotsky. According to social learning theories, people acquire knowledge through interactions and communication with others (Vygotsky, 1978). In this case, learning takes place through learner interactions with peers, teachers, and other experts. The constructivist learning theories assert that people learn better through information they create on their own (LeFrançois, 2012). Further, Ozer (2004) opines that the learner according to constructivists' theories, is considered central in the learning process and the teacher's role is that of facilitation and guiding. This means that the teacher plans, organizes, guides, and provides direction to the learner who is accountable for his or her own learning. Both social and constructivist learning theories support the use of FSNP for teaching and learning Computer Studies because it provides a platform for learners to interact with their peers and teachers, as well as a platform for learners to participate in knowledge creation and exchange. Teachers are able to facilitate and guide the learning process by creating closed groups on which they post learning content and challenges for learners to interact via Facebook.

According to the Connectivism theory of learning, also known as the learning theory of the digital age, the learner takes control of learning. Technology plays a role in the learning process. Alluding to this, Kop and Hill (2008) observe that the Connectivism theory has led to the emergence of new pedagogical techniques that have led to a learning shift from teacher-centered to learner-centered. The Connectivism theory has its roots in the Social Constructivism learning theory proposed by Vygotsky (1978). Even though the Connectivism theory is relatively new, several studies have been guided by it. For instance, in a quasi-experimental study involving high school learners in Tehran City in Turkey which aimed at examining the effect of web-based communication tools based on Connectivism theory on students' academic achievement and the value of their engagement, Lajmiri (2016) observed that the use of

communication tools in teaching was effective compared to traditional methods and resulted in improved learner engagement and academic achievement. This learning theory was therefore relevant in guiding this study because FSNP was used as the communication tool and the technology that provided a virtual learning environment for learners to interact with peers, teachers, and content at a rate that a learner has control over.

2.6 Conceptual Framework

The conceptual framework for this study is shown in figure 2.1.

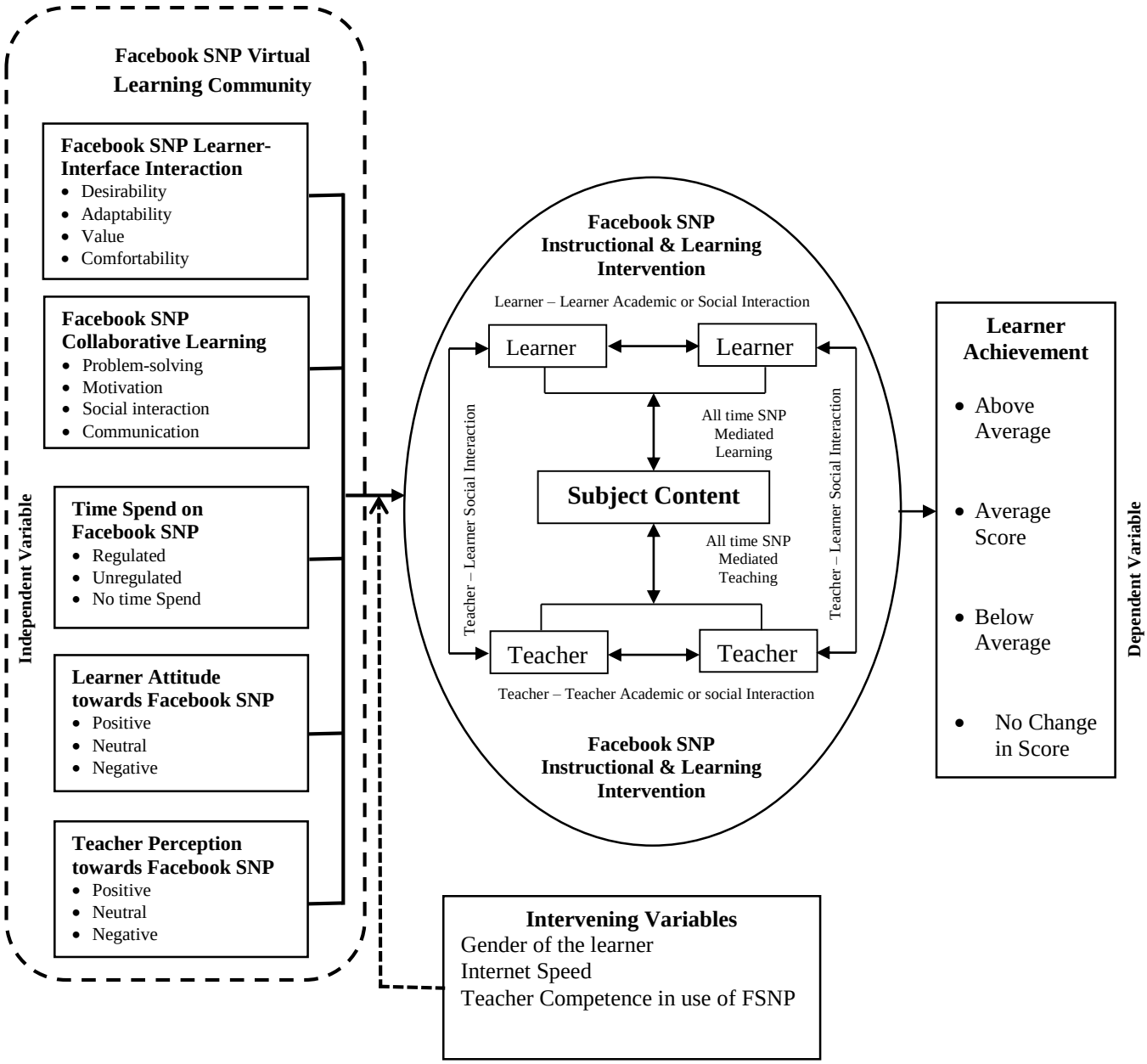

Figure 2.1: Conceptual framework for a Facebook SNP mediated teaching-learning environment.

Figure 2.1 shows the conceptual framework that guided this study. This study conceptualized a virtual learning community where learner-learner, learner-content, and learner-teacher, teacher-teacher academic and social interactions can take place via Facebook SNP when utilized as a learning resource and an instructional tool. The conceptual model was thus based on the assumption that Facebook SNP learner-interface interactions; collaborative learning on Facebook SNPs; time spent on Facebook SNP exposure; and learner attitude towards the use of Facebook as a learning resource, as well as the teacher perception towards the use of SNPs as an instructional tool, have an effect on learner academic achievement.

Thus, the study conceptualized a scenario where, when FSNP is used to facilitate social interactions among learners and with their teachers, it creates a conducive virtual learning environment where the participants freely interact with each other to share ideas and concepts taught, thus leading to improved academic achievement. In this concept, learner-learner, learner-content, learner-teacher and teacher-teacher interactions were done on the Facebook SNP for different amounts of time. The study also conceptualized that when learner-interface interactions are adaptable, desirable and comfortable to the learner, they add value to learning which may translate to improved academic achievement. The study further conceptualized that when learners spend different of regulated or unregulated amounts of time, their academic achievement may be influenced differently. Further still, the study conceptualized that collaboration on FSNP improve learner communication skills, problem-solving skills, social interaction as well motivating them resulting to improved academic achievement. The learner's attitude as well as the teacher's perception towards use of SNPs for purposes of learning and its effects on the learner's achievement was also visualized.

2.7 Summary of Literature Review

The summary of the literature reviewed was done in Table 2.1.

Table 2.1: The Summary of the Literature Reviewed

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
Hillman, D., Willis, D. & Gunawardena, C. (1994).	Learner interface interaction in distance education: An extension of contemporary models and strategies for practitioners.	A qualitative Survey study that focused on learner-interface interactions in distance education	In technology-driven distance learning, learner-interface interaction is the fourth form of learner interactions other than Learner-learner, learner-teacher, and learner-content identified in 1989	The study focused on conventional LMs but not the emerging interactive social networking platforms. The study did not point out learner-interface interactions impact on learner academic achievement	Determining the effect of learner-interface interactions on FSNP on learner-academic achievement through an empirical study while focusing on learning experiences expressed by adaptability, comfortability, desirability, and value to learner
Danesh, A., Bailey, P. & Whisenand, T. (2015).	Technology and Instructor-Interface Interaction in Distance Education	A survey study that used questionnaires for University students to determine the impact of various interactions on asynchronous interaction tools	Successful instructor-interface interactions just like other learner interactions on an online learning management system (LMS) play a great role in the learning process thus influencing learner academic achievement	Focused on instructor-interface interactions. It involved University students who might have had advanced knowledge of online interactions. Did not focus on a single synchronous SNP like FSNP but relied	The effect of learner-interface interactions on FSNP on learner academic achievement for learners at secondary level

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
				on asynchronous interaction tools like email, blog, and discussion boards.	
Hussin, W., Harun, J. & Shukor, N. (2019)	A Review on the Classification of Students' Interaction in Online Social Collaborative Problem-based Learning Environment: How Can We Enhance the Students' Online Interaction?	The literature search was performed using the following electronic databases: Elsevier (ScienceDirect), Springer, Google Scholar, IEEE Xplore, SAGE, Emerald Insight, Taylor and Francis, ERIC and Scopus, and Wiley Online Library for all papers published between 1989 and 2019	Identified learner-interface interactions alongside learner-learner, learner-instructor, learner-content and learner-self interactions as important elements of an LMS that enhance learner academic achievement	Did not focus on SNPs as LMSs, the findings in this study provide empirical evidence that learner-interface interactions on FSNP offer technology affordances that add value learner academic achievement.	A quasi-experimental study to empirically determine the effect of learner-interface interactions on FSNP on learner academic achievement among Computer Studies students in secondary school
Raut, V. & Patil, P. (2016)	Use of social media in education: Positive and negative impact on the students.	Desktop research that focused on the positive and negative impacts of social media in the education sector	Observed that the Social Media environments place the control of learning into the hands of the learner, thus offering a suitable platform for learner collaboration. Did not provide empirical evidence of how learner collaboration through SNPs such as FSNP	Did not focus on the effect of learner collaboration through a specific SNP such as FSNP on academic achievement in public secondary schools. Experimental data to prove the impact of Social Media on students' performance.	The study focused on the effect of learner collaboration through FSNP on learner academic achievement. Focused on how problem-solving skills, communication skills, and motivation acquired through the collaboration on the platform contribute to

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
			impact on learner academic achievement		learner academic achievement
Nyagah, V., Asatsa, V., & Mwania, J. (2015)	Social Networking Sites and Their Influence on the Self Esteem of Adolescents in Embu County, Kenya	A descriptive survey study that sought to specifically investigate the influence of social networking sites on the self-esteem of adolescents in secondary schools in Embu County Kenya	That study concluded that almost all secondary school students use SNPs mostly Facebook which influences the self-esteem and psychological wellbeing of secondary school student	The study did not inform how the use of specific SNPs such as Facebook influence the academic achievement of the secondary school students	This study focused on the effect of Facebook SNP on learner academic achievement in Computer Studies among students in public secondary schools
Özyurt, Ö. & Özyurt, H. (2016)	Using Facebook to enhance learning experiences of students in computer programming at Introduction to Programming and Algorithm course	Quantitative and qualitative study that focused on the effect of using Facebook on enriching learning experiences and involved university students	Study concluded that Facebook has positive effects such as providing rich content in programming learning, increasing extracurricular communication, offering a cooperative and collaborative learning environment, increasing motivation, and bringing different perspectives as well as negative effects such as causing distraction, decreasing face-to-face communication, and bringing problems about expressing oneself	Focused on the effect of using Facebook on enriching the learning experiences of students in programming learning but did not point its effect on learner academic achievement. Relied on the usage of Facebook and interview to collect data	The effect of learner collaboration through FSNP on learner academic achievement. Quantitative and qualitative data were collected using pre-test and post-tests, questionnaires, interviews, and observation schedules.

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
Ansari, J. A. & Khan, N. A. (2020)	Exploring the role of social media in collaborative learning the new domain of learning	Empirical study based on a survey involving university students with the focus on the student's perception of social media and mobile device collaborative learning, interactivity with peers, teachers, and impact on student's academic performance	Observed that the use of online social media such as FSNP for learner collaboration has a significant impact on interactivity among learners, teachers, and online knowledge sharing behaviors which ultimately impact on the learners' academic achievement.	Did not focus on the effect of collaborative learning through any specific social networking platform on learner academic achievement and involved University students who are expected to have self-regulation when using social media unlike those in secondary school. Experimental data to prove the impact of Social Media on students' performance.	A quasi-experiment study to establish the effect of learner collaboration through FSNP on learner academic achievement among Computer Studies secondary school students.
Kirschner, A. and Karpinski, C. (2010)	Facebook® and academic performance.	This was a descriptive and exploratory survey study involving Facebook use among University students and its impact on their academic performance	Concluded that learners who used Facebook spent less time studying and got lower GPAs.	Did not point out whether regulating time students spent on the use of Facebook would give different results. The involved university students from developed countries and the findings could be different for secondary school students from a	This was a quasi-experimental study that focused on the effect of time (regulated unregulated) spent on FSNP on learner academic achievement

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
				developing country like Kenya	
Mathur, G., Nathani, N., Sharma, A., Modi, D. & Arora, G. (2019).	Impact of Facebook Usage on Students' Involvement in Studies	An empirical study whose data on usage of Facebook and students' involvement in studies was collected using a questionnaire	The study revealed that students use Facebook mostly for entertainment, relaxing, and passing time but not for knowledge enhancement. It also revealed that due to the time spent on Facebook, the usage has got a negative impact on the student academics and this affects their career	The study used only a questionnaire to collect data but not a variety of tools. The study did not point out how regulated use of FSNP impacts on students' academics. The study involved college students.	A quasi-experimental study whose data was collected using student achievement tests, questionnaires, interviews, and observation tools. Involved regulated and closely supervised use of FSNP by learners in public secondary school for learning purposes
Wanjohi, Mwebi and Nyang'ara (2015)	Self-Regulation of Facebook Usage and Academic Performance of Students in Kenyan Universities	An ex post facto research design whose purpose was to investigate the influence of self-regulation of Facebook usage on academic performance among university students in Kenya	The study concluded that there was modest self-regulation in use of Facebook among university students and that there was a significant relationship between self-regulating and academic performance	The study focused on self-regulation of usage of Facebook and academic performance among university students. However, the study did not highlight how time spent on the platform, the attitude of learners, perception of teachers, and learner-interface interaction experiences offered by the technology influence the	This is an empirical study focused on secondary school computer studies on students and the effect of FSNP on the academic achievement. The study concentrated on the how learner-interface interaction experiences, regulated and unregulated time, learner collaboration, the attitude of learners, and the perception of teachers on FSNP influenced academic achievement.

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
				academic performance	
Alwreikat, A., Zaid, M. & Shehata, A. (2021)	Determinants of Facebook use among students and its impact on collaborative learning	The study used a quantitative research approach which used instrument used is a questionnaire	The results of the study showed that the relationship between Facebook use and collaborative learning is above average, which means that the more time spent on Facebook, the better academic performance students achieve through collaborative learning	The study used only questionnaires to collect data from University students whose results cannot be used to generalize the effect of time spent on FSNP on academic achievement for learners in secondary education level.	This was a quasi-experimental study that involved secondary school Computer Studies students. Data was collected using a variety of instruments including pre-test, post-test, questionnaires for teachers and students, lesson observation schedules, and teacher interview schedule. Triangulation of the findings from data using the various instruments was done.
Faizi, R., Afia, E., & Chiheb, R. (2018).	Examining Students' Attitudes Towards Using Facebook as an Educational Platform	A survey study involving higher education students. Data was collected using questionnaires.	Study results showed that students had a positive attitude towards the use of Facebook not only for entertainment, and socialization but for learning purposes	The study did not focus on how student attitude towards the use of Facebook impacted their academic achievement	This study focused on learner attitude towards the use of FSNP as a learning resource and its effect on their academic achievement. Data was collected using a variety of instruments and results were triangulated.

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
Khatun, J. and Halder, U. (2018).	Attitude towards the Use of Facebook of the Post-Graduate Students	The study used The Test of Attitude towards Facebook Use developed by Halder, U. K. (2016)	The study revealed that there was no significant difference between Post Graduate students' attitude towards the use of Facebook due to their locality of residence and disciplines but a significant difference between male and female students' attitude towards the use of Facebook	Study involved graduate students and used only one data collection instruments. The study focused on the attitude of students towards Facebook due to their gender, residence, and discipline but did not focus on how the attitude impacted their academic achievement	This study used several data collection instruments and focused on the effect of the learner attitude towards FSNP on their academic achievement among secondary school Computer Studies students
Moghadam, M. & Shamsi, H. (2021).	Exploring Learners' Attitude toward Facebook as a Medium of Learners' Engagement during Covid-19 Quarantine	This was an exploratory study that used online surveys. The study aimed at exploring learners' attitudes through the lens of sociocultural theory.	Results of the study revealed that learners have a positive attitude towards the use of Facebook and that the platform can be used as a technology to motivate and engage learners besides other online tools	The study used an only online survey to establish learner attitude towards the use of Facebook but did not focus on its effect on learner academic achievement	This study focused on establishing the effect of learner attitude towards the use of FSNP on their academic achievement. Data was collected using a variety of instruments which included student achievement tests, learner and teacher questionnaires, lesson observation, and teacher interview schedules.

Author	Title of Study	Methodology	Findings of the Study	Knowledge Gap	Focus of This Study
Chan-Olmsted, S., Cho, M. & Lee S. (2013)	User Perceptions of Social Media: A Comparative Study of Perceived Characteristics and User Profiles by Social Media	A survey study that examined the user perceptions of six main groups of social media: blogs, micro-blogs, social networks, wikis, forums and content communities based on five dimensions namely participation, commonality, connectedness, conversationality and openness	The results of a national consumer panel survey revealed that different social media applications are perceived differently based on usage patterns, gender and age	The survey study did not point out on specific group of used like teachers and application in education	This quasi-experimental study was specific on the perception of teachers towards use of FSNP as an instructional resource and its effect on learner academic achievement
Soulaymani, S., & Alem, N. (2019)	Perceptions of Moroccan English Teachers Towards Using Facebook as A Pedagogical and Instructional Tool	A survey that adopted quantitative method of research which, used the paper-based and online questionnaires as well as paper-based ones as tools to monitor the use of Facebook as a pedagogical and instructional tool as well as exploring the attitudes, motivation and perceptions concerning the use of Facebook among Moroccan English teacher	The study revealed that teachers have an inclination towards Facebook because it helps them to develop their professional skills which benefit learners.	The study relied only on questionnaires for data collection and did not focus on the effect of teachers' perception on learner academic achievement	This study used a variety of data collection tools including pre-test and post-test, questionnaires, lesson observation, and interview schedules to determine the relationship between teacher perception towards the use of FSNP as an instructional tool and learner academic achievement.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research design, the target population, the sample size, the sampling method, the research instruments used for data collection, the procedures for collecting data, validity and reliability tests, data analysis, and ethical considerations.

3.2 Research Design

The study adopted a quasi-experimental research design with non-equivalent group design. A quasi-experimental study is not a true experiment, but it resembles one. Quasi-experimental studies are aimed at evaluating interventions to demonstrate causality between the interventions and the outcomes (White and Shagun, 2014). The non-equivalent group design is a common type of quasi-experimental design because it is similar to the classic experimental design except that the groups are not randomly assigned (Rubin & Babbie, 2017). The non-equivalent group design was adopted because the form three Computer Studies students who participated in the study differed in numbers and characteristics in terms of gender and entry behaviors. White and Shagun (2014) state that in a quasi-experimental study, a control group that is as similar as possible in baseline characteristics to the treatment group is considered and one can manipulate the control and treatment groups to determine the causal effect. A quasi-experiment was suitable in this study for determining the causal effect of Facebook SNP on learner academic achievement in Computer Studies in public secondary schools in Kenya. The study treatment group consisted of form three learners who were taught the "Elementary Programming Principles" topic in Computer Studies using the Facebook SNP as the platform for learner-learner, learner-teacher, and learner-content interactions. In this topic, students learn programming skills and problem-solving with a computer. The control group was made up of three learners who were taught the same topic in face-to-face lessons but

were not exposed to the Facebook SNP for interactions. Student achievement tests comprising pre-test and post-test were administered before and after the treatment to obtain scores which formed the quantitative data for the study. Stratton (2019) argues that the pre-test and post-test study design gives the researcher the option to test the dependent variable both before and after intervention with an independent variable, thus providing directionality to their research. The quantitative data collected through the pre-test and post-tests was enriched using qualitative data that was collected using a questionnaire for students, a questionnaire for teachers, a lesson observation schedule, and a Computer Studies teacher interview schedule. Triangulation of the data collected using the various instruments was required to increase the validity and reliability of this quasi-experimental study results.

3.3 Target population

In this study, the target population was two thousand five hundred (2,500) form three Computer Studies students and sixty (65) subject teachers from thirty-seven (37) boys' and twenty-eight (28) girls' public secondary schools offering Computer Studies in Nairobi City County, Kenya. Form three students were selected to participate in this study because at this level they take Computer Studies as an elective subject and that the topic "Elementary programming principles" is taught at that level. The study was conducted in Nairobi City County because most schools in the county have robust information and communication technology (ICT) infrastructure (Murithi and Yoo, 2021) including reliable Internet connectivity required to implement the Computer Studies curriculum, thus found suitable for the study unlike others located outside the capital city of Kenya.

3.4 Sample size and sampling technique

Computer Studies is an elective subject taken by different numbers of students in Kenya depending on the schools' capacity to provide the computing resources needed to offer the subject. Hence, this study targeted schools that offer the subject up to form four. This study employed purposive sampling to obtain

about two hundred and fifty (250) Computer Studies students and six (6) teachers who teach the subject in six (6) Public Secondary Schools in Nairobi City County. Learners in private schools were excluded from the sample because they are from the county's middle and upper classes and are exposed to ICTs at a young age. As a result, they have significant differences in learner characteristics, and if included in this study, they would have had an advantage over those in public secondary schools.

According to Mugenda & Mugenda (2003), in purposive sampling, cases are handpicked because they are informative and possess the desired characteristics required for a study. To meet the objectives of this study, students and teachers who participated in the study were from public boys' and girls' secondary schools that: offer Computer Studies as KNEC examinable subject, have a reliable Internet connection, have a student-to-computer ratio of at least 1:2 and have reliable electricity supply. For the purpose of quasi-experiment, three (3) boys' and three (3) girls' public secondary schools in Nairobi City County were handpicked of which two of the schools (1 Boys' and 1 girls') with approximately seventy (70) students participated in the control group while four (2 boys' and 2 girls') with approximately one hundred and eighty (180) students participated in the treatment group. Systematic random sampling method was further used to obtain thirty-five (35) schools from the remaining fifty-nine (59) targeted schools which did not participate in the quasi-experiment. Questionnaires were administered to the Computer Studies teachers from thirty-five (35) schools including those in the experimental groups.

Mugenda and Mugenda (2003) define systematic random sampling as a technique where the K^{th} case in a population frame is selected for inclusion in the sample. For this study, to obtain a sample of thirty-five (35) teachers from the fifty-nine (59) remaining schools, the schools were listed randomly, that is without following any order, then the formula $k = \frac{N}{n}$ was used to pick the sample from the list; where N was the size of the frame, n was the desired sample size and k was the k^{th} case to pick from the list. In

this case, $k = \frac{59}{35} = 1.69.$ This was rounded off to k=2. A decision was made to select the first school randomly between 0^{th} and 9^{th} as the starting then pick every second school from that point. The process was repeated from the top until a sample size of thirty-five (35) schools was obtained from whose teachers responded to the questionnaire for teachers shown in appendix V which were administered to collect qualitative data on teachers' perception towards the use of Facebook Social Networking Platform (FSNP) as an instructional tool for teaching Computer Studies and its effect on learner achievement. The qualitative data enriched the quantitative data collected through the quasi-experiment.

3.5 Research instruments

In this study both quantitative and qualitative data were collected. A pre-test administered before treatment and a post-test administered after treatment were used to collect quantitative data. Qualitative data was collected through the use of questionnaires for students, questionnaires for teachers, a lesson observation schedule, and an interview schedule for computer studies teachers. All research instruments were developed by the researcher.

3.5.1 Pre-test

Stratton (2019) defines a pre-test as the initial measurement taken before an experimental treatment is administered and the subsequent score recorded. In this study, a pre-test with semi-structured questions derived from the topic, "Elementary Programming Principles", shown in appendix I was developed and administered to the control and treatment groups to obtain learner scores before the treatment. In this treatment, the FSNP was used as the intervention technology, enabling learner-learner, learner-content, learner-teacher, and learner-interface interactions in an environment superior to that provided by conventional learning management systems (LMSs) whose development is based on Web 1.0 technologies. The topic was selected because it prepares the students for Computer Studies project examination three (451/3) and it is required to tackle a compulsory question (question 16) in Computer

Studies examination paper one (451/1) which is poorly performed by students in the national examinations (KNEC Annual Report, 2019). The topic was also selected because it imparts knowledge and skills needed in problem-solving using a computer. The learner scores obtained in the pre-test were used to compare with post-test scores obtained from both control and treatment groups after the treatment to ascertain if there are statistically significant differences in the scores before and after the teaching and learning intervention using Facebook SNP. Teachers involved in the study were instructed not to revise the pre-test until the study was over to reduce the probability of the pre-test results influencing the outcomes of the post-test.

3.5.2 Post-test

Post-test refers to the measurement taken after treatment is administered in an experiment to compare with the pre-test results to determine any causal effect of the treatment or the experimental intervention (Stratton, 2019). The Post-test shown in appendix II was administered to both the control and the experimental groups after the treatment. It consisted of the same questions as in the pre-test to ensure the same level of difficulty. The questions were re-ordered to create an impression to the students that the test was different from the pre-test. The quantitative data (mean scores) collected from the pre-test was used to test the following hypothesis;

HO_1: There is no significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not;

HO_2: There is no significant difference in learner academic achievement between learners who collaborate on FSNP and those who do not;

HO_3: There is no significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not.

3.5.3 Questionnaire for Students

A 5-point Likert-scale student questionnaire shown in appendix III was administered to the participating Computer Studies students at the end of the study to determine the level of agreement with the items provided. To reduce respondents' bias, both positive and negative responses were included in the questionnaire. Vogt (1999) observes that a Likert-type scale is commonly used to measure attitudes, knowledge, perceptions, values, and behavior changes. This made a Likert-scale questionnaire appropriate in this study to determine the student attitude toward the use of the Facebook Social Networking Platform as a learning resource. The data collected was used to test the following hypothesis;

HO_4: There is no significant relationship between learner attitude towards the use of Facebook SNP for learning and learner academic achievement.

3.5.4 Questionnaire for Teachers

A 5-point Likert-scale teacher questionnaire with both positive and negative items to reduce respondents' bias as shown in appendix IV was administered to the participating teachers at the end of the study to collect data about teacher perception towards the use of Facebook as an instructional resource. The data collected was used to test the following hypothesis;

HO_5: There is no significant relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement.

3.5.5 Lesson Observation schedule

The lesson observation schedule shown in appendix V was administered to the participating Computer Studies students and teachers during the study. DeWalt & Dewalt (2002) avers that the observation method helps a researcher to have a holistic understanding of a phenomenon under study and increases the validity of the study. This made use of an observation schedule relevant to this study to collect qualitative data on active learner engagement, difficulties faced, task completion, interest, teacher role,

and enthusiasm in using FSNP as a learning and instructional resource. The qualitative data collected was used to test the following hypotheses;

HO_4: There is no significant relationship between learner attitude towards the use of Facebook SNP for learning and learner academic achievement.

HO_5: There is no significant relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement.

3.5.6 Interview Schedule for Teachers

The interview schedule shown in appendix VI was administered to teachers participating in the study. The focus was on those teachers who were involved in teaching the treatment group using the FSNP as a learning resource. Gill, Stewart, Treasure & Chadwick (2008) note that research interviews help to explore the views, experiences, beliefs, and/or motivation of individuals on specific matters and provide a deeper understanding of a social phenomenon than would be obtained from purely quantitative methods. This informed the use of an interview schedule in this study to collect qualitative data about teacher perception toward the use of Facebook as an instructional tool. The qualitative data collected on the teachers' views and experiences of using the FSNP as an instructional resource, learner engagement, lesson delivery, learner collaboration, and teacher motivation was used to test the following hypothesis;

HO_5: There is no significant relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement.

3.5.7 Training Manual for Teachers

To ensure that the Computer Studies teachers were well equipped before the study began, they were trained for two days on how to use the FSNP as a learning and instructional resource in teaching computer studies. The teacher training manual shown in appendix VII was used. The teachers were issued with the manual for reference during the study. The manual was developed by attempting and writing down all

the procedures for performing various learning and instructional activities on FSNP. These activities included posting a discussion, attaching documents, creating live video documents, uploading images, and taking quizzes.

3.6 Validity of the Research Instruments

The validity of a research instrument determines how effectively it performs its intended function. Anastasi and Urbina (1997) define validity as the ability of a research instrument to measure the behavior or quality of data with the precision intended. Similarly, Whiston (2012) describes the validity of a research instrument as its ability to collect data that serves the purpose intended. Further, Sürücü & Maslakçı (2020) indicate that validating research instruments guarantee valid study findings. To ensure internal validity in this study, the same pre-test was used as a post-test with a reorganization of the test items done so that the learner could not easily notice the similarity of the tests. To ensure external validity, the matching method was used to sample schools that promised similar learning conditions between the control and experimental groups. The student achievement test (SAT), the questionnaires, observation, and the interview schedules were piloted in three schools to determine the difficulty level of the questions. Teijlingen & Hundley (2001) suggest that carrying out a pilot study is critical because it allows the researcher to pre-test research instruments to get valuable insight into the research process and the expected outcomes. Upon analyzing the responses from the pilot study, questions were modified to improve the quality of the data collection tools. A review of the questionnaires, observation schedules, and interview schedules was conducted by supervisors and colleagues during departmental seminars for postgraduate students. This was done to improve the content validity of the research instruments. The suggestions drawn from the reviews were taken into consideration and implemented accordingly.

3.7 Reliability of the Research Instruments

Reliability involves measuring the extent to which an instrument yields similar results after several trials. According to Taherdoost (2016), testing the reliability of a research instrument like a questionnaire is significant because it demonstrates consistency across sections of that instrument. To test for internal consistency of the research instruments used in this study, the results obtained from the student achievement tests (pre-test and Post-test), the data from the questionnaire for students, the questionnaire for teachers, and the teacher interview were used to compute the correlation coefficient based on the split-half technique to eliminate chance error. The resulting split-half averages were used to compute Cronbach's Alpha (α) reliability coefficient. The achievement tests had an r-value of 0.81, the questionnaires for both teachers and students had an r-value of 0.86, the interview schedule for teachers had an r-value of 0.78 while the observation schedules had an r-value of 0.73. This indicated that the instruments were highly reliable. Kothari (2011) opines that a reliability coefficient of more than 0.5 is considered adequate for instruments to be applied in social research.

3.8 Procedure for data collection

A research permit was obtained from the Ministry of Education, Science, and Technology (MoEST) through the National Commission of Science, Technology & Innovation (NACOSTI) after an introductory letter from the departmental chairman. Further, authority from the County commissioner of education and the principals of the schools that participated in the study was sought. The Computer Studies teachers were trained on how to manage the FSNP-mediated teaching and learning process. Because of the government directive to minimize face-to-face interactions in schools due to the Covid-19 pandemic, a three-day virtual training was conducted. Six (6) graduate Computer Studies teachers were recruited to serve as research assistants.

The teachers were trained on how to manage the FSNP-mediated teaching learning process like the Computer Studies teachers participating in the study. Before the teaching of the selected topic began, a pre-test was administered to the treatment (TG) and control group (CG) and marked using a uniform marking scheme. After the pre-test, teachers in the two quasi-experimental groups taught the selected topic using conventional teaching methods and learning resources. However, after the lessons, students in the treatment group were allowed to use the Facebook SNP to interact with each other to share and discuss the content taught at the end of the week. In contrast, those in the control group were allowed to interact with the content as they do normally after the lessons but were not exposed to the FSNP. The teachers were instructed not to let the students know that they were being studied. Instead, they should teach the way they usually do to avoid the John Henry effect. Mugenda & Mugenda (2003) observe that the John Henry effect occurs when the control group performs much higher than its usual average simply because the subjects are placed in a competitive position with the treatment group (TG).

Monitoring of the process was done continuously, and a weekly progress report was provided. After the study period, a common post-test was administered to all students involved in the study both in the treatment group and control group, and test scores were recorded for performance analysis. Continuous observation of the learning process was made during the study using the student and teacher observation schedule. Questionnaires for both the students and teachers were administered at the end of the study and analyzed. During the study, observations and interviews on the Facebook SNP-mediated teaching and learning processes were conducted and analyzed. The study took three months.

In the study, students from different schools in the treatment group involved in the study were allowed to interact on Facebook for varied lengths of time per session. This was done once per week for one month to learn a common topic. Teachers guided the students during the allocated learning time. Students

involved in the study were allowed to collaborate for different amounts of time per session as shown in table 3.1.

Table 3.1 Grouping of the respondents

SNP	School Code	School Category	School Group	Regulated Time	Unregulated Time
Facebook SNP	S_1	B_1	TGB	√	-
	S_2	B_2	TGB	-	√
	S_3	G_1	TGG	√	-
	S_4	G_2	TGG	-	√
None	S_5	C_{gB}	CGB	-	-
	S_6	C_{gG}	CGG	-	-

Where;

S_1 to S_6 were codes allocated to the school that participated in the study. The codes were allocated to the schools for easy identification during data analysis.

B_1 and B_2 were boys' schools that participated in the study. The students in the school category B_1 were allowed to interact and collaborate on the Facebook Social Networking Platform for a regulated time running to a maximum of three (3) hours a week when they had computer lessons. Those in category B_2 were allowed to interact and collaborate on the platform for an unregulated amount of time that exceeded three (3) hours in a week.

G_1 and G_2 were girls' schools that participated in the study. Just like their counterparts in the boys' schools, those in category G_1 were allowed to interact and collaborate on the Facebook Social Networking Platform for a regulated time running to a maximum of three (3) hours in a week when they had computer lessons. Those in category G_2 were allowed to interact and collaborate on the platform for a more unregulated amount of time that exceeded three (3) hours in a week.

C_{gB} and C_{gG} were boys' and girls' schools that participated as control groups respectively. These students were taught and did not interact on FSNP at all.

TGB was the treatment group for boys' while TGG was the treatment group for girls who were taught using FSNP

CGB was the control group for boys while CGG was the control group for girls who were taught using the traditional methods.

In this study, four Facebook Social Networking Platform (FSNP) closed group accounts were set up to facilitate teaching and learning of the selected topic to the students who were in the treatment group. Students in One (1) boys' school and one (1) girls' were allowed to interact and collaborate on the Facebook Social Networking Platform for up to three (3) hours a week while students from One (1) boys' school and one (1) girls' school interacted and collaborated on the platform for more than three (3) hours per week respectively. Administrative privileges assigned to the teachers participating in the study to create and manage the closed group accounts on FSNP for the treatment groups. The FSNP groups were closed to ensure that other students or persons did not join the group other than those who were participating in the study. The Computer Studies teachers invited their students to their respective groups after creating their students' accounts to ensure control over the activities of the group. Learners in the treatment group were taught the topic "Elementary Programming Principles" and exposed to the FSNP-mediated virtual learning community under the guidance of their teachers. Learners in the control groups (CGB and CGG) were taught the same topic but were not exposed to the Facebook social networking platform.

After teaching and learning the topic, a learner achievement test (post-test) was administered to both the experimental and the control groups. After marking, the post-test scores were recorded for comparison with the scores from the pre-test to determine the effect of the FSNP on learner academic achievement in computer studies. During the study, the conditions and experiences of the two groups were kept as similar as possible. A comparison of causal effects of the two groups suggested by Mugenda & Mugenda

(2003) was done. Debriefing for learners and teachers was done after the study with groups allowed to continue using the platform accounts for learning purposes.

3.9 Data analysis procedure

The quantitative data (mean scores) obtained from the pre-test and post-test tests were subjected to various statistical analyses. The data was analyzed using percentages, mean, median, standard deviation, and a comparison of the mean scores. Hypotheses one and two were analyzed by analysis of variance (ANOVA). An ANOVA test was conducted to determine the significance of the differences between the two achievements. This helped in determining the effect on learner academic achievement due to the use of FSNP in teaching and learning. To test hypothesis three, a t-test was used to analyze the data while Pearson product-moment correlation was used to test hypotheses four and five to test the strength of the relationship. According to Mugenda and Mugenda (2003), these tests are carried out to decide whether to reject a hypothesis. Evaluation of the significance of the various statistical indices obtained from analyzed data was carried out to further test significance level and confidence level, in order to accept the null hypotheses or not. This was also done to determine whether the results held to a given confidence level and significance level. Thematic content analysis was used to analyze qualitative data obtained from student and teacher questionnaires, observation schedules, and interviews. To develop a codebook, responses were grouped into themes or ideas based on the objectives addressed. To make it easier to enter the data into the computer software and to analyze it more quantitatively, number values were assigned to the codes for ease of input into the software. The results from the qualitative data were used to support the analyzed quantitative data obtained from the quasi-experiment. The interview responses from the teachers were each given a case number from Case 1 to Case 32. Verbatim quotes from data collected using the interview schedules were incorporated to support the results from the quantitative and qualitative data.

3.10 Ethical considerations

Individual permission from participants before administering the questionnaire was sought. The school principals or the deputy principals in charge of academics signed consent on behalf of the form three Computer Studies students who participated in the study. The consent was signed because the study involved the use of the Facebook Social Networking Platform (a social media platform) by minors. The form three students were under eighteen (18) years, therefore considered minors according to the laws of Kenya and hence there was a need to have a responsible adult sign the consent on their behalf. Privacy and confidentiality of the data collected were observed. Furthermore, only computer studies teachers had access to create and administer closed groups from their FSNP accounts. This was to ensure that only form three Computer Studies students were invited and enrolled in the closed groups to cushion them from common cybercrimes. After the study, the control group received the same treatment as the experimental group to avoid feelings of unfairness among students, teachers, and administrators.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter discusses data analysis, presentation, and interpretation of field research findings. The data analysis section is introduced in this chapter, which discusses the return rate of research instruments, demographic information of respondents, data analysis, and interpretation. The findings are presented in accordance with the study's objectives, which included examining the difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who were not; assessing the difference in learner academic achievement between learners who collaborate on FSNP and those who did not; and determining the difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who did not; determining the relationship between learner attitude toward the use of Facebook SNP for learning and learner academic achievement and determining the relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement in Computer programming among students in public secondary schools in Nairobi City County, Kenya

4.2 Return Rate of Research Instruments

The research instruments which included questionnaires for students, questionnaires for teachers, and interview schedules for teachers were administered to the respondents after the quasi-experiment. Lesson observations were made and findings were recorded on the observation schedule during the quasi-experiment. Table 4.1 shows the response rate of the research instruments.

Table 4.1: Research instruments return rate

Type Of Instrument	Number Administered	Number Returned	% Return Rate
Questionnaire for Students	85	73	85.3%
Questionnaire for Teachers	50	31	62.0%
Recorded Lesson Observations	All	All	100.0%
Interview Schedule for teachers	4	4	100.0%
Pre-test	6	6	100.0%
Post-test	6	6	100.0%

Table 4.1 shows that the response rate was 100% for the interview schedule for teachers because all teachers from the schools purposively sampled for interview were available after the quasi-experiment, all lessons were observed and observations were recorded on the observation schedule, and 100% of both post-test and post-test indicating that all sampled schools for the quasi-experiment participated in the study to the end. The table also shows that 85.3% and 62% of the questionnaires for students and questionnaires respectively were returned. Lastly, the table shows that all the planned pre-test and post-tests (100%) were administered and results received by the researcher. According to Kothari (2014), a return rate of above 60% of a research instrument is acceptable.

4.3 Demographic Data

Table 4.2 shows the number and percentage of teachers and students by gender who responded to the study;

Table 4.2: Gender of Teachers and Students

Gender	Teachers	f %	Students	f %
Male	21	65.6	43	58.9
Female	11	34.4	30	41.1
Total	**32**	**100.0**	**73**	**100.0**

Table 4.2 shows the majority of 65.6% of the teachers were Male while 34.4% were female. Of the students, the majority 58.9% were male while 41.1% were female. This implies that the majority of school respondents were male, which was attributed to the technical nature of the Computer Studies subject and fewer females choosing the subject at the secondary and college levels. According to Nyakieka (2019), more males than females took Science, Technology, Engineering, and Mathematics (STEM) subjects in secondary and college, widening the gender gap in these disciplines at school, college, and workplaces. Nyakieka (2019) observed, however, that the gap was closing as evidence showed that the number of females pursuing STEM subjects was increasing year after year. In order to determine whether the participants were a representative sample of the target population for generalization purposes, the study's demographic data was crucial because it gave information about the participants in the targeted group.

4.4 FSNP Learner- Interface Interactions and Learner Academic Achievement in Programming in Computer Studies

In order to determine if the learners were at the same level prior to the start of the quasi-experiment, a statistical analysis utilizing the pre-test results was calculated to compare the mean scores of the two experimental groups (control and treatment groups), as shown in Table 4.3.

Table 4.3: Pre-Test Mean Scores for the Control and Treatment Groups Before Exposure to FSNP Learner-interface Interactions

Pre-Test Mean Scores					
Groups	***Frequency***	***Sum***	***Mean***	***Variance***	***Std Dev (σ)***
Pre_Test_Control_Group	77	1117	14.51	55.44	7.44
Pre_Test_Treatment-Group	126	1750	13.89	35.01	5.92

Table 4.3 shows that, out of a possible 100 points, 77 students who took part in the control group's pre-test had a mean of M=14.51 and a standard deviation of =7.44, whereas 126 students who took part in the treatment group's pre-test had a mean of M=13.49 and a standard deviation of =5.92. This

demonstrated that before the quasi-experiment began, the academic performance of the students in the control group and the treatment group was poor and dissimilar. The low level of test score variability for the control group, which was 7.44, and the treatment group, which was 5.92, showed that the results of the two tests had a normally distributed distribution. Additionally, Table 4.3 demonstrates that the treatment group achieved a lower mean score than the control group, which may be related to number of variables, including the learning environment, the number of students, the gender of the students, and the characteristics of the teachers and learners. Some students also may have read ahead of others. This suggested that the students knew little about the subject matter that needed to be taught.

Analysis of variance (ANOVA) was used to generate inferential statistics in order to assess whether there was a statistically significant difference in learner academic success between the two groups in the pre-test, as indicated in Table 4.4. According to Mugenda & Mugenda (2003), ANOVA is used to assess whether there are statistically significant variations in averages between two or more groups. Kothari and Garg (2019) assert that when groups are compared on just one variable but at various levels, a one-way analysis of variance (or 1-Way ANOVA) is used. The student achievement test (SAT) scores of the students in the control group and the students in the treatment group had to be compared in order to examine the differences in learner academic achievement between the control and treatment groups prior to and following an intervention. Accordingly, the 1-way ANOVA test was appropriate in this situation.

Table 4.4: ANOVA Comparison of the Pre-Test Scores for Learners Exposed to FSNP Learner-Interface Interactions and Those Who Were Not

One-Way ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	78.385	1	78.385	1.457	0.229	3.888
Within Groups	10815.408	201	53.808			
Total	10893.7931	202				

**P-value (α) = .0.05

Table 4.4 displays the one-way ANOVA statistic [F (1,201) =1.457, P=.229] and a P-value p=.229, which was greater than the confidence level of P=.05. As demonstrated, there was no statistically significant difference in learner academic achievement between the control and treatment groups before the quasi-experiment began. This indicated that the learners in the control and treatment groups had equal knowledge levels before the teaching of the topic "Elementary Programming Principles" began and before the intervention. A post-test was given to both the control and treatment groups after the topic was taught. The test was graded out of a possible 100 points. The post-test scores were statistically analyzed to see if there was a difference in academic achievement between the two groups following the intervention. Table 4.5 shows the computed means for the two groups.

Table 4.5: Post-Test Mean Scores for the Control and Treatment Groups After Treatment

Post-Test Means					
Groups	***Frequency***	***Sum***	***Mean***	***Variance***	***Std Dev (σ)***
Post-Test Control Group	77	2562	33.273	176.201	13.27
Post-Test Treatment Group	126	7060	56.032	306.687	17.51

According to Table 4.5, 126 students (treatment group) who were exposed to learner-interface interactions on FSNP had higher learner academic achievement (mean score, M=56.03, = 17.51) than the 77 students (control group) who were not (mean score, M=33.27, = 13.27). The variability of test scores for the two groups was low, with the control group = 13.27 and the treatment group = 17.51 indicating that the scores from the two tests were normally distributed. Table 4.5 shows that learners in the treatment group posted a higher mean than those in the control group. The difference in means between the two groups indicated that the intervention of exposing learners in the treatment group to FSNP learner-interface interactions contributed to more effective learning, resulting in a higher mean than the control group, which was not exposed to the intervention. This could be related to the technological affordances (both functional and social) offered by FSNP which give it the potential to serve as a learning resource and an instructional tool respectively.

A comparison of the mean scores of the control group and the treatment group using the one-way ANOVA statistic was performed to determine whether there was a statistically significant difference in learner academic achievement between the two groups. The computed ANOVA statistic aided in testing the null hypothesis "HO1: There is no significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not." The results of the one-way ANOVA statistic are shown in Table 4.6.

Table 4.6: One-Way ANOVA Statistics Comparing the Post-Test Mean Scores for Learners Exposed to FSNP Learner-Interface Interactions and Those Who Are Not

1-Way ANOVA

Source of Variation	**Sum of Squares**	*df*	**Mean Square**	*F*	*P-value*	*F crit*
Between Groups	24755.53	1	24755.53	96.194	0.000	3.888
Within Groups	51727.15	201	257.349			
Total	76482.68	202				

**P-value (α) = .0.05

Table 4.6 shows a one-way ANOVA statistic [F (1,201) = 96.194, P=.000]. Table 4.6 also shows that the p-value for each group was p=.000, which is less than the significance or confidence level of p=.05. As a result, the null hypothesis, “there no is statistically significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not" was rejected, and the alternate hypothesis was accepted. This meant that there was a statistically significant difference between the control and treatment groups' post-test scores, thus indicating that as a result of the intervention, learners exposed to FSNP learner-interface interactions posted higher mean (higher academic achievement) than those who were not exposed. This further indicated that learner-interface interactions on FSNP had a greater impact on learner academic achievement in computer programming among students who were exposed to the platform than those who were not.

The hypothesis test results shown in Table 4.6 were supported by qualitative data collected using questionnaires for students and teachers (appendices V and VI), as shown in Table 4.7.

Table 4.7: Response Means of Students and Teachers' Views Per Dimension on FSNP Learner-Interface Interactions and Academic Achievement

Subtheme	Mean Responses for Teachers	Mean Responses for Students
The adaptability of FSNP Learner-interface Interactions	4.33	3.99
Comfortability of FSNP Learner-interface interactions	4.33	3.96
The desirability of FSNP Learner-interface interactions	4.40	3.98
Value of FSNP Learner-interface interactions	4.36	4.04

Table 4.7 shows that students, mean M = 3.99, and teachers, mean M = 4.33, strongly agreed that learner-interface interactions were adaptable; students' mean M = 3.96 agreed and teachers' mean M=4.33 strongly agreed that learner-interface interactions were comfortable; students' mean M = 3.98 agreed and teachers' mean M=4.40 strongly agreed that learner-interface interactions were desirable; students' mean M = 4.04 agreed and teachers' mean M=4.36 strongly agreed that learner-interface interactions added value to learning. This meant that exposing learners to FSNP learner-interface interactions contributed to a statistically significant difference in academic achievement in programming in among Computer Studies students exposed to the platform than those who were not.

This implied that, in contrast to traditional learning management systems (LMSs), the considerable difference in learner academic accomplishment owing to learner-interface interactions on FSNP may be attributed to the platform's user-friendliness, adaptability to learner needs and preferences, comfortability, as well as its desirability, pleasure, and engagement, which enhance learning through interactions between learners and with content.

The findings in this study that there were statistically significant differences in academic achievement in programming between Computer Studies learners exposed to learner-interface interactions on FSNP and those who were not; are supported by Jamaat and Tasir (2016), who reviewed the potential of Facebook as a platform for academic-related discussion and its impact on student academic achievement. The study looked into students' performance on FSNP through discussions between teachers and colleagues. According to Jamaat and Tasir, students' academic achievement increased as a result of their Facebook interactions.

Unlike this quasi-experimental study, which focused on learner experiences in terms of value addition to learning, adaptability, desirability, and comfortability with learner-interface interactions on FSNP among secondary school students, Jamaat and Tasir (2016) conducted an exploratory study with college students. However, this study agrees with Jamaat and Tasir (2016) that the increase in academic achievement among learners exposed to FSNP is due to the platform's rich learner-interface interaction tools and content presentation.

Furthermore, this study was supported by the findings of Hussin, Harun, and Shukor (2019), who reviewed types of student interactions with online social collaborative and problem-based learning environments using literature searches of electronic journal databases. Hussin et al. (2019) identified learner-interface interactions as important elements of an LMS alongside learner-learner, learner-instructor, learner-content, and learner-self interactions. While Hussin et al. (2019) identified learner-interface interactions as an important component of an LMS, their study did not reveal whether these interactions affect learner academic achievement. Unlike this study, where the empirical findings show that learner-interface interactions on FSNP provide technology affordances that add value to learning and lead to improved learner academic achievement, the study by Hussin et al. (2019) did not focus on

learner-interface interactions on any specific SNP as an LMS and how learner experiences on the platform's interface interactions influence academic achievement.

However, the findings in this study dissent with the opinion of Ku, Lin & Tsai (2012) who in an experimental study involving senior high school students in Taiwan concluded that there was no significant difference in learning achievement between high-interaction and low interaction groups. Ku et al. did not focus on the role of social media (SM) technologies like the FSNP on learning but instead focused on the social interactions of learners and their online behavior. Similarly, the findings of this study differ from those of Kiplagat and Ombiro (2016), who investigated the impact of social media such as Facebook on students' academic performance in public day secondary schools in Kenya's Kisii County. Kiplagat and Ombiro (2016) discovered that students spend a significant amount of time on Facebook engaging in social interactions, which has a negative impact on their academic performance. Kiplagat and Ombiro's study, like Ku et al. (2012), focused on social interactions to reach this conclusion but not on how interacting with the technology's interface influenced learning. In contrast to the studies by Ku et al. (2012) and Kiplagat & Ombiro (2016), this focused on the technological affordances provided by FSNP, learner experiences with learner-interface interactions in terms of comfortability, desirability, adaptability, value in learning, and its impact on learner academic achievement.

4.4.1 FSNP Learner-Interface Interactions and Adaptability

The student and teachers' questionnaire responses in this study indicated that FSNP's learner-interface interactions were adaptable to the learners as shown in Table 4.7 where a majority of students, mean M = 3.99 agreed and teachers, mean M = 4.33 strongly agreed that learner-interface interactions were adaptable. The adaptability of an instructional technology deals with its flexibility and ability to fit different learner needs and preferences, hence the importance of examining FSNP's ability to offer such learner experiences. This indicated that FSNP presented itself as an instructional technology that offered

a platform whose learner-interface interactions were adaptable to the learner's individual needs, hence contributing to improved academic achievement. The importance of adaptability of learner-interface interaction in any learning management system (LMS) was emphasized in a pilot study using technology that combined DyKnow software (an LMS) with a hardware platform of pen-enabled HP Tablet notebook computers by Sinha, Khreisat and Sharma (2009). Khreisat and Sharma observed that learner-interface interactions on a technology platform should provide an adaptable learning environment which promotes hands-on approach and offer real-time feedback that enable active learning thus boosting learner academic achievement. Mladenova and Kirkova (2014) put similar emphasis by opining that that adaptability of learner-interface interactions on a LMS play a key role on determining learning outcome when the platform is well structured and is easy to use. Mladenova and Kirkova were involved in a study that established the role of learner-interface interactions in web-based distance learning involving university students and focused on the conventional LMS but not a SNP when used for learning purpose. The contribution of the FSNP learner-interface interactions due to its adaptability to the learner was echoed in this study by the feedback from the teachers' interviewed during. For instance, one of the teachers while responding to a question regarding the adaptability of the learner-interface interactions on FSNP noted that:

> Most of the learners had FB accounts. It was easy for them to join the FSNP group made for learning provided. They adapted very fast to the interface of platform and had minimal challenges navigating tools such as chat, videos, etc. which were used for learning. (Case No. 30)

The interview response by the teachers as recorded was an indicator that FSNP offered pedagogical affordances that met the various learner experiences in terms of its adaptability. Huang, Spector and Yang (2019) opine that adaptability of an instructional technology deals with the variety of learners and their learning preferences which result in a need to treat learners as individually as possible which always lead to effective learning that translate to improved academic achievement.

Further support of the hypothesis test results was from the observations made during the lessons where learners were exposed to FSNP learner-interface interactions. The observations were made during the experiment to establish whether learners had difficulties adapting to the learning environment offered by FSNP. The observations results showed that all teachers and over 95% of students who interacted with the platform could easily sign in, navigate through the closed FSNP group with ease and access the various tools for posting discussion questions or topics, chatting, taking quiz, sharing graphics and recording live videos. Teachers and learners could key in their responses to posts made and could view posts made in the previous lesson. Further, the observations made showed that learners could repeatedly interact with the text, picture and video content until they mastered. This indicated that the FSNP learner-interface interactions were adaptable both to the learners and teachers. It further indicates that the adaptability of the FSNP learner-interface interactions facilitated effective learning leading which led to statistically significant difference in learner academic achievement between learners who were exposed to FSNP learner-interface interactions and those who were not.

4.4.2 FSNP Learner-Interface Interactions and Comfortability

Learners and teachers felt at ease using the FSNP's learner interface, according to student and teacher questionnaire responses. Table 4.7 shows that the majority of students (M = 3.96) and teachers (M = 4.33) strongly agreed that the comfortable nature of FSNP learner-interface interactions influenced learners' academic performance. A comfortable instructional technology offers learners emotional well-being as well as learning experiences that contribute to effective learning. The teachers' and learners' responses suggest that FSNP is a suitable learning environment because it provides students with comfortable learner-interface interactions in which they can connect emotionally not only with each other but also with the content they are learning. As established by the hypothesis $H0_1$ tested in this study, the questionnaire responses affirmed that there was a statistically significant difference in academic

achievement between students who were exposed to the FSNP learner-interface interactions and those who were not.

This study's findings supported Mutungwe and Tsvere's (2014) contention that, unlike other learning environments, technology-driven learning environments provide the "space" where students learn effectively because they are comfortable enough to discuss and share information and opinions. Danesh, Bailey, and Whisenand (2015) hold similar views, claiming that when learner-teacher and learner-learner interactions are done synchronously or asynchronously through technology intervention, learners feel more comfortable and participate more in discussion than in a face-to-face classroom. The results further supported a study finding by Means (2019), who found that when FSNP is used as a learning management system, it provides a cozy virtual environment where a community of learners interacts with one another, teachers, and the subject matter to the point that even the most reclusive learners feel comfortable taking part in the learning process. One of the teachers who was interviewed had thoughts along these lines and said:

> Being girls, at first they were skeptical because the school bans the use of social media despite them using FB while at home to meet friends. However, they gained confidence. They were comfortable creating posts, making comments, and chatting even in my presence as a member of the group. My presence gave them confidence which made them not have difficulties in navigating through the tasks given. (Case No. 7)

According to the teachers' interview responses as recorded, FSNP provided a comfortable platform whose learner-interface interactions increased learner confidence and self-efficacy when interacting with the content to be learned. The platform's navigation tools enabled learners to easily engage with one another and their teachers through posts and chats. The quasi-experimental results and feedback from the teachers' interviews were triangulated by, data collected through the lesson observations recorded during the study revealed that over 85% of the students navigated the FSNP platform easily, comfortably shared ideas, and provided feedback during the interactions. It was discovered that learners interacted comfortably with the platform's interface with little or no assistance from colleagues or teachers. This

also suggested that students' comfort with the FSNP learner-interface interactions contributed to the disparities in academic achievement between those who were exposed to it and those who were not.

4.4.3 FSNP Learner-Interface Interactions and Desirability

Table 4.7 shows that the majority of students (mean M=3.98) and teachers (mean M=4.40 strongly agreed) who responded to the questionnaire said that learner-interface interactions on FSNP were desirable, leading to students' desire to access the platform for learning purposes. Instructional technology is considered desirable if it makes learning enjoyable for students and maintains their attention throughout a lesson. According to Huang, Spector, and Yang (2019), the desirability of instructional technology is determined by how appealing it is to users and whether it engages them in meaningful learning. According to the responses of the students and teachers who participated in this study, the majority of them believed that FSNP provided learner-interface interactions that were desirable to them and appropriate for promoting learning, which may account for the difference in academic achievement between students who were exposed to FSNP and those who were not.

The results of an empirical study by Duncan and Barczyk (2016) involving university students in the United States that looked into Facebook's impact on learning in higher education support the findings of this study regarding teachers' and students' opinions on the desirability of FSNP learner-interface interactions. While the study by Duncan and Barczyk (2016) did not specifically address learner academic achievement, it revealed that Facebook offered a desirable environment where students felt more connected and engaged. Because FSNP learner-interface interactions were desirable, learners were engaged throughout the learning process. As a result, there was a statistically significant difference in academic accomplishment between those who used it and those who didn't. As a result of the desirability of FSNP learner-interface interaction, learner engagement increased throughout the learning time,

resulting in a statistically significant difference in academic achievement between those exposed to it and those who were not. This viewpoint was shared by one of the teachers interviewed who stated:

> My students liked using the FB group discussions. Most of them had existing accounts and were using it before. They enjoyed being engaged on FB for learning purposes other than for fun. They wished to remain connected through FB even beyond lesson time. (Case No. 14)

According to the recorded teacher interview responses, FSNP's learner-interface is desirable to learners that they would be reluctant to sign off even after the scheduled lessons. The desirability of the learner-interface interactions on FSNP makes learning interesting and enjoyable. This encourages learners to interact not only with the platform but also with other learners, teachers, and content, resulting in effective learning and improved academic achievement. Similarly, the observation data collected revealed that over 90% of the learners remained focused throughout the learning activities and were willing to stay engaged beyond the scheduled lessons. It was observed that learners were always eager to use the platform to engage the colleagues, teachers and interact with the content shared.

4.4.4 FSNP Learner-Interface Interactions and Value to Learners

According to the responses from student and teacher questionnaires, learner-interface interactions on FSNP added value to the learning experiences. Table 4.7 shows that a majority of students, mean M = 4.04, and teachers, mean M = 4.36, agreed that FSNP learner-interface interactions added value to platform learning, resulting in improved learner academic achievement. The value of instructional technology is concerned with whether the technology meets a learner's learning needs. Stosic (2015) asserted that incorporating instructional technology into teaching and learning adds value by improving knowledge and skill acquisition. Stostic (2015) went on to argue that instructional technology adds value to learning by supporting a learner's cognitive and affective development. The findings of this study on the value of learner-interface interaction on FSNP corroborated with those of Jong, Lai, Hsia, Lin, and Liao (2014), who conducted an exploratory study of Facebook's potential educational value. According

to Jong et al. (2014), Facebook adds value to learning by motivating learners, providing the convenience of sharing learning content, and providing immediate feedback. Teachers who were interviewed expressed similar sentiments in this regard. One of them stated that the FSNP was a valuable tool whose incorporation into teaching and learning in this country was long overdue, replying that:

> Integration of Facebook into teaching and learning is long overdue in this country. Facebook has more superior interactive tools that support eLearning better than some of the common systems we use in the country. As a country, we should address our policies to allow students to use FSNP in school. I find the platform good and its use adds value to education. My students are happy and want us to continue using Facebook over the holidays. (Case No. 21)

According to teacher interview responses, FSNP provides superior interactive tools that support learning better than traditional learning management systems. According to the responses, the interactive platform provided by FSNP adds value to the learning process. As a result of the convenient learner-interface interactions on FSNP, effective learning occurs, which leads to improved academic achievement. Further, observations made during the lesson in this study revealed that the majority of the students, 85%, were able to review the previous discussion by following the thread of posts made and that the platform provided them with opportunities to interact with other learners, content, and teachers. It was observed that learners navigated through the platform with ease, were able to access and reply to posts made on the discussion pages. As evidenced by the hypothesis test results, FSNP learner-interface interactions added value to learning through the platform, resulting in a statistically significant difference in learner academic achievement between students who were exposed to it and those who were not.

4.5 Learner Collaboration on FSNP and Academic Achievement in Programming in Computer Studies

A pre-test was given to the experimental groups before the learner collaboration on the FSNP experiment began. The mean pre-test scores and standard deviation were computed to determine the similarity between the control and treatment groups and how the scores deviated from the mean, as shown in Table 4.8.

Table 4.8: Means of Pre-Test Scores of the Learners in the Control Group and Treatment Group Before Collaboration on FSNP Started

Pre-Test Mean Scores					
Groups	***Frequency***	***Sum***	***Mean***	***Variance***	***Std Dev (σ)***
Pre_Test_Control_Group	77	1117	14.51	55.44	7.44
Pre_Test_Treatment_Group	126	1750	13.89	35.01	5.92

Table 4.8 shows that the mean of the pre-test for students in the control group was M = 14.51, with a standard deviation of $\sigma = 7.44$. The mean for those in the treatment group was M = 13.89, with a standard deviation of $\sigma = 5.92$. This indicated that students in the control and treatment groups had low and disparate academic achievements prior to the start of the quasi-experiment. The variability of test scores for the two groups, the control group $\sigma = 7.44$ and the treatment group $\sigma = 5.92$, was low, indicating that the scores from the two tests were normally distributed. Table 4.8 also shows that the treatment group had a lower mean score than the control group, which could be attributed to a variety of factors including teacher characteristics, learner characteristics, the number of learners, the gender of the learners, the learning environment, and some students reading ahead of others. However, this implied that the learners had a low baseline knowledge of the topic to be taught.

Inferential statistics were computed using the t-test to determine whether there was a statistically significant difference in learner academic achievement between the two groups in the pre-test, as shown in Table 4.9. The t-test was appropriate in this case because it was necessary to compare the SAT scores of students in the control group and those in the treatment group in order to examine the difference in learner academic achievement between the control and treatment groups before and after an intervention.

Table 4.9: A t-Test Comparing the means of Pre-Test Scores of the Learners in the Control Group and Treatment Group Before Collaboration on FSNP Started

	Pre_Test_Control_Group	*Pre_Test_Treatment_Group*
Mean	14.51	13.89
Variance	55.41	35.01
Observations	77	126
Hypothesized Mean Difference	0	
df	134	
t Stat	0.62	
P(T<=t) one-tail	0.27	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.54	
t Critical two-tail	1.98	

*Confidence level of P=.05

Table 4.9 shows a t statistic [t (134) =.62, P=.54] where the p-value is more than the confidence level p =.050. The t statistic shown in Table 4.9 indicated that there was no statistically significant difference in learner academic achievement between the control and treatment groups prior to the start of the experiment. This is due to the fact that the P-value, p=.54, was greater than the confidence level, P=.05. This implied that the students in the control and treatment groups had comparable prior knowledge of the topic.

A post-test was given to both groups at the end of the topic and intervention for the treatment group to determine learner academic achievement. Table 4.10 shows the means of the post-test scores of all students who collaborated on FSNP and those who did not.

Table 4.10: Means of Post-Test Scores of the All Students Who Collaborated on FSNP and Those who did not

Post-Test Mean Scores					
Groups	***Frequency***	***Sum***	***Mean***	***Variance***	***Std Dev (σ)***
Post_Test_Control_Group	77	3100	40.26	177.85	13.34
Post_Test_Treatment_Group	126	7248	57.52	154.20	12.42

Table 4.10 shows that 126 students (treatment group) who participated in FSNP collaborative learning had higher learner academic achievement (mean score, M=57.52, σ = 12.42) than the 77 students (control group) who did not (mean score, M=40.26, σ = 13.34). The variability of test scores for the two groups was low, with the control group σ = 13.34 and the treatment group σ = 12.42 indicating that the scores from the two tests were normally distributed. The difference in means between the two groups suggested that the intervention had a causal effect. This indicated that the students in the treatment group's participation in collaborative learning on FSNP (intervention) contributed to more effective learning, resulting in a higher mean than the control group, which was not exposed to the intervention. This could be attributed to FSNP's tools, which supported collaborative learning through discussions, chats, taking quizzes and receiving immediate feedback, and sharing documents, photos, recorded and live videos, resulting in effective learning and higher academic achievement in the treatment group than in the control group.

To test the hypothesis, "HO_2: There is no statistically significant difference in learner academic achievement between learners who collaborate on FSNP and those who did not", the post-test means of students who participated in FSNP (treatment group) and those who did not (control group) were subjected to t-test inferential statistics. The t statistic was computed as shown in Table 4.11.

Table 4.11: A t-Test Analysis Comparing the Means of Post-Test Scores of the Students Who Collaborated on FSNP and Those who did not

	Post_Test_Control_Group	Post_Test_Treatment_Group
Mean	40.26	57.52
Variance	177.83	154.20
Observations	77	126
Hypothesized Mean Difference	0	
df	152	
t Stat	-9.18	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.00	
t Critical two-tail	1.98	

Table 4.11 displays the t statistic [t (152) = 9.18, p =.000], where the p-value is less than the confidence level p =.050, indicating that there was a statistically significant difference in learner academic achievement between those who collaborated on FSNP and those who did not. As a result, the hypothesis "HO_2: There is no statistically significant difference in learner academic achievement between those who collaborate on FSNP and those who do not" was rejected, and the alternative hypothesis was accepted. This implies that there was a statistically significant difference in learner academic achievement between those who used FSNP to learn Computer programming and those who did not.

According to the findings of this study, learners who engaged in collaborative learning were more engaged through interactions with the content (learner-content), colleagues (learner-learner), and teachers (learner-content). This cultivated interest and motivation to learn, resulting in effective learning among those who collaborated on FSNP as opposed to those who did not. Collaborative learning enabled students to develop problem-solving and communication skills, resulting in higher academic achievement in the treatment group than in the control group.

This study's findings corroborate previous research suggesting that collaborative learning on FSNP improves learner academic performance. For instance, Mahmud and Wong (2018) found in their study that Facebook collaborative learning encourages learner engagement and participation, allowing them to duplicate, act, learn from one another, and create significant knowledge and competence. In their empirical study, Mahmud and Wong used a blended learning strategy to take advantage of technological integration and analyze the viability of integrating Facebook and online peer evaluation for an English Critical and Creative Writing class.

Mahmud and Wong emphasized the significance of incorporating Facebook into online assessment and collaborative learning to increase students' interest and motivation. However, Mahmud and Wong's study did not focus on the effect of collaborative learning on FSNP on learner academic achievement and only included college-level learners who are expected to be responsible for using social media, as opposed to secondary-level learners. This was addressed in this study, which found that collaborative learning on FSNP contributed significantly to positive gains in learner academic achievement in computer programming among public secondary school students in Nairobi City County, Kenya.

Similarly, Ansari and Khan (2020) in a study involving university students in India that examined the usefulness of social media in collaborative learning and resource sharing observed that social media platforms are suitable for learner engagement through collaborative learning. Ansari and Khan contended that social media-enhanced collaborative learning influences interactions with peers, teachers, and online knowledge-sharing behaviors. Ansari and Khan went on to say that engaging in collaborative learning through social media makes learning more interesting and enjoyable, influencing students' academic achievement. However, Ansari and Khan's survey study did not focus on the effect of collaborative learning through any specific social networking platform on learner academic achievement and involved University students, who are expected to use social media with self-regulation, unlike those in secondary

schools. This study addressed this gap by conducting a quasi-experimental study to determine the effect of collaborative learning via FSNP on secondary school student's academic achievement.

The quasi-experimental findings in this study were supported by qualitative data gathered through student and teacher questionnaires, teacher interviews, and lesson observation schedules, which are shown in appendices V, VI, VII, and VIII. The qualitative data collected using these instruments for this study focused on three dimensions of collaborative learning via FSNP: problem-solving skills, motivation, and communication skills. The questionnaires specifically sought to ascertain students' and teachers' perspectives on the extent to which they agreed with the statement that "collaborative learning through FSNP has an effect on learner academic achievement." The data collected from the students' and teachers' questionnaires was analyzed to compute the mean statistics of the responses per each dimension, as shown in Table 4.12. The questions in each dimension or sub-theme of the questionnaires were coded using numbers 1 to 5 for ease of entry into the SPSS computer program and statistical analyses using mean (M). As shown in Table 4.12, the questions under each dimension or sub-theme were pooled together to compute the mean of responses under it.

Table 4.12: Means of Students and Teachers' Responses on Their Views Per Dimension on the Effect of Collaborative Learning Through FSNP on Learner Academic Achievement

Sub-theme/Dimension	**Mean of Teachers' Responses**	**Mean of Students' Responses**
FSNP Collaborative Learning & Problem-Solving Skills	4.47	4.01
FSNP Collaborative Learning & Motivation	4.41	4.17
FSNP Collaborative Learning & Communication Skills	4.44	4.02

Table 4.12 shows that the majority of students and teachers strongly agreed that collaborative learning through FSNP had an effect on learner academic achievement because it improved learners' problem-

solving skills, motivation, and communication skills. The FSNP provided a platform for learners to share solutions, receive feedback, express themselves, and later review their engagements through the recorded threads of chats and posts made during the learning sessions. These findings were supported by data collected through a lesson observation schedule and teacher interviews guided by the three dimensions discussed in the following sub-themes;

4.5.1 Learner Collaboration on FSNP and Problem-Solving Skills

Table 4.12 shows that the majority of students and teachers with means M = 4.01 and M = 4.47, respectively, strongly agreed that collaborative learning through FSNP had an effect on learner academic achievement because it improved learners' problem-solving skills. This implies that learners' participation in FSNP for collaborative learning enabled them to develop more problem-solving skills as they discussed tasks assigned during lessons. It also implies that students actively shared knowledge, ideas, and techniques for completing assigned tasks via the platform. To support this, one of the teachers interviewed stated:

> Discussions were mostly used especially when I posted a topic or task to solve. The learners would discuss through chatting and sharing relevant videos. I think the collaborative interactions on Facebook contributed immensely to my students' performance in the second test I gave. Exchanging ideas enabled them to acquire good problem-solving skills which I think made them perform well in the second test than in the first test. (Case No. 26)

According to the recorded responses of the interviewed teachers, when students collaborate on FSNP, they freely share ideas and knowledge when completing assigned tasks, which hone their problem-solving skills, resulting in academic achievement gains. The observations made during the study on the learner's problem-solving skills during the lesson bolstered the study's findings. When there were properly structured group tasks for collaborative learning on the FSNP, students worked cooperatively, and 95% of the students actively participated in the lesson and conceptualized the problems being solved with ease. Observation data also revealed that collaborative learning on FSNP enabled learners to gain self-confidence, self-esteem, and improved problem-solving skills.

This meant that collaborative learning via FSNP enabled students to acquire and reinforce their problem-solving skills by sharing ideas and assisting one another in the tasks assigned. The findings of the study by Adolphus, Alamina, and Aderonmu (2013) on the benefits of collaborative learning on problem-solving skills among senior secondary school physics students in simple harmonic motion provide additional support for these conclusions. Adolphus, et al. (2013) found that students who were taught using a collaborative learning strategy improved their problem-solving abilities more than students who were taught using more conventional methods. Adolphus, et al. (2013) did not take into account learner collaboration using a technological platform like FSNP, though.

The findings of this study are also supported by observations made by Jamari, Zaid, Mohamed, Abdullah, and Aris (2015) in a related study that examined the potential of using Facebook as an informal alternative learning tool to improve problem-solving skills in school students. According to Jamari et al. (2015), the use of social networking sites (SNPs) in teaching and learning enables students to participate in collaborative learning, which aids in the improvement of their problem-solving abilities. Jamari et al. found that engaging in Facebook discussions encourages students and aids them in honing their problem-solving abilities. However, the exploratory study by Jamari et al. did not take into account how the learners' academic performance was impacted by their problem-solving abilities gained through collaborative learning through social networking sites.

This study found that using FSNP in computer programming teaching and learning enabled learners to share problems, take quizzes on the platform, discuss, and review solutions with colleagues using the platform's discussion, chat, quiz, and post interactive tools. Additionally, the results of a study by Junior, Kruistum, Kontopodis, and Oers (2019) confirm the conclusions of this study. According to Junior, et al. (2019), in their exploration study on how secondary school students' agency evolves over time across offline and online spaces, online spaces like Facebook can serve as a collaborative learning environment

where learners can easily understand the problem being solved and conceptualize the solution with ease, which boosts confidence and improve problem-solving skills. However, Junior, et al. (2019) did not investigate the impact of collaborative learning through Facebook on learner academic attainment, which represents a little difference from the findings in this study.

4.5.2 Learner Collaboration on FSNP and Motivation

Table 4.12 shows that the majority of students and teachers, with means M = 4.17 and M = 4.41, strongly agreed that collaborative learning via FSNP had an effect on learner academic achievement because learners were motivated to learn through the platform. This implies that the learners' participation in collaboration via FSNP made learning enjoyable and captivating, resulting in effective learning. To support this, one of the teachers interviewed stated:

> My students participated in discussing the questions I posted, they asked questions and answered questions, shared some learning materials, attempted the quiz I gave, and uploaded and downloaded documents. They were free to interact and they collaborated very well than they do in their round table discussion groups. What I can say is that my students were motivated to engage in the discussions on FSNP more than when they are when participating in discussion groups in the class. (Case No. 16)

Teachers' interview responses suggested that students would be motivated to collaborate online using FSNP. According to the response, when learners are motivated to collaborate on FSNP, they become actively engaged and immersed in the learning process, resulting in improved learner academic achievement. Filgona, Sakiyo, Gwany and Okoronka (2020) emphasize the importance of motivation, claiming that highly motivated learners make the learning environment interesting to teach and learn readily, whereas unmotivated learners make teaching unpleasant and learn little. This implies that learners must be motivated to learn in order to participate in an online collaborative learning platform like the FSNP and achieve meaningful academic achievement. This study's findings support those of Ziegler (2007), who claims that Facebook has the "ability to better motivate students as engaged learners rather than learners who are primarily passive observers of the educational process." Similarly, the findings corroborate Wang and Vasquez's (2012) observation that FSNP has the potential to promote

greater interactive learning opportunities among learners through genuine communication and social interaction. These points of view agreed with McCarthy's (2012) findings that FSNP allows students to collaborate and share knowledge. Additionally, these findings corroborated the findings of a study conducted by zyurt and zyurt (2016), which examined the effect of using Facebook on enriching learner experiences in programming. According to zyurt and zyurt (2016), Facebook has positive effects such as providing a collaborative learning environment and increasing learner motivation. Their study, however, only included university students in Turkey and did not report on how increased student motivation from participating in collaborative learning through FSNP impacted learner academic achievement, a gap that this study filled.

The results of this investigation were further validated by the data obtained through the observation schedule. It was noted that the students preferred no particular cooperation partner, made an effort to reply to every question submitted, completed 80% of the learning exercises on time, and were not in a rush to end the online session. Teachers successfully managed the learning activities throughout the lessons, kept them interested, and successfully controlled the learning sessions. This demonstrated how the development of students' motivation through collaborative learning led to efficient learning and improved academic achievement.

4.5.3 Learner Collaboration on FSNP and Communication Skills

Table 4.12 shows that a majority of students and teachers, with means M = 4.02 and M = 4.44, strongly agreed that collaborative learning through FSNP had an effect on learner academic achievement because learners acquired or improved their communication skills as a result of it. This implies that the learners communicated effectively during the collaborative learning on FSNP via chats, posts, and discussions, which greatly aided their academic achievement. To support this, one of the teachers interviewed stated:

> Facebook provided a new class environment where they collaborated freely even with my absence online. I observed that continuous engagement on FSNP would enable my student hone their communications skills because even the quite ones could read and post answers to the questions and share ideas. Reading, answering questions, participating in discussions, downloading content and getting feedback from me and among themselves enabled my students' academic achievement improve. (Case No. 9)

According to the teacher interviewed, collaborative learning on FSNP allows learners to hone their communication skills through writing and reading of posts, chats, engaging in discussion, and answering questions from colleagues. Improved communication skills aid in effective learning, resulting in improved academic achievement.

The findings of this study, as well as the opinions of teachers and students, support the findings of Cunha, Kruistum, and Oers (2016). Cunha et al. (2016) conducted a study to determine how teachers from various cities in Brazil used groups on FSNP and how this affected communication between teachers and students. Cunha et al. (2016) discovered that active participation in collaborative learning activities on FSNP improved communication between teachers and students. Their study, however, did not address the effect of improved communication and collaborative learning on learner academic achievement, a gap that this study filled.

Similarly, the findings of this study confirmed the findings of Dweikat (2016), who conducted an experimental study to investigate the effect of using FSNP on improving English communication skills through a blended teaching approach. Dweikat discovered a statistically significant difference in achievement between the experimental groups of students. According to Dweikat (2016), FSNP provided a collaborative learning platform where learners could have discussions, and share ideas, documents, photos, videos, chats, and links to relevant websites, all of which helped them improve their communication skills. However, Dweikat's study, which involved university students studying English, did not focus on how communication skills and collaborative learning impacted learner academic achievement at lower levels, a gap that this study filled.

Further, the results of this study supported those of a study by Vivekha and Babu (2020), which looked at how to use FSNP as a tool for improving students' communication abilities. In their study, Vivekha and Babu (2020) found that collaborative learning on FSNP is an entertaining form of unconscious learning in which students freely express their ideas, thoughts, and feelings. This allows them to develop communication skills, pick up shared knowledge unconsciously, and ultimately improve their academic performance.

4.6 Academic Achievement Between Learners Who Spend Different Amounts of Time on FSNP and Those Who Did Not

The third objective was to establish the difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who did not. A pre-test was administered to the students in both the control and treatment groups and marked to establish whether they were in the same baseline knowledge of the content that was to be taught. A statistical analysis of pre-test scores was done to compute the mean scores of the control group and the treatment group as shown in Table 4.13. The mean scores helped to determine whether the students in both the control and treatment groups had similar baseline academic achievement before the teaching and the experimental intervention began.

Table 4.13: Analysis of the Pre-Test Mean Scores for the Control and Treatment Groups Before Start of the Experiment

Pre-Test Mean Scores					
Groups	***Frequency***	***Sum***	***Mean***	***Variance***	***Std Dev (σ)***
Pre_Test_Control_Group	77	1117	14.51	55.44	7.44
Pre_Test_Treatment-Group	126	1750	13.89	35.01	5.92

Table 4.13 shows that the mean of the pre-test for students in the control group was M = 14.51 with a standard deviation of σ = 7.44 and M = 13.89 with a standard deviation of σ = 5.92 for those in the treatment group. This indicated that the students in the control and treatment groups had low and disparate academic achievement prior to the start of the quasi-experiment. The variability of test scores

for the two groups was low, with the control group $\sigma = 7.44$ and the treatment group $\sigma = 5.92$ indicating that the scores from the two tests were normally distributed. Table 4.13 also shows that the treatment group had a lower mean score than the control group, which could be attributed to a variety of factors, including teacher characteristics, learner characteristics, the number of learners, learner gender, and the learning environment, as well as some students reading ahead of others. However, this implied that the learners had a low baseline knowledge of the topic to be taught.

To determine whether there was a statistically significant difference in learner academic achievement between the two groups in the pre-test, inferential statistics were computed using the analysis of variance (ANOVA) as shown in Table 4.14.

Table 4.14: One-way ANOVA Comparing the Pre-test Scores of the Students Before Students Spent Time on FSNP

One-Way ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	18.22998457	1	18.22998	0.426684	0.514367	3.888139
Within Groups	8587.691198	201	42.72483			
Total	8605.921182	202				

*Confidence level p = .05

Table 4.14 shows that the p-value was greater than the confidence level of p =.05, indicating that there was no statistically significant difference in learner academic achievement between the control and treatment groups prior to the start of the quasi-experiment, as supported by the one-way ANOVA statistic [F (1,201) =.427, P=.514]. This could be attributed to a variety of factors, including teaching methods used, teacher characteristics, learner characteristics, number of learners, learner gender, and learning environment.

Following the teaching and exposure of students to FSNP, a statistical analysis of the post-test scores was performed to determine the mean scores of the control group and treatment group's two sub-groups

of students, those who were exposed for regulated time of less than three (3) hours per day and those who were exposed for unregulated time of more than three (3) hours, as shown in Table 4.15.

Table 4.15: Mean Scores for Students Who Spent Different Amounts of Time Learning On FSNP and Those Who Did Not

	N	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Std. Error
Post_Test_Control_Group	77	33.27	13.274	.441	.274
Post_Test_Less_3hrs	52	57.21	13.156	-.154	.330
Post_Test_More_3hrs	74	55.65	10.819	-.070	.279

Table 4.15 shows that students who did not spend time on FSNP (control group) posted a mean, M=33.27 and a standard deviation σ =13.27; those who interacted and learned on FSNP for the regulated time of less than three hours posted a mean, M = 57.21 and standard deviation = 13.16; and those who interacted and learned for the unregulated time of more than three hours posted means of and M = 55.65 and standard deviation σ = 10.82. This indicates that students exposed to FSNP performed better in terms of learner academic achievement than those who were not; however, students exposed for less than three hours (regulated) performed better than those exposed for more than three hours (unregulated). This inferred that the intervention of exposing students in the treatment group to spend time interacting, collaborating, and learning through FSNP resulted in higher academic achievement than those who were not exposed. The findings also suggest that students who were exposed for a regulated amount of time (less than three hours) had a higher mean than those who were exposed for an unregulated amount of time (more than three hours), indicating that the latter lost self-regulation and concentration on learning content and spent time accessing other Internet sites.

To test the hypothesis "HO_3: There is no significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not" the means of the post-test

scores were subjected to inferential statistical analysis. A t statistic was used to compare the means of the post-test scores of students who spent different amounts of time on FSNP to learn (treatment group) and those who did not spend any time on FSNP to learn (control group), as shown in table 4.16.

Table 4.16: Paired t-Test Comparing the Mean Scores for Students Who Spend Different Amount of Time Learning On FSNP and Those Who Did Not

	Post-Test Control Group	**Post-Test Time<3 Hours**	**Post-Test Control Group**	**Post-test Time >3 Hours**
Mean	33.27	57.21	33.27	55.65
Variance	176.20	173.07	176.20	117.05
Observations	77	52	77	74
Hypothesized Mean Difference	0.00		0.00	
df	110.00		145.00	
t Stat	-10.10		-11.37	
P(T<=t) one-tail	0.00		0.00	
t Critical one-tail	1.66		1.66	
P(T<=t) two-tail	0.00		0.00	
t Critical two-tail	1.98		1.98	
Confidence value = 0.05				

Table 4.16 displays the t-statistic [t (110) = 10.10, p =.00] for the post-test mean scores of students who spent less than three (3) hours per day on FSNP and those who did not (control group). Table 4.16 also displays the t-statistic [t (145) = 11.37, p =.00] for the post-test mean scores of students who spent more than three (3) hours per day on FSNP and those who did not (control group). The p-value for the two groups that spent different amounts of time on FSNP (p =.00) was less than the confidence value (p =.05). The t-test revealed a statistically significant difference in learner academic achievement between those who spent different amounts of time on FSNP (treatment group) and those who did not (control group). As a result, the hypothesis "HO_3: There is no significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not" was rejected, and the alternate hypothesis was accepted. This implied that students who spent time on Facebook for

learning purposes performed better academically than those who did not. This also suggests that FSNP provides technology affordances that facilitate learner engagement, engage learners in active and enjoyable learning, and allow learners to share knowledge and ideas and assist one another in problem-solving. The findings further suggest that learners who spend the regulated amount of time on FSNP outperform those who spend the unregulated amount of time. This could be because learners on regulated time tend to maximize available time for learning activities, have self-control, and avoid time-wasting activities such as side chatting with colleagues and visiting irrelevant websites.

The results of this study were reinforced by the findings of Celia, Yurt, and Sahin (2015), who in a study involving university students in Turkey looked at the factors influencing the use of Facebook for learning and their relationships. In their survey, Celik et al. (2015) concluded that students who use Facebook for learning reasons post higher academic grades than those who do not. According to Celik et al. (2015), these students use Facebook often but appropriately by abstaining from it for longer periods. The findings of this study are supported by Wanjohi, Mwebi, and Nyang'ara (2015), who investigated the impact of self-regulation of Facebook usage on academic performance among Kenyan university students. Wanjohi et al. (2015) discovered that students with high levels of self-regulation control the time they spend on FSNP, allowing them to achieve high academic achievement. While Wanjohi et al. (2015) studied university students with self-regulation, the findings in this study of secondary school students agreed with the view that when students spend regulated amount of time on FSNP, they achieve higher academic grades than those who do not. This implies that teachers and parents may need to limit the amount of time secondary school students spend on FNSP for it to be productively used.

The findings in this study corroborated the findings of Rouis, Limayem, and Salehi-Sangari (2017), who observed that extensive use of FSNP by students with extraverted personalities resulted in poor academic achievement, whereas students with self-control and self-regulation effectively controlled the amount of

time they spent on the platform and had a better cognitive absorption that led to high academic achievement. Rouis, et al. (2017) stressed the necessity for teachers to actively monitor learning using FSNP to restrict learners' multitasking on the platform, which impairs cognitive absorption and results in low academic accomplishment regardless of whether access time is regulated or not.

The findings of this study also confirmed the findings of Kumara and Prabandari (2018), who conducted a study to investigate the relationship between self-regulated learning and academic achievement among undergraduate medical students and revealed a positive correlation between self-regulated learning and academic achievement. In a similar vein, Kumara and Prabandari (2018) believe that students with good self-regulated learning achieve high academic achievement because they can focus on the content being learned. Further, while investigating the impact of FSNP usage on college student involvement in studies, Mathur, Nathani, Sharma, Modi, and Arora (2019) concluded that while spending time on FSNP may have a positive effect on learner academic achievement, if not regulated, students will use the platform for entertainment, relaxing, and passing time but not for academic purposes, resulting in a negative effect on their academic achievement. Mathur et al. (2019) proposed that teachers and other educators regulate FSNP usage to ensure that the platform is used optimally for academic purposes resulting in improved academic achievement.

Further still, the results of this study concur with those of Alwreikat & Shehata (2021), who in a study to examine the factors influencing students' use of Facebook and how it affects collaborative learning, held the opinion that the more time spent on Facebook, the better learner academic achievement students achieve through collaborative learning. However, Alwreikat & Shehata (2021) stressed the necessity for teachers to set time limits to maintain students' focus on the task at hand. According to Oyelere, Olaleye, Balogun, and Tomczyk (2021), in a study to examine the relationship between students' teamwork experience, self-regulated learning, technology self-efficacy, and performance in an online educational

technology course, the right self-regulated learning strategies in online courses motivate students to strive for a good teamwork experience, leading to increased interest in online learning and academic achievement. This further implies that if learners spend a regulated amount of time on FSNP, they are more likely to achieve high academic achievement than those who do not or are exposed to the platform for an unregulated amount of time.

To triangulate the findings from the quasi-experiment in this study, the qualitative data collected through questionnaires for teachers and students, teacher interviews, and lesson observation schedules were analyzed and discussed. First, responses were sought from Computer Studies teachers and students on how much they agreed with the statement that regulating time spent on FSNP would allow students to concentrate on learning content, avoid access to distracting sites on the Internet, and control social interactions with colleagues during the lesson, and what effect this would have on the student's academic achievement.

The responses on whether regulating students' FSNP access time would enable learners to concentrate on learning activities were indicated in Table 4.17.

Table 4.17: Teachers' and students' responses on whether regulated access time to FSNP enabled learners to concentrate only on learning content

Statement	**Teachers**		**Students**	
	f	**%**	**f**	**%**
Agreed	9	28.1	40	54.8
Strongly Agreed	20	62.5	18	24.7
Not Sure	2	6.3	5	6.8
Disagreed	0	0.0	5	6.8
Strongly Disagreed	1	3.1	5	6.8
Total	**32**	**100.0**	**73**	**100.0**

Table 4.17 shows that the majority of teachers (62.5%) strongly agreed that limiting FSNP access time allowed students to focus solely on learning content, while 28.1% agreed and 6.3% were not sure, none

disagreed, and 3.1% strongly disagreed. Table 35 also shows that the majority of students, 54.8%, agreed that regulating FSNP access time allowed learners to focus solely on learning content, 24.7% strongly agreed, and 6.8% disagreed, strongly disagreed, or were unsure. This indicated that limiting the amount of time students spent on FSNP enabled them to focus on interactive and constructive activities that facilitated mastery of the content taught. This meant that, while spending time on FSNP was beneficial to learning, the amount of time learners spent on it should be limited in order to improve learner concentration and attention during the learning process.

The responses on whether regulating students' access time on FSNP would enable learners to avoid accessing destructive sites on the Internet during class time are indicated in Table 4.18.

Table 4.18: Teachers' and students' responses on whether regulated access time to FSNP enabled learners to avoid distractive sites on the Internet

Statement	**Teachers**		**Students**	
	f	**%**	**f**	**%**
Strongly Disagreed	0	0.0	3	4.1
Disagreed	0	0.0	2	2.7
Not Sure	0	0.0	2	2.7
Strongly Agreed	10	31.3	46	63.0
Agreed	22	68.7	20	27.5
Total	**32**	**100.0**	**73**	**100.0**

Table 4.18 shows that the majority of teachers (68.7%) agreed that limiting Facebook SNP access time enabled students to avoid distracting websites on the Internet, while 31.3% strongly agreed. Table 4.18 also shows that a majority of students, 63.0%, strongly agreed that regulating FSNP access time enabled them to avoid accessing distracting sites on the Internet, while 27.5% agreed, 4.1% strongly disagreed, and 2.7% were unsure. Given that FSNP is awash in social and entertainment posts that can serve as time wasters for learners if not regulated and closely monitored, regulating how much time learners spend on FSNP allows them to avoid accessing such posts and other sites that would disrupt their learning.

Teachers should therefore engage students on the platform for a specific amount of time and with activities that keep students focused. One of the teachers interviewed backed up this claim by saying:

> It is difficult to tell how much amount of time is enough for learners on FB and I think enough time can be provided outside the school timetable but it will be good if there is a way of regulating the time so that learners do not loose concentration and start engaging in other activities other than those meant for learning purposes. (Case No. 19)

According to the observations of the interviewed teachers, limiting the amount of time learners spend on FSNP allows them to use the platform solely for learning purposes, which contributes positively to their academic achievement.

The responses on whether regulating students' access time on FSNP would enable learners to control social interactions with colleagues were summarized in Table 4.19.

Table 4.19: Teachers and student's responses on whether regulated access time on FSNP enabled learners to control social interactions with colleagues

Statement	**Teachers**		**Students**	
	f	**%**	**f**	**%**
Strongly Disagreed	1	3.1	4	5.5
Disagreed	3	9.4	4	5.5
Not Sure	0	0.0	10	13.7
Strongly Agreed	7	21.9	10	13.7
Agreed	21	65.5	45	61.6
Total	**32**	**100.0**	**73**	**100.0**

Table 4.19 shows that the majority of teachers, 65.5%, agreed that regulating FSNP access time enabled learners to control social interactions with colleagues during the lesson, 21.9% strongly agreed, 9.4% disagreed, and 3.1 strongly disagreed. Table 4.20 also shows that a majority of students, 61.6%, agreed that regulating FSNP access time enabled learners to control social interactions with colleagues, 13.7% strongly agreed, 13.7% were Not Sure, 5.5% disagreed and 5.5% strongly disagreed, respectively. This indicates that FSNP is a social networking platform, and students would always want to have social interactions on the platform. While students would still learn while engaging in social interactions, the

responses in table 4.19 suggest that teachers should limit the amount of time their students spend on FSNP in order to optimize the platform for learning purposes other than social interaction. Students, like anyone else, would be tempted to lose self-control and spend more time socializing on the platform rather than learning if they were given unrestricted time.

Furthermore, the findings of this study were confirmed by data collected through lesson observations, which revealed that during online lessons, more than 80% of learners in all groups would occasionally multitask by engaging in non-learning activities such as side-chatting with friends, viewing friends' profile pictures and videos, and accessing other websites not related to the content being learned. This implies that teachers should closely monitor student learning on the FSNP, as well as any other social networking platform. The observations also revealed that learners do not prefer to interact with specific partners, are unable to complete tasks within the time allotted, are interested in learning through FSNP, and crave extra time. This suggests that teachers should assign tasks that can be completed in the allotted time or time that is proportional to the tasks to be covered. The study's findings suggest that time is a key determinant of academic achievement attained by Computer Studies students learning online through FSNP; however, time spent online should be regulated for high academic achievement. The findings further suggest that Computer Studies students be encouraged to have self-control and the ability to self-regulate in order to concentrate and avoid multitasking while learning through the platform for better academic achievement.

These findings are supported by Muthui and Sirera (2017), who observed in a survey study to determine the implications of time spent on social media on academic performance by adolescents in public day secondary schools in Nakuru East constituency that most adolescents spend the most time on social media such as FSNP for social interactions, which has the potential to contribute to their low academic achievement. Muthui and Sirera also claimed that students defied school rules and regulations by

sneaking mobile devices to use for social interactions rather than academic purposes. According to Muthui and Sirera (2017), in order to avoid this resistance, schools should review existing policies to allow students to carry such devices and train them on responsible use of SNPs in order to avert negative effects on their academic achievement. This implies that students would strike a balance between using SNPs for learning, entertainment, and socializing while also being concerned about breaking school rules. As a result, students would benefit from the technological affordances provided by FSNP and other SNPs for academic purposes, yielding high academic achievement.

4.7 The Relationship Between Learner Attitude Towards Use of Facebook SNP for Learning and Learner Academic Achievement

The fourth objective of this study was to determine the relationship between learner attitude toward the use of Facebook SNP as a learning resource and academic achievement. The mean (M) of the students' questionnaire responses on their attitude towards FSNP as a learning resource and the post-test scores were analyzed per each school and tabulated as shown in Table 4.21.

Table 4.20: Students' Means of Post-test Scores and Responses on Attitude Towards Use of FSNP as a Learning Resource

School Code	Mean of Pre-Test Scores	Mean of Post-Test Scores	Difference Between Means of Post-test and Pre-test Scores	Mean of Students' Responses on Attitude
S_1	14.08	30.57	16.49	3.95
S_2	16.70	31.00	14.30	3.87
S_3	11.84	30.06	18.22	4.06
S_4	13.86	29.95	16.09	4.02

Table 4.20 shows that students in school S1 had M = 14.08 in the pre-test, M = 30.57 in the post-test, and M = 3.95 in their responses on their attitudes toward using FSNP for learning. Other schools had S2 mean M = 16.70, M = 31.00, and M = 3.87 for pre-test, post-test, and student attitude responses, respectively; S3 mean M = 11.84, M = 30.06, and M = 4.06 for pre-test, post-test, and student attitude

responses, respectively; and S4 mean M = 13.86, M = 29.95, and M = 4.02 for post-test and student attitude responses, respectively. Table 4.21 shows that there was a positive change in mean scores between the pre-test and post-test for each school. This inferred that the students' attitudes toward the use of FSNP influenced their academic performance positively.

To test the hypothesis "HO_4: There is no significant relationship between learner attitude toward the use of Facebook SNP as a learning resource and academic achievement", a t-test was used to compare the means of differences between pre-test and post-test scores and students' responses to their attitude toward the use of FSNP for learning in Table 4.20. The results are shown in Table 4.21.

Table 4.21: Comparison of Students' Means of Differences Between Pre-score and Post-test Scores and Responses on Attitude Towards Use of FSNP for Learning

	Difference Between Means of Post-test and Pre-test Scores	**Mean Of Student Responses On Attitude**
Mean	16.276	3.975
Variance	2.594	0.007
Observations	4.000	4.000
Pearson Correlation Coefficient	0.891	
Hypothesized Mean Difference	0.000	
df	3.000	
t Stat	16.008	
P(T<=t) one-tail	0.000	
t Critical one-tail	2.353	
P(T<=t) two-tail	0.001	
t Critical two-tail	3.182	

Table 4.21 displays a t statistic [t (4) = 93.413, P=.001]. The p-value for each of the two groups was p=.001, which is less than the significance or confidence level of =.05, so the null hypothesis "$H0_4$: There is no statistically significant relationship between learner attitude toward the use of Facebook SNP as a learning resource and academic achievement" was rejected and the alternate hypothesis accepted. This demonstrated that there was a statistically significant relationship between learner attitudes toward using

FSNP as a learning resource and academic achievement. Table 4.21 also shows a Pearson correlation coefficient, r =.891, indicating a strong positive correlation between the change in academic achievement and the learner attitude toward using FSNP as a learning resource, implying that the change in academic achievement increased as the learner attitude increased. Furthermore, the hypothesis test results suggest that learners' attitudes toward using FSNP as a learning resource contributed significantly to learner academic achievement in computer programming among Computer Studies students in Nairobi City County, Kenya.

The data collected through the lesson observation schedule complemented the hypothesis test results in this study. Lesson observation data collected revealed that over 98% of students exposed to FSNP during the study were motivated to learn. Other than occasional network and Internet outages, the students faced no major challenges and demonstrated approval to the use of FSNP as a learning resource.

The findings of this study on the relationship between learner attitude toward the use of FSNP as a learning resource and academic achievement are supported by the findings of a study conducted in Japan by Gamble and Wilkins (2014). Gamble and Wilkins used a mixed methods approach to investigate the attitudes and perceptions of Japanese university students' use of Facebook in an educational setting, as well as the platform's capacity to be used in a way similar to a traditional learning management system for various specific language-learning activities. According to their findings, students have a favorable attitude toward using FSNP for educational purposes. Gamble and Wilkins attributed the positive attitude to the platform's ability to provide a flexible community learning environment in which multimedia learning materials can be presented, access is not limited by time or geography, and learners are actively engaged in learning activities.

The findings agreed with those of ElsayyedSanad (2016), who investigated the perceptions and attitudes of English as a Foreign Language (EFL) undergraduate students toward Facebook as an educational

learning tool. According to ElsayyedSanad's research, students' positive attitudes toward using Facebook as a learning resource are due to the platform's ability to foster social and academic engagement, which is a significant predictor of learner academic achievement. Despite ElsayyedSanad's study involving university students, its findings highlight the reason why the secondary school participants in this study had a favorable view of the usage of FSNP in learning and academic achievement. The findings of this study are supplemented by the findings of a study involving undergraduate students in Morocco in which Faizi, Afia, and Chiheb (2018) investigated students' attitudes toward using Facebook as an educational tool. However, while Faizi et al. (2018) did not focus on learner academic achievement as this study did, their observations, that positive students' attitudes toward the use of the platform concur with those of this study that students like to use the FSNP not only for social interactions and entertainment but also for learning purposes in various subjects.

Further still, the results of this study are supported by findings from a recent study conducted by Moghadam and Shamsi (2021) to investigate learners' attitudes toward Facebook as a medium of engagement during Covid-19 quarantine. Moghadam and Shamsi concluded in their study that students had a favorable attitude toward the use of FSNP as a medium of instruction. According to Moghadam and Shamsi (2021), students' positive attitude toward using FSNP for learning purposes was due to the platform's ability to increase students' confidence; engage students in motivating ways using chats, knowledge sharing through posts, document sharing, and live videos; provide an interpersonal and interacting learning community for both students and teachers; promote collaborative learning and support virtual learning beyond the aftermath of Covid-19 pandemic.

Despite the fact that many previous studies involved college and university students from all over the world, their findings serve as the foundation for supporting the findings of this study, which involved form three Computer Studies students in public secondary schools in Nairobi City County in Kenya. This

study provides empirical evidence that a positive learner attitude toward using FSNP as a learning resource leads to significant improvements in academic achievement. This can be attributed to the platform's technological and pedagogical affordances.

4.8 The Relationship Between Teacher Perception Towards Use of Facebook SNP as an Instructional Tool and Learner Academic Achievement

The fifth objective was to determine the relationship between teachers' perception towards the use of Facebook SNP as an instructional tool and learner academic achievement. The students' mean scores (M) in both the pre-test and post-test were analyzed and recorded per school (S1, S2, S3, and S4), as shown in table 4.22. The difference between the mean scores of the pre-test and post-test was computed to determine whether there were gains in the student's achievement in the two tests, as shown in Table 4.22. The means (M) of the teachers' responses on their perception towards the use of FSNP as an instructional tool was also recorded per each school and tabulated as shown in Table 4.22.

Table 4.22: Means of Students' Pre-test and Post-test Scores and Teachers' Responses on Their Perception Towards Use of FSNP as an Instructional Tool

School Code	Mean of Pre-Test Scores	Mean of Post-Test Scores	Difference Between Means of Post-test and Pre-test Scores	Mean of Teachers' Responses on Their Perception
S_1	14.08	50.57	26.49	4.08
S_2	16.70	51.00	24.30	3.96
S_3	11.84	50.06	28.22	4.08
S_4	13.86	49.95	26.09	4.11

Table 4.22 shows that students in school S_1 had means of M = 14.08 in the pre-test, M=50.57 in the post-test and M = 4.08 in the teachers' responses on their perception towards the use of FSNP as an instructional resource. Other schools had: S_2 mean M = 16.70, M = 51.00 and M = 3.96 for pre-test, post-test and teachers' responses on their perception respectively; S_3 mean M = 11.84, M = 50.06 and M = 4.08 for pre-test, post-test and teachers' responses on their attitude respectively and S_4 mean M = 13.86,

M = 49.95 and M = 4.11 for post-test and teachers' responses on their perception respectively. Table 4.22 shows that there was a positive change in mean scores between the pre-test and post-test for each school.

A comparison of the means of differences between the students' pre-test and post-test scores and teachers' responses on their perception towards the use of FSNP as an instructional resource shown in Table 4.22 was done using a t-test as shown in Table 4.23 to test the hypothesis "HO_5: There is no significant relationship between teachers' perception towards the use of Facebook SNP as an instructions resource and learner academic achievement".

Table 4.23: Comparison of Means of Students' Pre-test and Post-test Score Differences and Teachers' Responses on Their Perception Towards Use of FSNP as an Instructional Tool

	Means Of Change Between Post-Test and Pre-Test Scores	Mean Of Teachers' Responses On Attitude
Mean	26.28	4.06
Variance	2.59	0.00
Observations	4	4
Pearson Correlation	0.72	
Hypothesized Mean Difference	0	
df	3	
t Stat	28.46	
P(T<=t) one-tail	0.00	
t Critical one-tail	2.35	
P(T<=t) two-tail	0.00	
t Critical two-tail	3.18	

Table 4.23 displays a t statistic [t (3) = 28.46, P=.000]. The p-value for each of the two groups was p=.001, which is less than the significance or confidence level of =.05, so the null hypothesis "$H0_5$: There is no significant relationship between teachers' perception towards the use of Facebook SNP as an instructions resource and learner academic achievement" was rejected and the alternate hypothesis accepted. This demonstrated that there was a statistically significant relationship between teachers' perception toward using FSNP as an instructional tool and academic achievement. Table 4.23 also shows

a Pearson correlation coefficient, r =.720, indicating a strong positive correlation between the change in academic achievement and the teacher perception towards using FSNP as an instructional tool, implying that the change in academic achievement increased as the teacher perception increased. Furthermore, the hypothesis test results suggest that teachers' perception towards using FSNP as a learning resource contributed significantly to learner academic achievement in computer programming among Computer Studies students in Nairobi City County, Kenya. Additionally, the results of the hypothesis test suggest that teachers' perception towards the use of FSNP as an instructional; resources on the employment of FSNP as a teaching tool greatly influenced the academic achievement of computer programming students in public secondary schools in Nairobi County, Kenya.

Like any other educational tool, the usage of FSNP gives teachers an engaging and convincing method for imparting information in a way that encourages students to learn more. The effectiveness with which a teacher uses an instructional tool throughout the delivery of a lesson, however, may eventually have an impact on the academic accomplishment of his or her students. In a study that investigated how teachers' perception of television screen time influences the academic performance of secondary school students in Awka Educational Zone in Nigeria, Okika and Chinwe (2015) argued that teachers' negative perception of time students spent viewing television has a negative impact on learner performance. According to Okika and Agbasi (2015), teachers would avoid using an instructional tool if they believed it would have a negative impact on learner academic achievement. However, this would deprive students of the benefits of using the tool.

As such, while using FSNP as an instructional tool may improve learner academic achievement, teachers' perceptions of the platform will determine its use and whether learners will be able to benefit from the instructional affordances provided by the technology. The study's findings revealed a statistically significant relationship between teachers' perceptions of using FSNP as an instructional tool and learner

academic achievement. According to the findings, the teachers' positive perception enabled them to effectively engage their learners on FSNP, allowing the learners to benefit from the platform's interactive and collaborative features, a technology affordance that enabled them to post improved learner academic achievement.

The hypothesis test results in this regard were verified by the data collected through teachers' interview and lesson observation schedule. Responding to what she liked about use of FSNP as an instructional resource and whether she would recommend the tool to any other teacher, one of the teachers said this:

> I loved the virtual interaction with my students. My students were unusually eager to learn the elementary programming principals through the platform. They were ready to explore the opportunities provided by FB. They performed well in the second test than the first one. We didn't finish the topic. We agreed we will continue learning it on FB during the holiday and complete it before schools open in May this year. Why not? Of course yes. I will not hesitate to recommend use of FSNP to other teachers. Teachers have to be dynamic and should change with changes in technology. Otherwise they will be swept by the technology. (Case No. 11)

According to the above interview response from one of the teachers, FSNP provides a platform that elicits learners' eagerness to participate in collaborative learning. The response indicates that teachers enjoy interacting with students on FSNP for academic purposes. It encourages collaborative learning and interactions between teachers and students, both of which contribute to positive learning outcomes. Furthermore, the responses show that teachers have a positive perception of the platform as an instructional tool, with one interviewee admitting that he would readily recommend its use to colleagues.

This was an indication that teachers perceived the platform as an instructional tool that acted as a catalyst in the learning process, thereby helping to improve learner academic achievement. It was also observed that, aside from the occasional network and Internet outage, the teachers faced no major challenges. The findings of this study also pointed out that teachers viewed FSNP as an instructional tool that provided an excellent platform for learners to interact with their peers, content, and teachers. The findings also

revealed that teachers perceived the platform as a tool that: supports teamwork and learning outside of the classroom; allows for instant feedback; is safe for learners, and is a useful resource that can positively impact learner academic achievement.

The findings of this study on teachers' attitudes toward the use of FSNP as a teaching tool complemented those of Chen and Bryer (2012), who in their qualitative study on the use of Social Media (SM) like FSNP among faculty in public administration in the United States (U.S.) held that the inclusion of such tools in formal learning would encourage teachers to use them in order to increase students' engagement and academic achievement. According to Chen and Bryer (2012), teachers perceived such media as educational tools that might enhance lesson discussions, boost student participation, and strengthen ties between students and teachers, all of which would raise learner academic achievement. Similarly, the findings of this study were corroborated by those of Prescotte (2014), who conducted a study in one UK university to gain insight into instructors' attitudes and perceptions toward the use of Facebook in an instructional context. According to Prescott (2014), instructors' attitudes toward the use of Facebook as an instructional tool influence online learner engagement, and the instructor-learner interactions ultimately influence learner academic achievement.

Additionally, the findings of Rezaei and Meshkatian (2017), who conducted a quantitative survey study to examine Iranian language teachers' attitudes and perceptions toward social media and technology-based interaction, support the findings of this study. They found that English Language Teaching (ELT) teachers had a favorable attitude and perception toward the use of social media. Rezaei and Meshkatian (2017) hinted that utilizing social media platforms like FSNP in the classroom encourages blended learning, supports instructors' professional development, and involves students both within and outside of the classroom, all of which have a favorable impact on learning outcomes.

The findings of this study are further supported by those of a quantitative survey study conducted by Soulaymani and Alem (2019) to track Moroccan English instructors' usage of, attitudes toward, motivation for, and views of FSNP as a teaching and pedagogical instrument. In their study, Soulaymani and Alem (2019) noted that teachers tend to have a positive perception towards FSNP because it aids in the development of their professional abilities, which benefit students through increased motivation and academic achievement. Similar to this, in their study to examine teachers' attitudes toward social media use in online learning amid the COVID-19 epidemic, Jogezai, et al. (2021) found a surge in the usage of social media (SM) like FSNP in schools, primarily in poor nations. According to Jogezai et al. (2021), teachers have a good attitude toward social media and even more so, they perceive it as a tool that is crucial for fostering continuous learning despite the physical distance that Covid-19 imposes. Jogezai, et al. (2021) added that when teachers continue to use such tools even during the epidemic, learning outcomes including academic success would not be negatively impacted.

4.9 Summary of Hypothesis Testing, Results and Interpretations

Table 4.24: Summary of Hypothesis Testing, Results and Interpretations

Objective	Hypothesis	Respondents	Hypothesis Test	Test finding	Reference Tables	Interpretation
To examine the difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those exposed who are not	**HO_1**: There is no significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not	Students and Teachers	ANOVA	(F=96.194 , p=.000) Null hypothesis rejected	Table 4.7	There is a significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not
To assess the difference in learner academic achievement between learners	**HO_2**: There is no significant difference in learner academic achievement between learners	Students and Teachers	ANOVA	(F=96.194 , p=0.00)	Table 4.11	There is a significant difference in learner academic achievement between learners

Objective	Hypothesis	Respondents	Hypothesis Test	Test finding	Reference Tables	Interpretation
who collaborate on FSNP and those who do not	who collaborate on FSNP and those who do not			Null hypothesis rejected		who collaborate on FSNP and those who do not
To establish the difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not	**HO_3**: There is no significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do not	Students and teachers	T-test	t=2.470, p=0.039 Time less than 3 hours (T<3hrs) t= .245, P=.807 Time more than 3 hours (T >3hrs) - t=2.717, P=.008 Null Hypothesis rejected	Table 4.16	There is a significant difference in learner academic achievement between learners who spend different amounts of time on FSNP and those who do no
To determine the relationship between learner attitude towards the use of Facebook SNP for learning and learner academic achievement	**HO_4**: There is no significant relationship between learner attitude towards the use of Facebook SNP for learning and learner academic achievement	Students	Pearson's product Moment correlation coefficient	(r=.082, p=.024 null hypothesis rejected	Table 21	There is a significant relationship between learner attitude towards the use of Facebook SNP for learning and learner academic achievement
To determine the relationship between teacher attitude and perception towards the use of Facebook SNP as an instructional tool and learner academic achievement	**HO_5**: There is no significant relationship between teacher attitude and perception towards the use of Facebook SNP as an instructional tool and learner academic achievement	Teachers	Pearson's product Moment correlation coefficient	(r=.126, p=.036) Null hypothesis rejected	Table 23	There is a significant relationship between teacher attitude and perception towards the use of Facebook SNP as an instructional tool and learner academic achievement

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings, conclusions, and recommendations. This chapter also offers suggestions for further research.

5.2 Summary of findings

The purpose of this study was to establish the effect of Facebook SNP on academic achievement in Computer Programming among Computer Studies learners in public secondary schools, Nairobi City County, Kenya. Firstly, the study sought to examine the difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not. The study established that learners who are exposed to FSNP learner-interface interactions post higher means score (higher academic achievement) than those who are not exposed to the platform. The hypothesis "HO_1: There is no significant difference in learner academic achievement between learners exposed to FSNP learner-interface interactions and those who are not" was rejected. This indicated that there is a statistically significant difference in learner academic achievement between learners who are exposed to FSNP learner-interface interactions and those who were not.

Secondly, the study sought to assess the difference in learner academic achievement between learners who collaborated on FSNP and those who did not. The study established that learners who collaborated on FSNP posted higher mean scores than those who did not. The hypothesis "HO_2: There is no significant difference in learner academic achievement between learners who collaborate on FSNP and those who do not" was rejected. This indicated that there is a statistically significant difference in academic achievement between learners who collaborate on FSNP and those who do not.

Thirdly, the study sought to establish the difference in learner academic achievement between learners who spent different amounts of time on FSNP and those who did not. The was established that learners

who spent different amounts of time on FSNP posted higher mean scores than those who did not. The study further established that learners who spent regulated amount of time posted higher mean score than those who spent unregulated amount of time on the platform. The hypothesis "HO_3: There is no significant difference in learner academic achievement between learners who spent different amounts of time on FSNP and those who do not". This indicated that there is a statistically significant difference between learners who spend time on FSNP and those who do not.

Fourthly, the study sought to determine the relationship between learner attitude towards use of Facebook SNP for learning and learner academic achievement. The hypothesis "HO_4: There is no significant relationship between learner attitude towards use of Facebook SNP for learning and learner academic achievement" was rejected and the alternate hypothesis accepted. The study pointed out that there is a significant relationship between learners' attitude towards use of Facebook SNP as a learning resource and learner academic achievement. The study established that there exists a strong positive correlation between learner attitude towards the use of FSNP as a learning resource and academic achievement, indicating that learners are likely to use FSNP to collaborate online for academic purposes.

Lastly, the study sought to determine the relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement. The hypothesis "HO_5: There is no significant relationship between teacher perception towards the use of Facebook SNP as an instructional tool and learner academic achievement" was rejected and the alternate hypothesis accepted. The study established that there is a significant relationship between teacher perceptions towards the use of FSNP as an instructional tool and learner academic achievement. The study also pointed out that there is a strong positive correlation between teachers' perception towards the use of FSNP as an instructional tool and learner academic achievement, indicating that teachers are likely to adopt FSNP as an instructional tool for teaching computer programming in public secondary schools in Nairobi City County, Kenya.

5.3 Conclusions

Overall, the study's major conclusion was that FSNP has a positive effect on learner academic achievement when used both an instructional tool and a learning resource. The study also made the following conclusions;

Firstly, the positive effect of FSNP on learner academic achievement is attributed to the platform's friendly learner-technology interface which is flexible, desirable, adaptive, comfortable and that add value to learner experiences and self-efficacy. FSNP offers an intuitive learner-interface platform suitable for supporting individual learning styles, learner-content, learner-learner and learner-teacher interactions.

Secondly, the positive effect of FSNP on learner academic achievement is linked to the platform's ability to support collaborative learning and other emerging 21st-century teaching approaches. This is due to the FNSP's virtual environment, which allows participants in a learning community to share ideas, knowledge, information, and experiences via tools such as chat, posts, document sharing, recorded and live video sharing, graphics, and online quizzes. Based on Web 2.0 principles, FSNP provides features that allow learners to improve their communication, problem-solving skills, and motivation to learn as they interact with one another, teachers, and the content.

Thirdly, while FSNP has a positive effect on learner academic achievement, its use by learners should be regulated to ensure optimal academic utilization. The regulation of usage ensures that learners are not drawn to destructive sites or distracted by social interactions that may impede effective learning. Thus, rather than prohibiting the use of FSNP and other SNPs in schools, as is currently the case in Kenya, teachers and parents should allow students regulated amounts of access time and monitor to ensure responsible technology usage in order to maximize both the functional and social affordances offered by the platform.

Fourthly, as with most educational technologies, the effect of FSNP on academic achievement, can be associated with the learner attitude towards the use of the technology as a learning resource. Learners with positive attitude towards an educational technology have self-esteem; are motivated, engaged and have self-esteem. Such learners willingly share ideas, information, knowledge, and experiences with colleagues, which increases self-efficacy, resulting in effective technology-assisted learning.

Lastly, teacher perceptions of FSNP use influence its effect on learner academic achievement. A teacher who perceives the use of FSNP positively, as with most educational technologies, is emotionally stable, interested, and motivated to use it to facilitate learning. Such a teacher fosters self-efficacy, which is required for facilitating social and pedagogical interactions via the platform, resulting in effective learning and thus improved learner academic achievement.

5.4 Recommendations

Based on the findings of this study, the researcher made the following recommendation;

5.4.1 Integration of Facebook Social Networking Platform in Education

The Facebook Social Networking Platform (FSNP) has become a worldwide tool for sharing ideas, knowledge, information, and networking in other sectors of the economy. However, its uptake in the education sector especially in developing countries is low. The FSNP's capacity to support the building of collaborative learning communities and stimulate learning leading to improved learner academic achievement qualifies it as a powerful instructional technology that can be embraced as a learning and instructional resource just like conventional learning management systems (LMSs). This study recommends the embracing and integration of FSNP in teaching and learning.

5.4.2 Adoption of Emerging Technology-driven Pedagogical Approaches

The current proliferation of social networking platforms (SNP) and their infiltration in education has led to the emergency of technology-driven pedagogical approaches. This study recommends the adoption

the emerging pedagogical approaches such as the blended or hybrid learning, flipped learning, collaborative learning, mobile learning, online synchronous and asynchronous learning which can be facilitated through SNPs such as FSNP, WhatsApp, Twitter, Google meet and Zoom among others. However, the use of the technology-driven pedagogical approaches should regulated and monitored for effective learning.

5.4.3 Teacher Capacity Building in Pedagogical Integration of Technology in Education

This study recommends pedagogical integration of emerging technologies such as social networking platforms, commonly known as social media in teacher capacity building programs at pre-service or in-service levels.

5.4.4 Educational Policies

The Kenya Ministry of Education's (MoE) sessional paper no. 1 of 2019 provide a policy framework for adoption of ICT-based curriculum delivery and assessment innovations. However, use of mobile devices and SNPS in schools by students is prohibited. Therefore, many students illegally smuggle these devices into schools and use them for entertainment instead of academics purposes. This study recommends review of the existing educational and related ICT policies to pave way for the integration and safe use of FSNP and other emerging SNPs in teaching and learning.

5.4.5 Learning Theory Adopted on this Study

In today's world, knowledge is quickly becoming measured by how quickly one can learn, unlearn, and relearn information. As a result, embracing any-time, any-where and just-in-time learning environments represents enormous engagement potential for teachers and learners. As a result, teachers should model connected learning environments for their learners' social and academic interactions. This can be accomplished by heavily borrowing from the connectivism learning theory advanced by Siemens and Downes (2005). Thus, this study recommends rethinking existing educational innovations and

pedagogical approaches in order to build on existing information, make connections between multiple sources of information and apply the information in solving day-to-day problems.

5.5 Recommendations for Further Research

This study concentrated on the effect of Facebook SNP on learner academic achievement in programming among Computer Studies students in public secondary schools, Nairobi City County, Kenya. The researcher recommends further studies to;

i) Establish the effect of Facebook SNP on learner academic achievement in other subjects at the secondary school level in other counties across the country

ii) Establish the effect of Facebook SNP on other dependent variables such as learner self-efficacy, motivation, psychological well-being and self-esteem

iii) Establish the effect of other social networking platforms like WhatsApp and Telegram on learner academic achievement in Computer Studies and other subjects at the secondary school level across the country.

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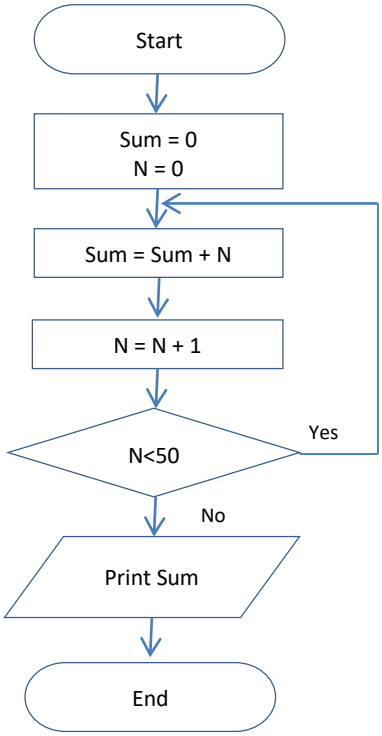
APPENDICES

APPENDIX I: STUDENT ACHIEVEMENT TEST (PRE – TEST)

Name: .....Admission number ..... School .....

Instructions: *Answer all questions*

1) Define the following: (4 marks)
   a) programming
   b) Programming language
2) State TWO types of program documentation. (2 marks)
3) Differentiate between: (4 marks)
   c) Object code and source code
   d) Interpreter and compiler
4) Compare and contrast low level languages and high level languages. (5 marks)
5) Highlight the factors to consider when choosing a programming language. (5 marks)
6) The figure below shows a flow chart. Use it to answer the questions that follow:



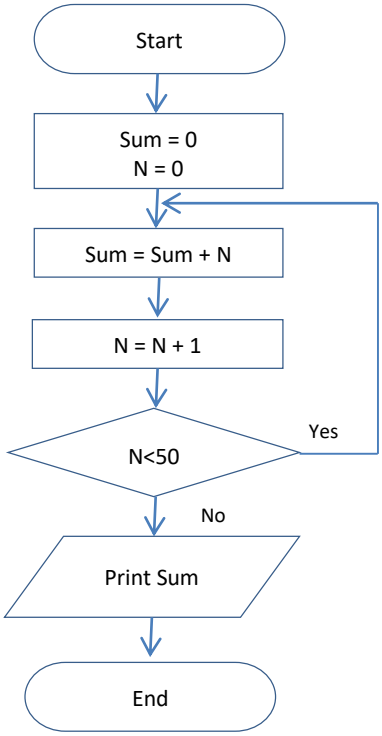
   a) Write the output of the program represented in the flow chart above. (4 marks)
   b) Write the pseudocode to represent the program design in the flow chart above. (8 marks)
7) With aid of diagrams, discuss the following program control structures: (6 marks)
   a) Sequence
   b) Selection
   c) Iteration
8) Describe the six computer program development stages. (12 marks)

APPENDIX II: STUDENT ACHIEVEMENT TEST (POST-TEST)

Name: .....Admission number ..... School .....

Instructions: *Answer all questions*

1) State two types of program documentation. (2 marks)
2) Compare and contrast low level languages and high level languages. (5 marks)
3) Define the following: (4 marks)
   a) Programming
   b) Programming language
4) With aid of diagrams, discuss the following program control structures: (6 marks)
   a) Sequence
   b) Selection
   c) Iteration
5) Highlight the factors to consider when choosing a programming language. (5 marks)
6) Differentiate between: (4 marks)
   a) Object code and source code
   b) Interpreter and compiler
7) Describe the six computer program development stages. (12 marks)
8) The figure below shows a flow chart. Use it to answer the questions that follow:



   a) Write the output of the program represented in the flow chart above. (4 marks)
   b) Write the pseudocode to represent the program design in the flow chart above. (8 marks)

APPENDIX III: QUESTIONNAIRE FOR STUDENTS

Section A: Introduction

I am a Postgraduate student at the University of Nairobi pursuing PhD in Educational Communication, Technology and Pedagogical Studies in the Department of Educational Communication and Technology. As part of the requirement for the award of the degree, I am carrying out a study on **Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Programming Among Learners in Public Secondary Schools, Nairobi County, Kenya**. This questionnaire is therefore being administered to collect data about student use and attitude towards Facebook Social Networking Platform (FSNP) as an instructional tool. I am kindly appealing to you to respond to items in this questionnaire. Your identity will be confidential and your responses shall solely be used for purpose of this study. Thank you in advance for taking your time to respond to the questionnaire.

Peter K. Mulwa

E81/52217/22

Section B: Personal details

Name (Optional):……**Gender:** Male [ ] Female [ ]

Age: 10 – 15 [ ] 16 – 20 [ ] 21 – 25 [ ] Above 25 [ ]

Type of School: Boys' [ ] Girls' [ ] Mixed [ ]

Section C: Facebook SNP Learner-interface Interaction

To what degree do you agree with the following statements? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D=**Disagree, **N=**Not Sure, **A=**Agree, **SA=**Strongly Agree					
STATEMENT: FSNP Learner-interface interactions has effect on my academic achievement because of:					
1. Adaptability	**SD**	**D**	**N**	**A**	**SA**
i. FSNP has available user friendly navigation tools					
ii. FSNP provides a flexible layout of presenting content to learners					
iii. FSNP is not easy to use					
iv. FSNP is not adaptive to individual learner's style of learning					
v. Content in FSNP is presented using a variety of media such as recorded video, audio, audiovisual, live text chats and conferencing					

vi. Content in FSNP is presented to learners in a sequential manner					
vii. Content shared on FSNP cannot be learned repeatedly until mastered by a learner					
2. Comfortability	**SD**	**D**	**N**	**A**	**SA**
i. FSNP is easy to use for learning purpose					
ii. I am not willing to share ideas to fellow learners through FSNP					
iii. I trust colleagues whom we learn together through the FSNP					
iv. I am not comfortable when finding for help from fellow learners and teachers via FSNP					
v. I am comfortable participating in class discussion on FSNP than on a face-to-face class discussion					
vi. I am not comfortable with the presentation of learning content on FSNP					
vii. FSNP can be access at any time for learning					
3. Desirability	**SD**	**D**	**N**	**A**	**SA**
i. I am satisfied with the FSNP's simple user interface which is easy to navigate					
ii. FSNP has distractive visual tools which affect my concentration during learning					
iii. FSNP interface is attractive and interesting to learners					
iv. I am not always curious to meet fellow learners on FSNP					
v. FSNP does not have different interaction tools					
vi. Different types of content can be shared FSNP					
vii. It is not easy to access shared content on FSNP					
4. Value	**SD**	**D**	**N**	**A**	**SA**
i. It is easy to get feedback from colleagues and teacher on FSNP					
ii. I find content shared on FSNP lessons more useful and relevant					
iii. It is easy to reach to other colleagues and teachers for consultation on FSNP					
iv. Learning through FSNP does not meet my expectation					
v. Learning through FSNP satisfies my learning needs					
vi. Using FSNP is not better than most learning management systems					
vii. Using FSNP give value for the time and effort spend.					

Section D: Facebook SNP Collaborative Learning

To what degree do you agree with the following statement? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: Collaborative learning on FSNP has effect on my academic achievement because:					
1. Problem-solving skills	**SD**	**D**	**N**	**A**	**SA**
i. I am able to analyze a problem shared on FSNP critically and solve it					
ii. I do not give ideas and opinions of solving a problem on FSNP					
iii. Problems shared on FSNP are solved in a sequential manner					
iv. I am shy to propose solutions to a problem on FSNP					

v. I am always willing to share solutions to problems on FSNP					
vi. Problems solved on FSNP cannot be reviewed later at ones pace for deep understanding					
vii. I am able to get feedback on problems solved on FSNP immediately					
2. Motivation	**SD**	**D**	**N**	**A**	**SA**
i. I am interested in attending lessons offered through the FSNP					
ii. I am not interested in sharing ideas and concepts on FSNP					
iii. I am encouraged to interact with fellow learners on FSNP					
iv. I do not readily offer social support to colleagues on FSNP					
v. I am motivated to participate on lesson activities on FSNP					
vi. I am not always motivated to meet my fellow learners on FSNP					
vii. I find learning on the FSNP more enjoyable					
3. Communication Skills	**SD**	**D**	**N**	**A**	**SA**
i. Learning on FSNP enable me to improve on my reading skills					
ii. Learning on FSNP does not enable me to improve on my listening skills					
iii. Learning on FSNP enable me to improve on my writing skills					
iv. I am not able to express myself freely during lessons done on FSNP					
v. I am not shy when responding to questions from other learners and the teacher through FSNP					
vi. I am able to socially interact with other learners freely on FSNP					
vii. I am not able to socially interact with my teacher freely on FSNP					

Section E: Time Spend on Facebook Social Networking Platform

To what degree do you agree with the following statements? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: The amount of time spend on Facebook SNP has effect on my academic achievement because:					
1. Regulated Time to spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**
i. Regulating FSNP access time enabled me to concentrate only on learning content					
ii. Regulating Facebook SNP access time enabled me to avoid distractive sites on the Internet					
iii. Regulating Facebook SNP access time enabled me to control social interactions with colleagues					
2. Unregulated Time Spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**
i. Unregulated Facebook SNP access time does not interfere with my concentration in learning					
ii. Unregulated Facebook SNP access time make it easy for me to access other sites which distract my learning					
iii. Unregulated Facebook SNP access time make it difficult to control my social interactions with colleagues					
3. No Time Spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**

i. Not Spending time on Facebook SNP enables me to concentrate in learning					
ii. Not Spending time on Facebook SNP does not prevent me from having access to other sites which distract my learning					
iii. Not spending time on Facebook SNP does not prevent my social interactions with colleagues					

Section F: Use of Facebook SNP as a learning resource

To what degree do you agree with the following statements? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: Use of Facebook SNP as a learning resource has effect on my academic achievement because:					
Use of Facebook SNP as learning resource	**SD**	**D**	**N**	**A**	**SA**
i. FSNP offers an excellent interactive platform for me and my teachers					
ii. Use of FSNP does not encourage team work and support my learning beyond classroom					
iii. FSNP enable me to get instant feedback from my teacher and colleagues					
iv. Using FSNP is a waste of my worthwhile time					
v. When using FSNP I contribute content for learning					
vi. FSNP does not offer ways of dealing with cyberbullying of learners					
vii. Adopting FSNP as a learning resource in schools would improve academic achievement of learners					

……. END …….

Thank you for taking part of your valuable time to fill this questionnaire

APPENDIX IV: QUESTIONNAIRE FOR TEACHERS

Section A: Introduction

I am a Postgraduate student at the University of Nairobi pursuing PhD in Educational Communication and Technology in the Department of Educational Communication, Technology and Pedagogical Studies. As part of the requirement for the award of the degree, I am carrying out a study on **Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Programming Among Learners in Public Secondary Schools, Nairobi County, Kenya**. This questionnaire is therefore being administered to collect data about student use and attitude towards Facebook SNP as an instructional tool. I am kindly appealing to you to respond to items in this questionnaire. Your identity will be confidential and your responses shall solely be used for purpose of this study. Thank you in advance for taking your time to respond to the questionnaire.

Peter K. Mulwa

E81/52217/22

Section B: Personal details

Name (Optional):……**Gender:** Male [ ] Female [ ]

Age: 10 – 15 [ ] 16 – 20 [ ] 21 – 25 [ ] Above 25 [ ]

Type of School: Boys' [ ] Girls' [ ] Mixed [ ]

Section C: Facebook SNP Learner-interface Interaction

To what degree do you agree with the following statements? Please tick (√) in the appropriate box.					
Key: SD=Strongly Disagree, **D**=Disagree, **N**=Neutral, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: Facebook SNP Learner-interface interactions enhance learner academic achievement because of:					
5. Adaptability	**SD**	**D**	**N**	**A**	**SA**
i. FSNP has available user friendly navigation tools					
ii. FSNP provides a flexible layout of presenting content to teachers and learners					
iii. FSNP is not easy to use					
iv. FSNP is not adaptive to individual learner's style of learning					
v. Content in FSNP is presented using a variety of media such as recorded video, audio, audiovisual, live text chats and conferencing					

vi. Content in FSNP is presented to learners in a sequential manner					
vii. Content shared on FSNP can be learned repeatedly until mastered by a learner					
6. Comfortability	**SD**	**D**	**N**	**A**	**SA**
i. FSNP is easy to use for teaching and learning purposes					
ii. I am not willing to share ideas to my learners through FSNP					
iii. I trust learners whom we interact through the FSNP					
iv. I am not comfortable when sharing information and ideas with learners and other teachers via FSNP					
v. I am comfortable participating in class discussion on FSNP than on a face-to-face class discussion					
vi. I am not comfortable with the presentation of learning content on FSNP					
vii. I can access FSNP at any time for teaching					
7. Desirability	**SD**	**D**	**N**	**A**	**SA**
i. I am satisfied with the FSNP's simple user interface which is easy to navigate					
ii. FSNP has distractive visual tools which affect my concentration during teaching					
iii. FSNP interface is attractive and interesting to both teachers and learners					
iv. I am not always curious to meet my learners on FSNP					
v. FSNP does not have different interaction tools					
vi. Different types of content can be shared FSNP					
vii. It is not easy to access shared content on FSNP					
8. Value	**SD**	**D**	**N**	**A**	**SA**
i. It is easy to give and get feedback from learners on FSNP					
ii. I find content shared on FSNP lessons more useful and relevant					
iii. It is easy to reach to learners and other teachers for consultation on FSNP					
iv. Teaching through FSNP does not meet my expectation					
v. Teaching through FSNP satisfies my teaching needs					
vi. Using FSNP is not better than most learning management systems					
vii. Using FSNP give value for the time and effort spend					

Section D: Facebook SNP Collaborative Learning

To what degree do you agree with the following statement? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: Collaborative learning on FSNP has effect on learner academic achievement because:					
4. Problem-solving skills	**SD**	**D**	**N**	**A**	**SA**
i. Learners are able to analyze a problem shared on FSNP critically and solve it					
ii. Learners give ideas and opinions of solving a problem on FSNP					
iii. Problems shared on FSNP are solved in a sequential manner					

iv.	Learners are shy to propose solutions to a problem on FSNP					
v.	Learners are always willing to share solutions to problems on FSNP					
vi.	Problems solved on FSNP cannot be reviewed later at ones pace for deep understanding					
vii.	I am able to give and get feedback from learners on problems solved on FSNP immediately					
5.	**Motivation**	**SD**	**D**	**N**	**A**	**SA**
i.	I am interested in offering lessons through the FSNP					
ii.	I am not interested in sharing ideas and concepts on FSNP					
iii.	I am encouraged to interact with learners on FSNP					
iv.	I do not readily offer social support to learners on FSNP					
v.	I am motivated to supervise lesson activities on FSNP					
vi.	I am not always motivated to meet my learners on FSNP					
vii.	I find teaching on the FSNP more enjoyable					
6.	**Communication Skills**	**SD**	**D**	**N**	**A**	**SA**
i.	Learning on FSNP enable learners to improve on their reading skills					
ii.	Learning on FSNP does not enable learners to improve on their listening skills					
iii.	Learning on FSNP enable learners to improve on their writing skills					
iv.	Learners are able to express themselves freely during lessons done on FSNP					
v.	Learners are not shy when responding to questions from other learners and the teacher through FSNP					
vi.	Learners are able to socially interact with other learners freely on FSNP					
vii.	Learners are not able to socially interact with their teacher freely on FSNP					

Section E: Time Spend on Facebook Social Networking Platform

To what degree do you agree with the following statement? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: The amount of time spend on Facebook SNP has effect on learner academic achievement because:					
4. Regulated Time to spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**
i. Regulating FSNP access time enabled learners to concentrate only on learning content					
ii. Regulating Facebook SNP access time enabled learners to avoid distractive sites on the Internet					
iii. Regulating Facebook SNP access time enabled learners to control social interactions with colleagues					
5. Unregulated Time Spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**
i. Unregulated Facebook SNP access time does not interfere with learner concentration in learning					
ii. Unregulated Facebook SNP access time make it easy for learners to access other sites which distract my learning					

iii. Unregulated Facebook SNP access time make it difficult to control learner social interactions with colleagues					
6. No Time Spend on Facebook SNP	**SD**	**D**	**N**	**A**	**SA**
i. Not Spending time on Facebook SNP enables learner to concentrate in learning					
ii. Not Spending time on Facebook SNP does not prevent learner from having access to other sites which distract my learning					
iii. Not spending time on Facebook SNP does not prevent learner social interactions with colleagues					

Section F: Use of Facebook SNP as a learning resource

To what degree do you agree with the following statement? Please tick (√) in the appropriate box.					
Key: SD=Strongly Agree, **D**=Disagree, **N**=Not Sure, **A**=Agree, **SA**=Strongly Agree					
STATEMENT: Use of Facebook SNP as a learning resource has effect on learner academic achievement because:					
Use of Facebook SNP as learning resource	**SD**	**D**	**N**	**A**	**SA**
i. FSNP offers an excellent interactive platform for learner and teachers					
ii. Use of FSNP does not encourage team work and support of learning beyond classroom					
iii. FSNP enable learner to get instant feedback from the teacher and colleagues					
iv. Using FSNP is a waste of my worthwhile time					
v. When using FSNP, learners contribute content for learning					
vi. FSNP does not offer ways of dealing with cyberbullying of learners					
vii. Adopting FSNP as a learning resource in schools would improve academic achievement of learners					

……. END …….

Thank you for taking part of your valuable time to fill this questionnaire

APPENDIX V: LESSON OBSERVATION SCHEDULE

1. Purpose

The purpose of this observation schedule is to collect data during Computer Studies lessons for a PhD study on the Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Programming Among Learners in Public Secondary Schools, Nairobi County, Kenya.

2. Lesson Details

Type of School: Boys' [ ] Girls' [ ] Mixed [ ]

Class:…….……Observation No:……

Lesson:……Topic:…….Subtopic:…….……
Date:……Time:……..…… Group Code:……Number of learners: ……

3. Learner Observation

Instruction: Observe the following about the learner during the lesson;

QUESTION	**YES/NO**	**COMMENT** (Indicate details of the observations made)
1. Do learners have difficulties in joining the FSNP for learning?		
2. Are learners actively involved in the learning activities on FSNP?		
3. Do the learners have challenges in participating in the learning activities on FSNP?		
4. Do the learners engage in non-learning activities during the lesson on FSNP?		
5. Are learners able to complete the learning activities on FSNP within the allocated time?		
6. Do the learners establish preferred collaboration partners during the lesson on FSNP?		
7. Are the learners interested the learning activities on FSNP?		
8. Are the learners enthusiastic to continue with learning on FSNP after the allocated time?		
9. Did the learners enjoy having the lesson on FSNP?		

10. Do the learners ask for extra time after the lesson on FSNP?		

4. Teacher Observation

QUESTION	**YES/NO**	**COMMENT** (Indicate details of the observations)
1. Does the teacher have a role to play during the lesson on FSNP?		
2. Does the teacher have challenges in interacting with learners during the lesson on FSNP?		
3. Is the teacher able to coordinate the learning activities on FSNP?		
4. Is the teacher interested the conducting the lesson on FSNP?		
5. Is the teacher enthusiastic to continue with the lesson on FSNP?		
6. Does the teacher like teaching using the FSNP?		
7. Does the teacher seem to enjoy teaching on FSNP?		

Instruction: Observe the following about the teacher during the lesson;

5. Additional Observation Details

……
……
……
……
……
……

……The End……

APPENDIX VI: INTERVIEW SCHEDULE FOR TEACHERS

A. PURPOSE

The purpose of this interview schedule is to collect data from the Form Three Computer Studies teachers for a PhD study on the Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Programming Among Learners in Public Secondary Schools, Nairobi County, Kenya.

B. INTERVIEWER'S GUIDELINE

i) Why did learners find it easy or not to interact with the Facebook Social Networking Platform learner interface?

ii) Why is Facebook Social Networking Platform a useful instructional resource?

iii) What difficulties did learners face when learning via the Facebook Social Networking Platform?

iv) What difficulties did you face when delivering your lessons via the Facebook Social Networking Platform?

v) What learning activities are learners able to collaborate on Facebook Social Networking Platform?

vi) What amount of time would be enough for a lesson delivery via Facebook Social Networking Platform?

vii) What improvements should be done for effective lesson delivery via Facebook Social Networking Platform?

viii) What did learners enjoy when learning via the Facebook Social Networking Platform SNP?

ix) What issues should be addressed in a policy on adoption of Facebook Social Networking Platform for teaching and learning?

x) What effect did Facebook Social Networking Platform have on your learners' academic achievement?

..... The End …….

APPENDIX VII: TEACHER TRAINING GUIDE FOR USING FSNP

A GUIDE FOR USING FACEBOOK SOCIAL NETWORKING PLATFORM (FSNP) IN TEACHING AND LEARNING PROGRAMMING IN COMPUTER STUDIES

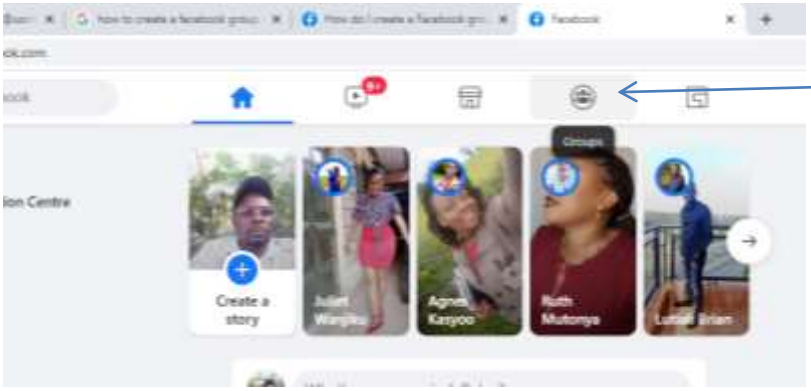
Table of Contents

Section A: How to Create a FSNP Learning Group

1. Log in to your Facebook Page from your browser using your email address and password.

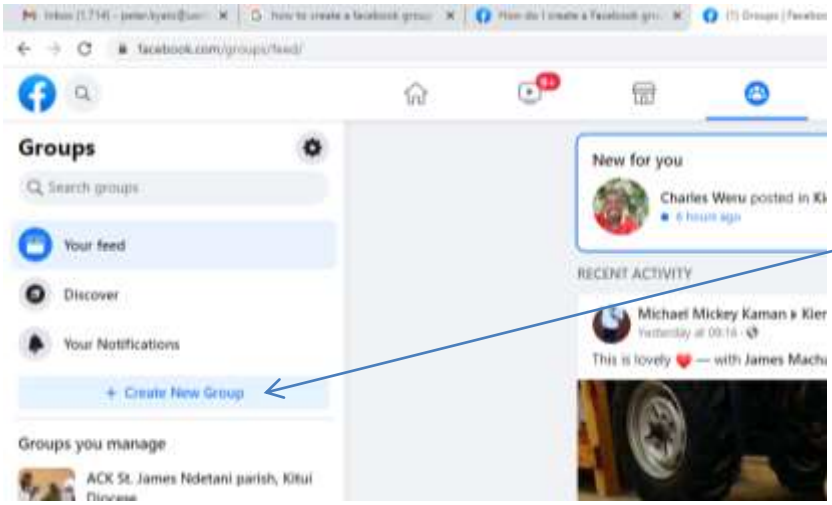
Key in your account email address and password

2. Click on the Groups Icon above the Cover photo as shown below;



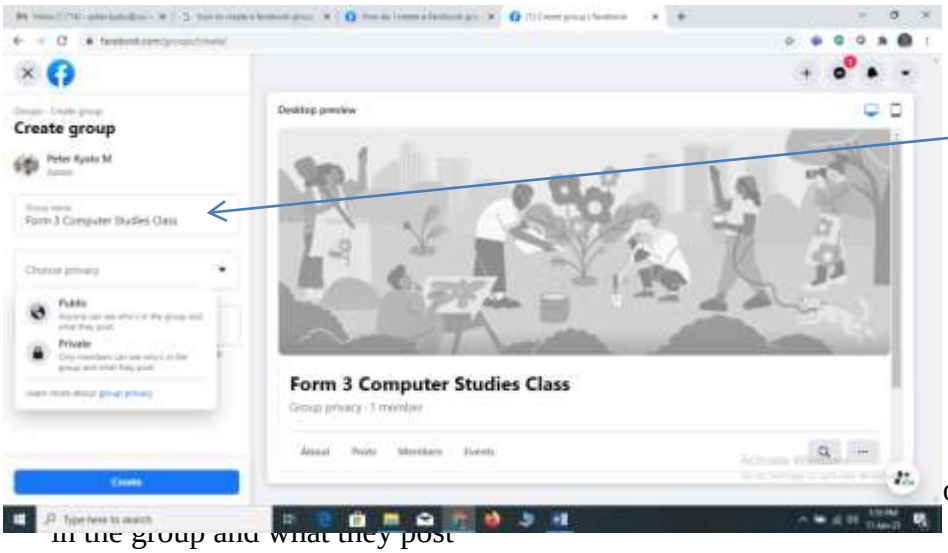
Click on Groups Icon on the tool bar above your picture profile

3. Click on Create New Group on the Left Pane as shown below;



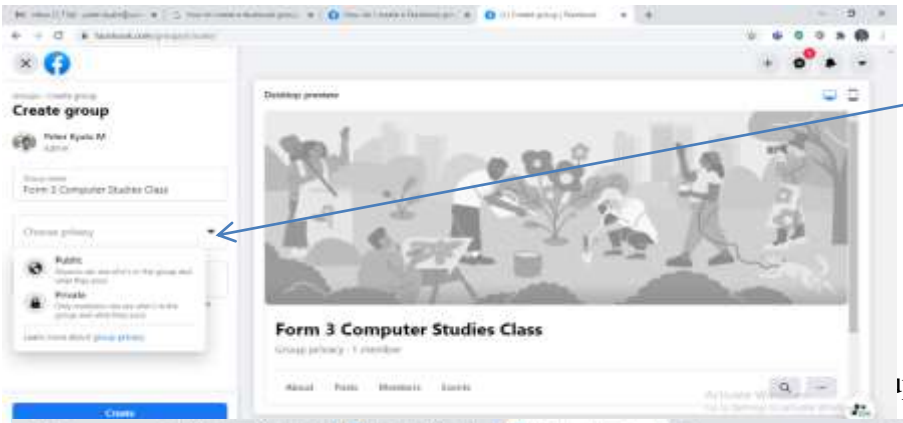
*Create **New Group** on the Left Pane*

4. Type the name of the group in the Group Name text box



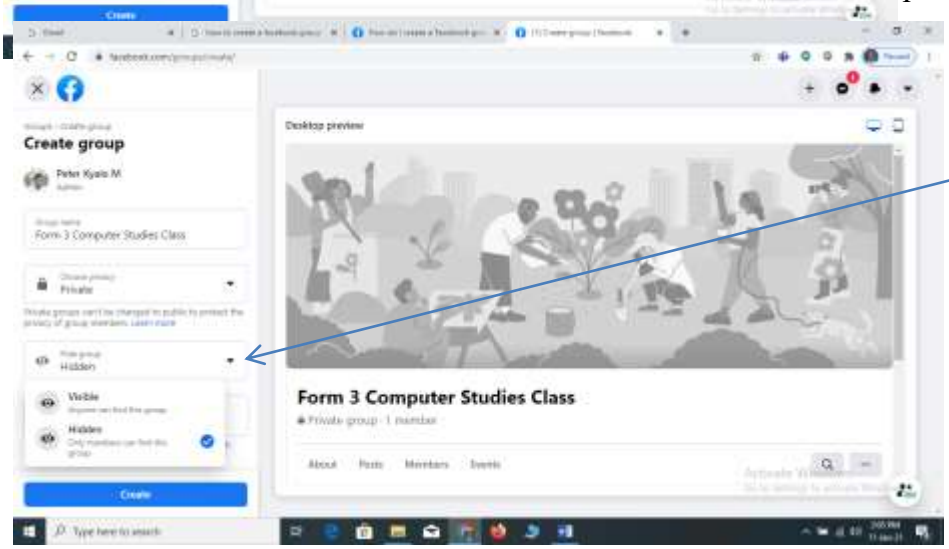
Type the name of the group here

of the group can see who is in the group and what they post



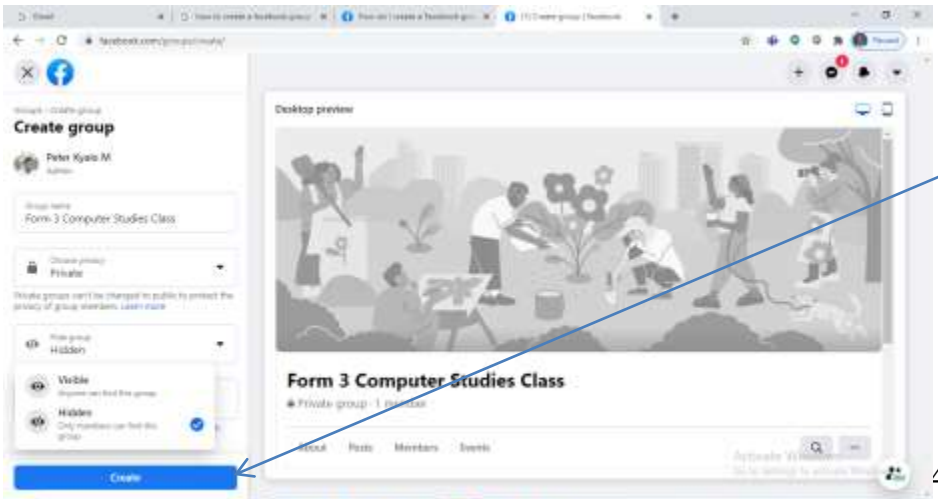
*Change group Privacy to **Private**.*

6. ıp can find the group



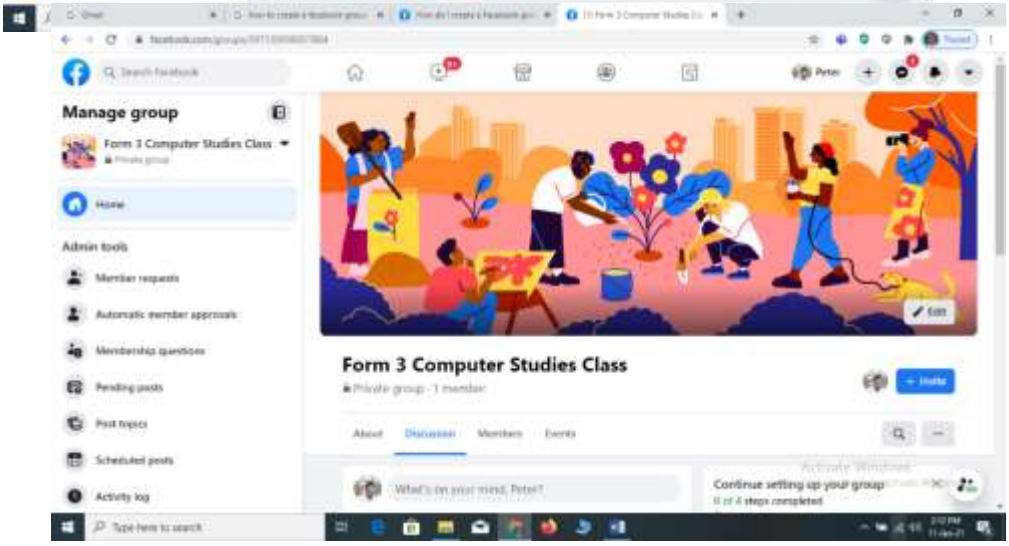
*Select the option **Hidden** to hide the group from non-members*

7. Click on Create as shown in figure below;



*Click **Create** to create the group*

4 below;

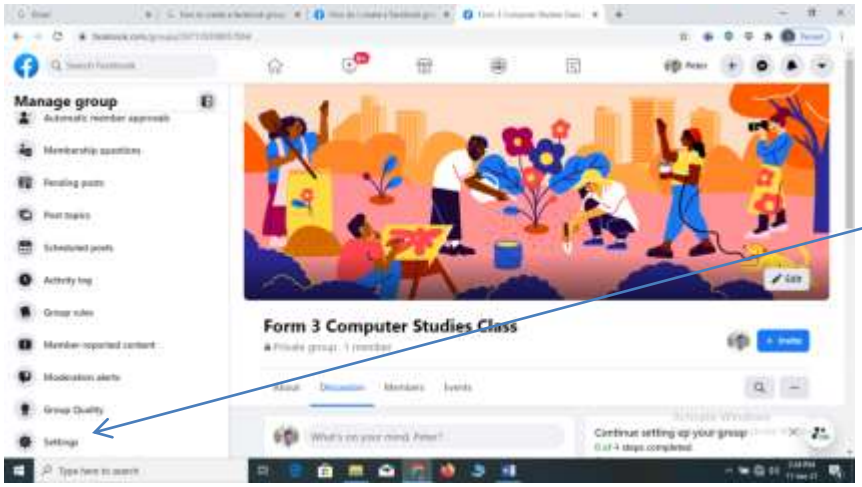


9. You can Edit the Group Profile Photo by clicking on Edit command on the right bottom of the profile Photo

Click on edit to change the Group Profile Photo

Section B: How to Change Group Settings

1. Under Manage Group Task pane on the left of the group, Click on Settings at the bottom



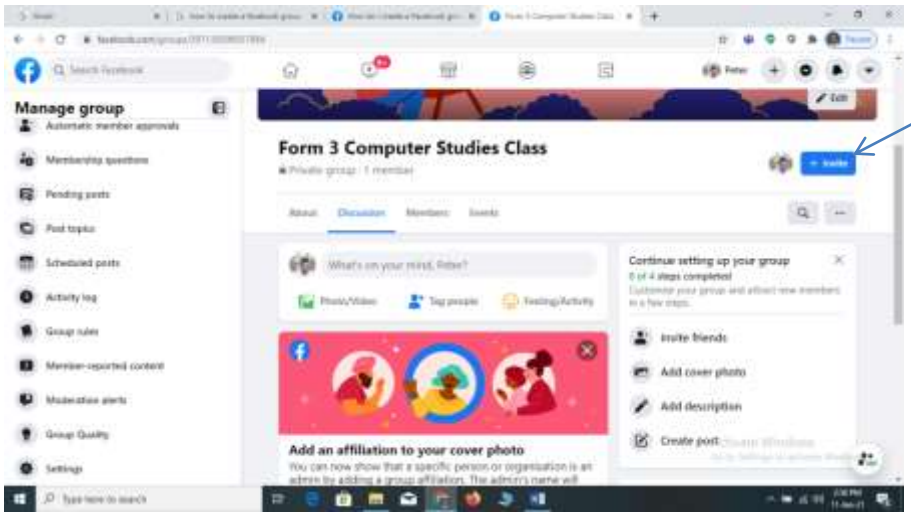
*Click on **Settings** to manage the group settings*

2. Change the group privacy options from the menu that appears as in Section A (5) above
3. Change how to manage member posts accordingly. Allow only admin/s of the group to approve group membership.
4. You can create group rules by clicking on **Group Rules** under **Admin tools** on the left of the group page
5. Customise the group website address to make it for members to search or open the group page e.g. web.facebook.com/groups/compstudies/
6. Change the group type to Social Learning group

Section C: How to Add Members/Students in the Group

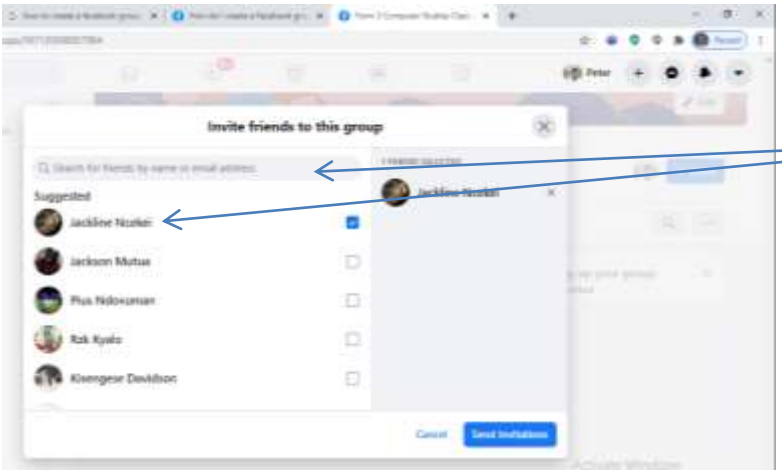
To invite new members/students to a group:

1. Click **+ Invite** below the cover photo



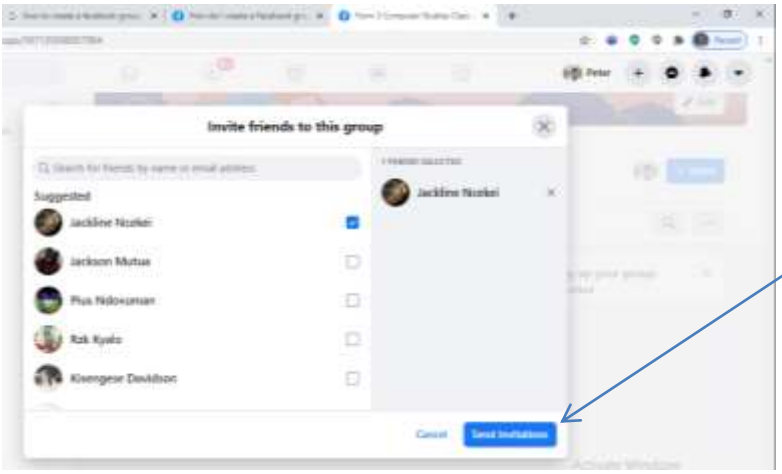
*Click on **+ Invite** here to invite new members*

2. In the Search text box, enter the names or email address of the member you want to add or select from the suggested list as shown below;



Search for members /friends /students by name/email address or selected from the suggested list of friends

3. click on **Send Invitation**

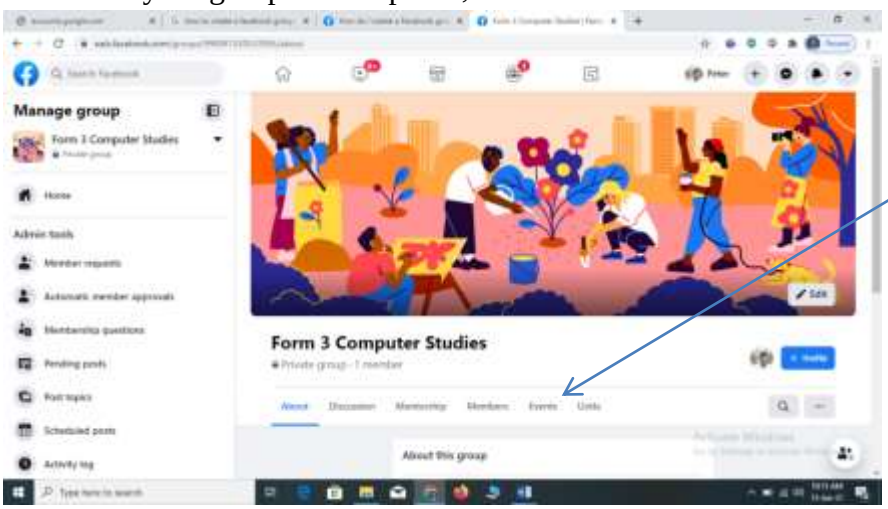


Click on Send Invitations to invite a friend/student

4. Invited friend /member /student will receive an invitation to join the group. Once he/she accepts the invitation he/she is added as a member of the group.

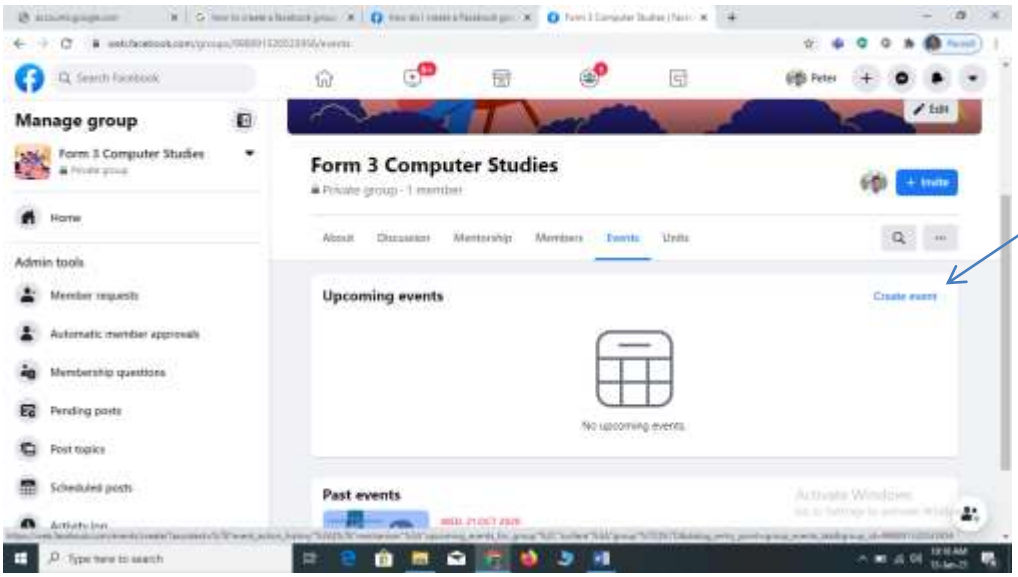
Section D: How to create /Schedule an Event for a Facebook Group

1. Below your group's cover photo, click **Events**.



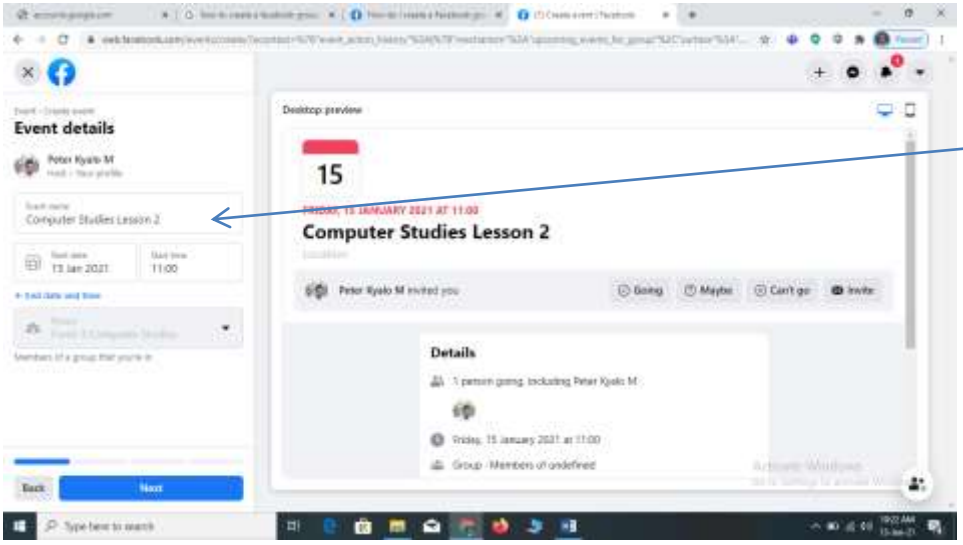
*Click on **Events** Menu to Schedule an event e.g. a lesson, discussion session, etc.*

2. Click **Create Event** in the top right the click on **In-Person** from the screen that appears.



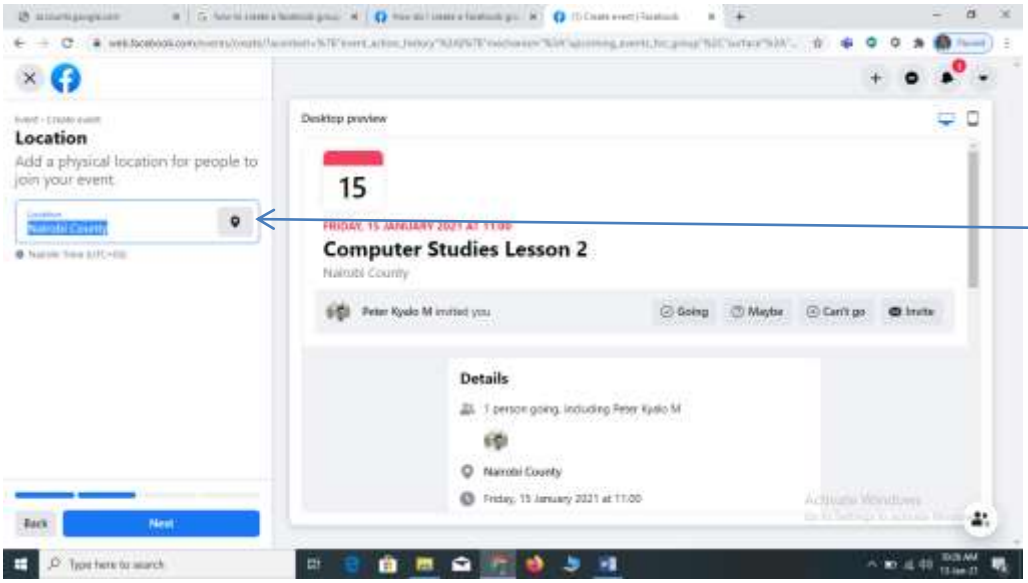
*Click on **Create event** to fill the details of the event*

3. Fill in the details for your event and click Next below to select/enter location of the event



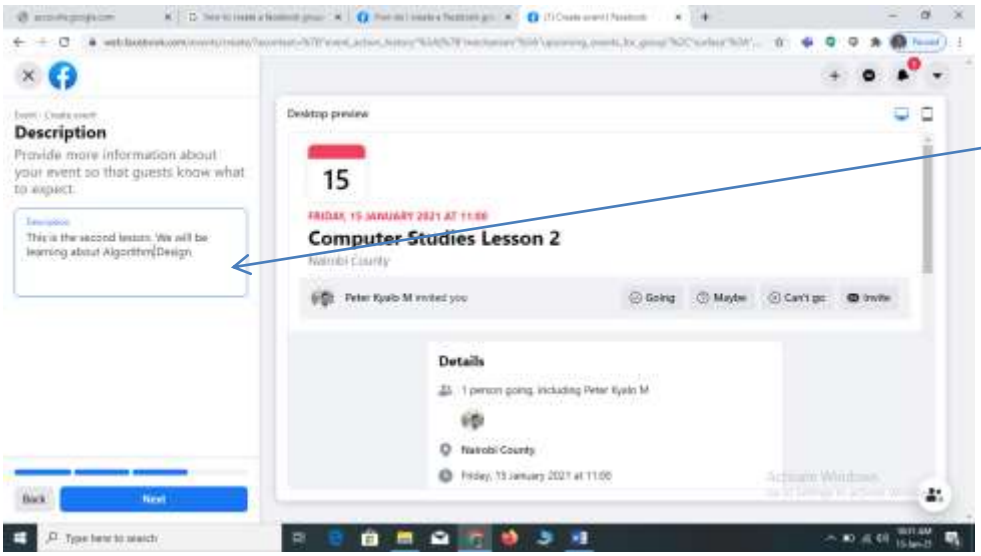
Fill the details of the event like the name of the event, date and time.

4. Select/enter location of the event



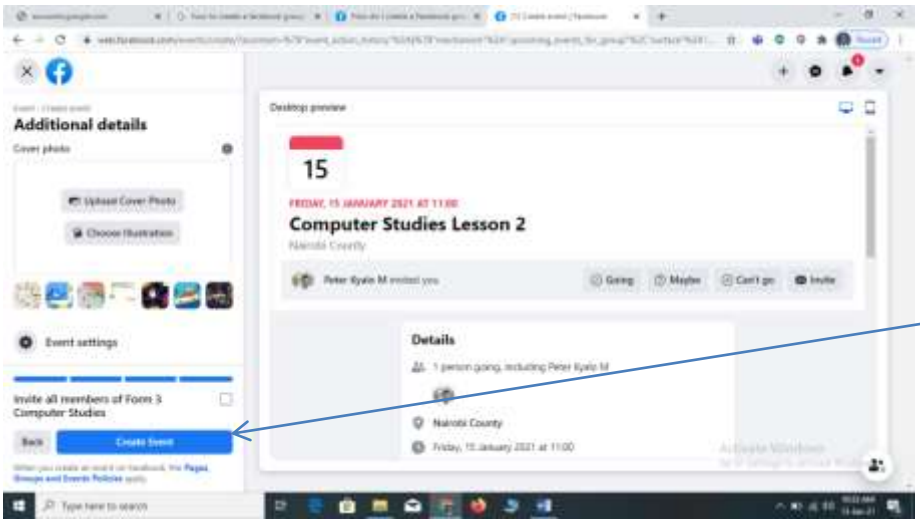
Select location of the event then click Next below to provide the description of the event

5. Key in the description of the event as shown below then click next



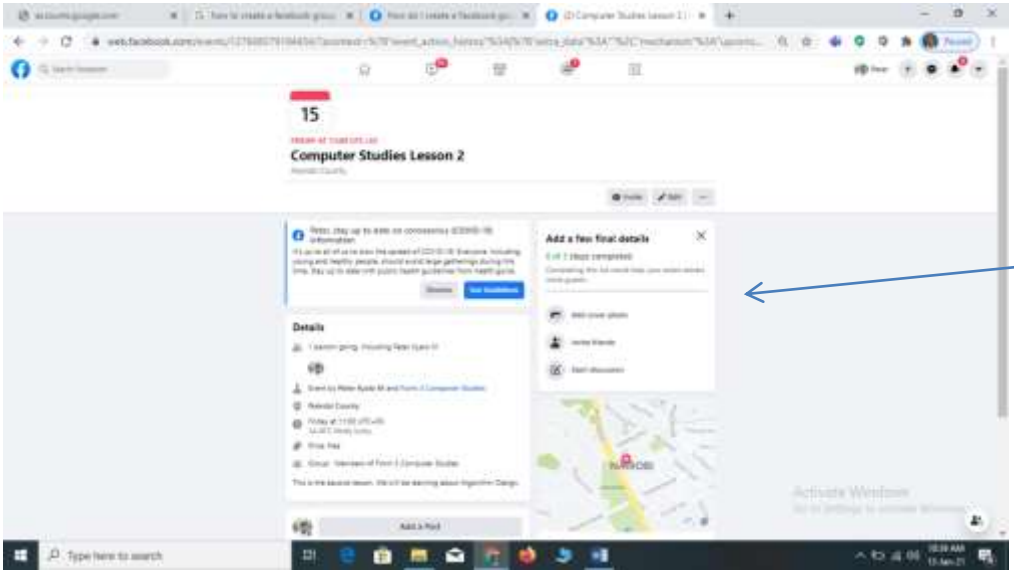
Key in the description of the event here

6. Click on Create Event to complete the process as shown below



Click on Create Event to complete the process

7. The event details are as shown below. You can change the event cover page, add a post, invite guests/friends, start a discussion and even edit the event details by clicking the correct options shown below;

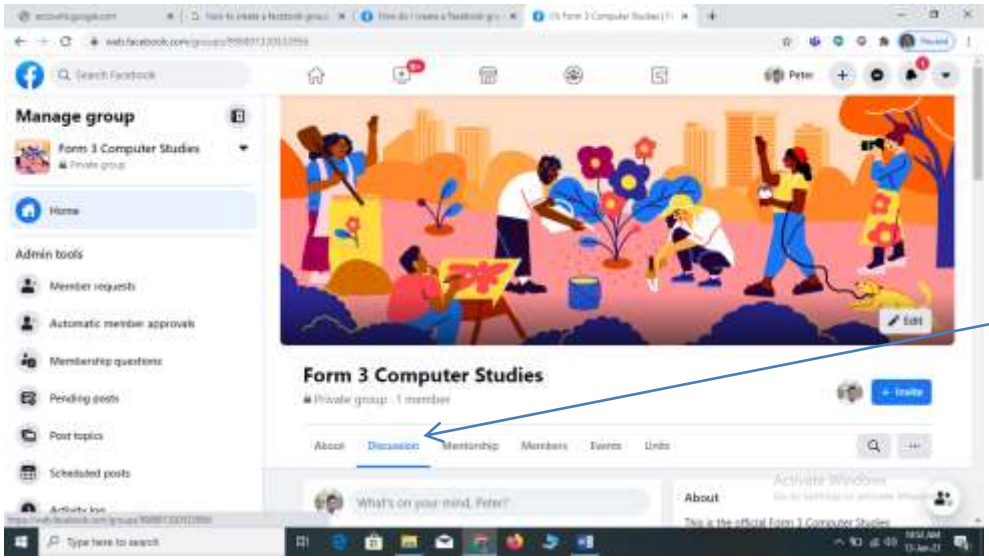


Change the event cover page, add a post, invite guests/friends, start a discussion and even edit the event details

Section E: How to Create a Discussion

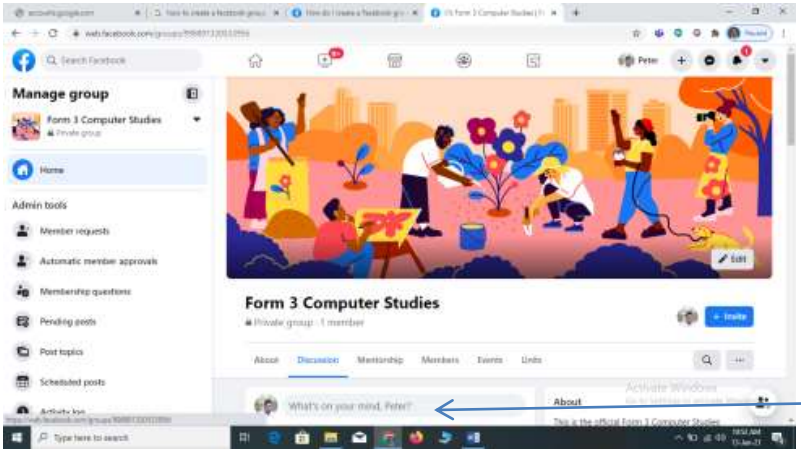
- It is useful to archive your posts by **topics** and your group members can find them according to the **topics** you created. With **Discussion Topic**, you can build a small library for your group.
- To create a discussion topic:

1. Click on the Discussion tab/menu below the group profile photo



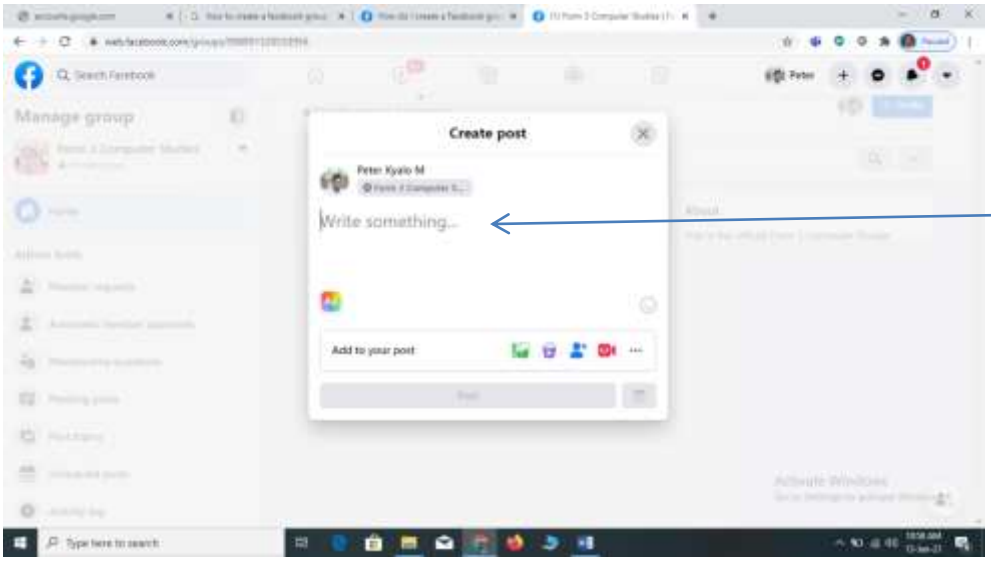
*Click on the **Discussion** tab/menu to create a discussion*

2. Create the post you would want to create a topic by click on the text box asking what's on your mind as shown below;



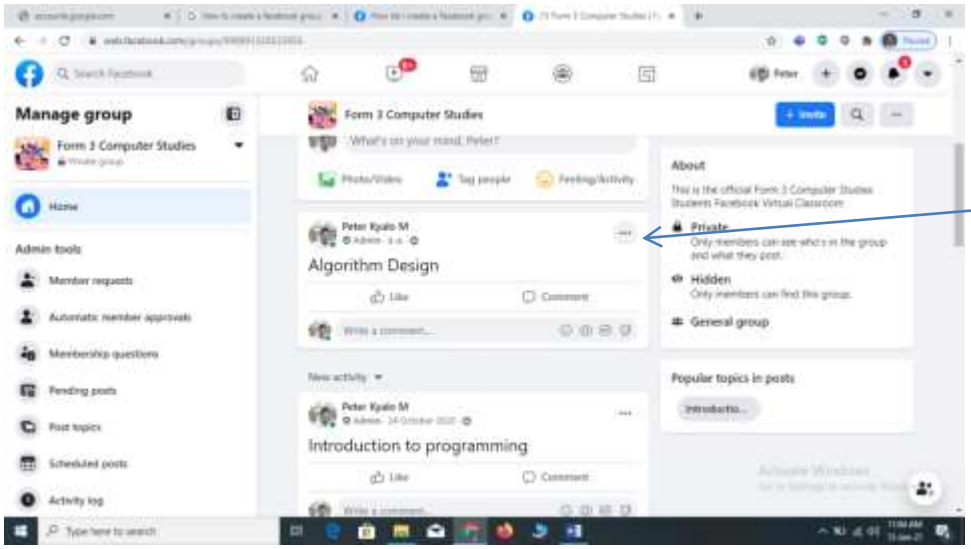
Click to create a post of the discussion

3. Key in the post then click on **Post**



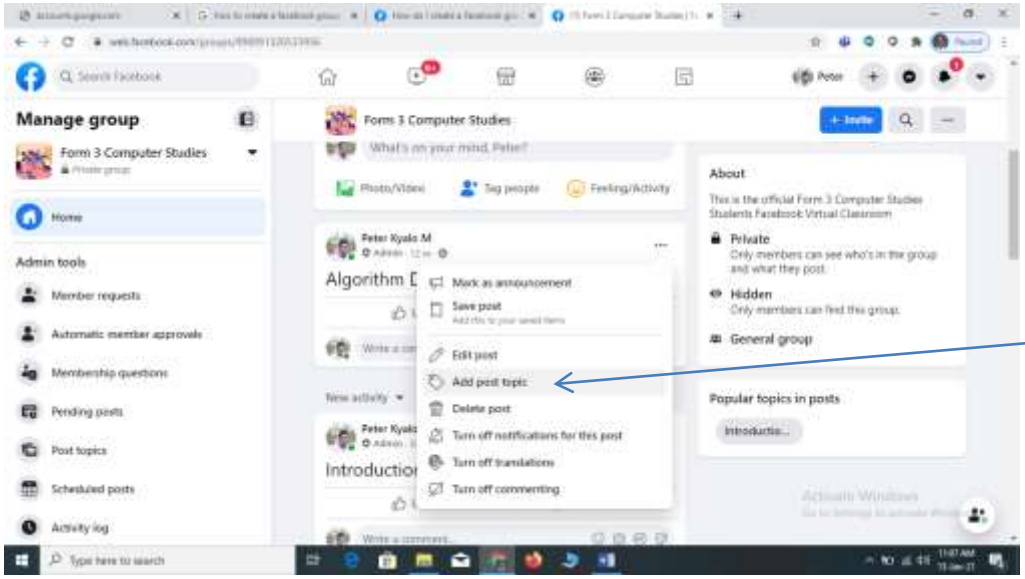
Key in a post to guide the discussion e.g. Algorithm design

4. To add a topic, click on the three dots (…) on the right top of the post



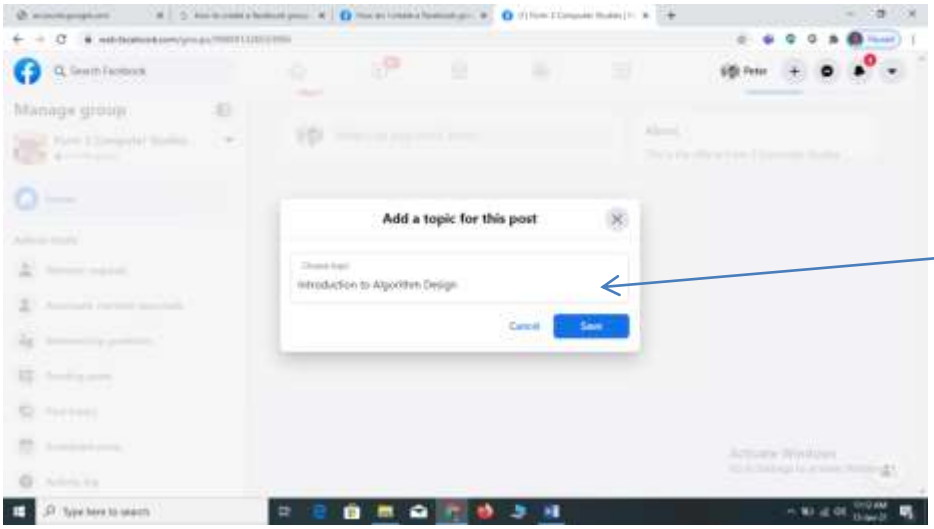
Click on the three dots (. . .) to see the option of adding a topic

5. Click on "Add Post Topic" from the drop down menu



Click on the three dots (. . .) to see the option of adding a topic

6. Type the topic on the text box that pops up then click on **Save on the dialog box**



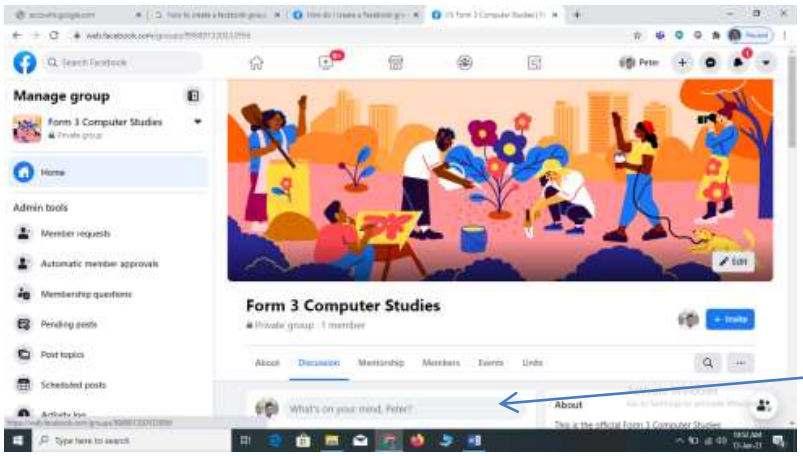
Type the Topic for the post to help in organizing your discussion and posts in topics then Click on Save

NB: The topic appears below the post. When make a post below the topic, the topic will be tagged to the message making it easy for members of the group to associate the message/post with the topic.

Section F: How to Add a File (Documents, Photos and Videos)

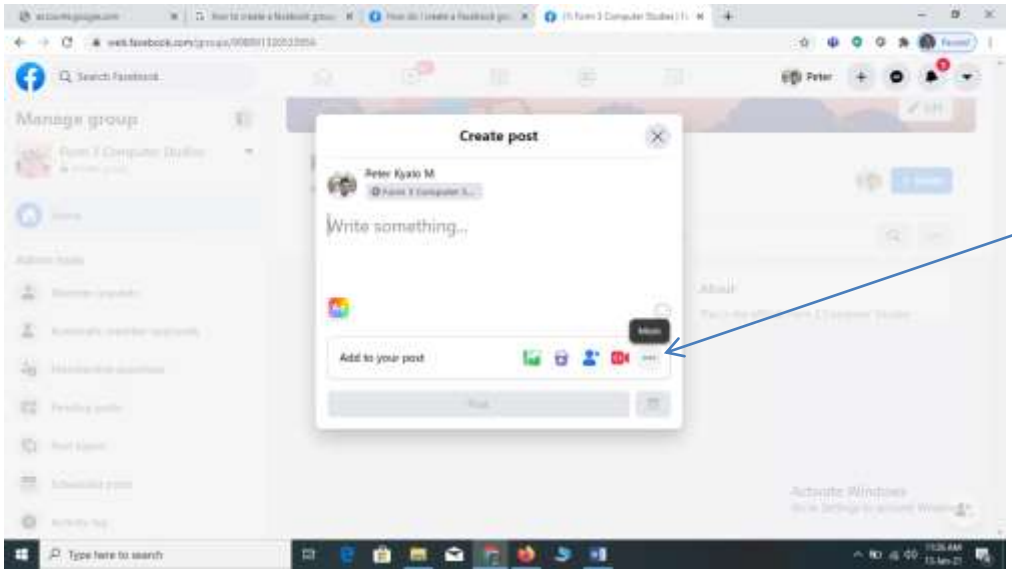
To add a file to a group:

1. Click **What's on your mind?** Type the post to introduce the topic.



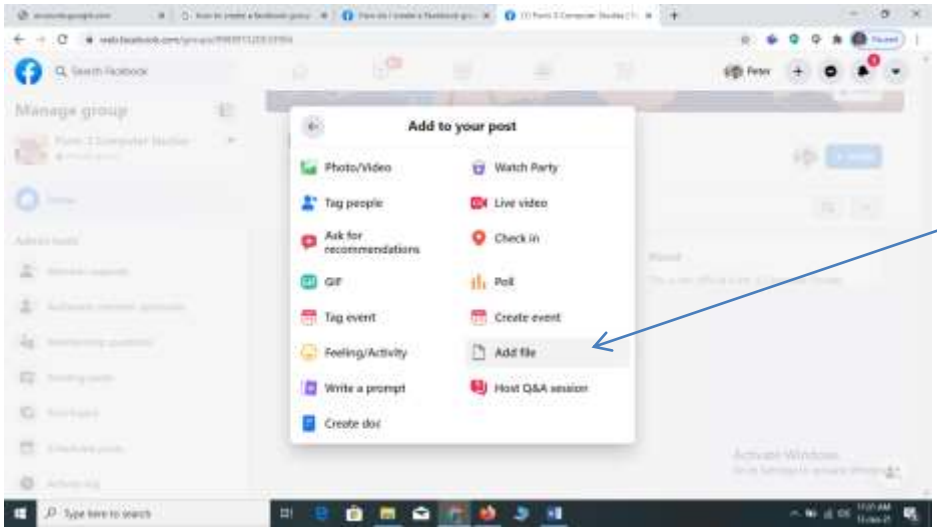
*Click **What's on your mind?** Text box*

2. Click ••• then select **Add File**.



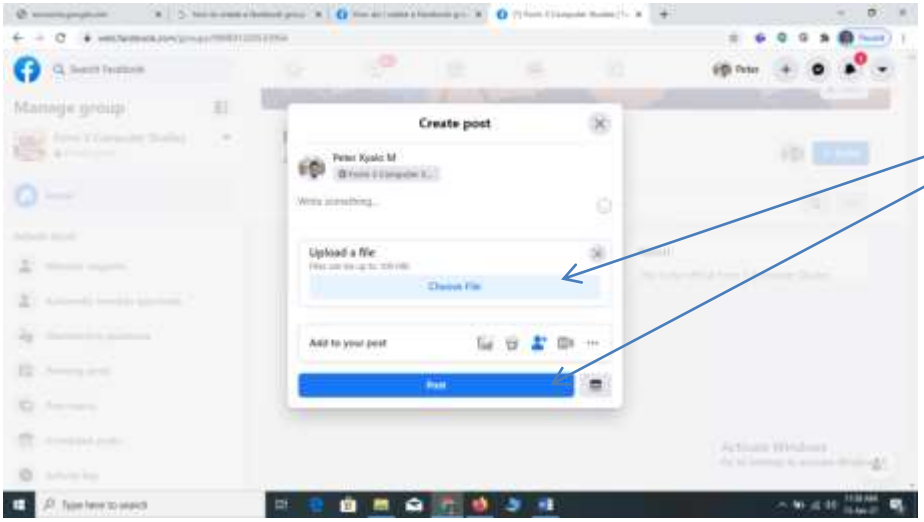
Click on the three (. . .) dots the option of adding a file

3. Click **Add File** to select a file from your computer.



*Click on **Add file***

4. Choose to say something about your file
5. Choose the file to add from your computer the click on **Post** as shown below.



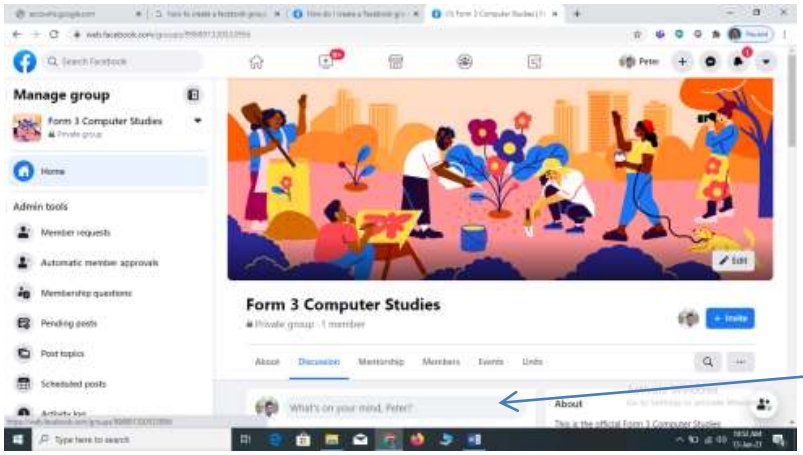
*Click on **Choose File** to browse for the file to add from your computer then click on **Post***

Keep in mind anyone in the group can delete a file and that links to Dropbox files can be shared outside of the group.

Section G: How Create a Collaborative Document

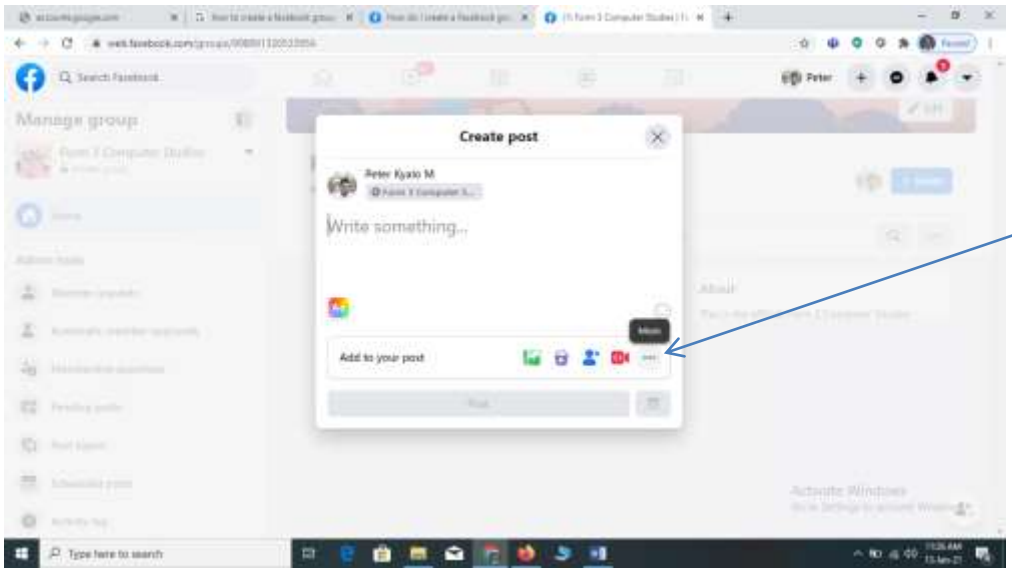
To create a collaborative document in a group;

1. Click **What's on your mind?** Type the post to introduce the document.



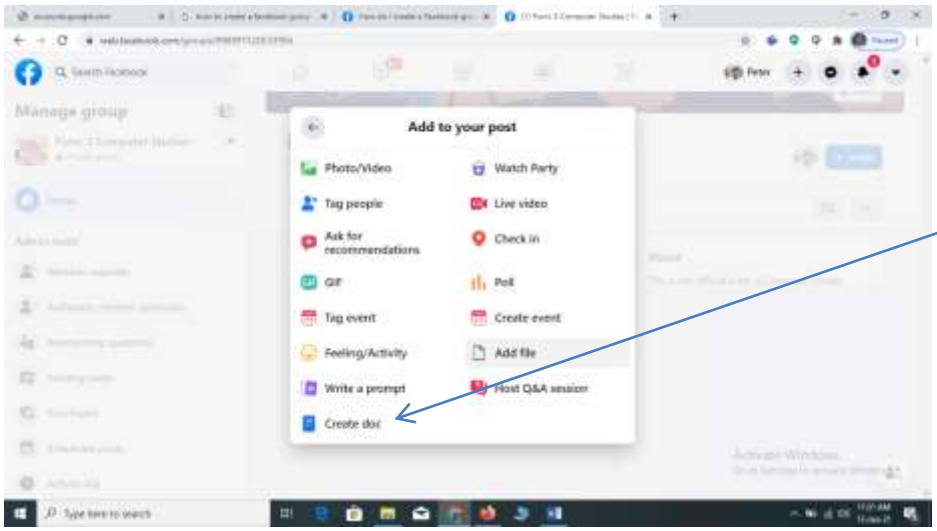
*Click **What's on your mind?** text box.*

2. Click ••• then select **Create doc**.



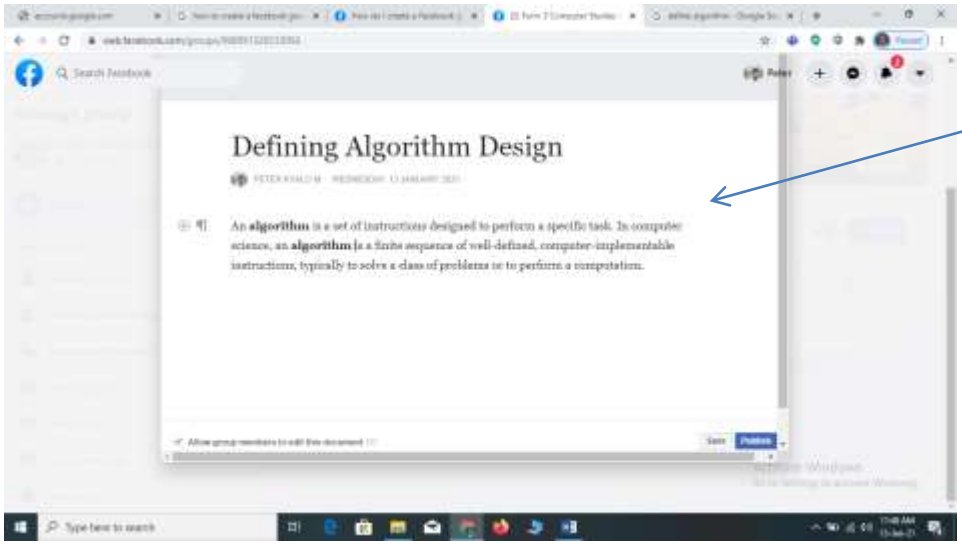
Click on the three (. . .) dots the option of adding a file

3. Click **Create doc** to create a collaborative document



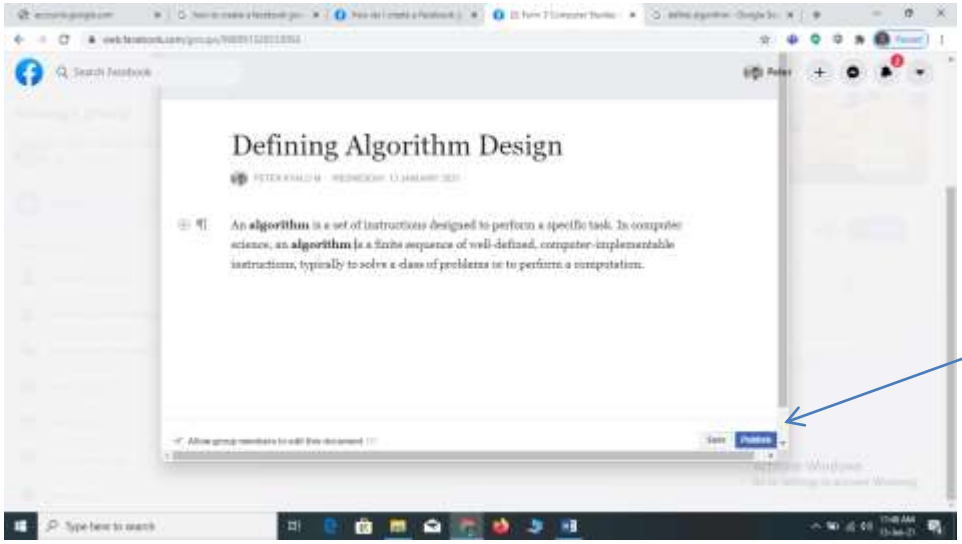
Click on Create doc to create the collaborative document

4. Type the Title of the document and content of the document



Type the Title of the document and content of the document. Click the check box below to allow or deny group members the authority to edit to document

5. Click on Publish to create the document

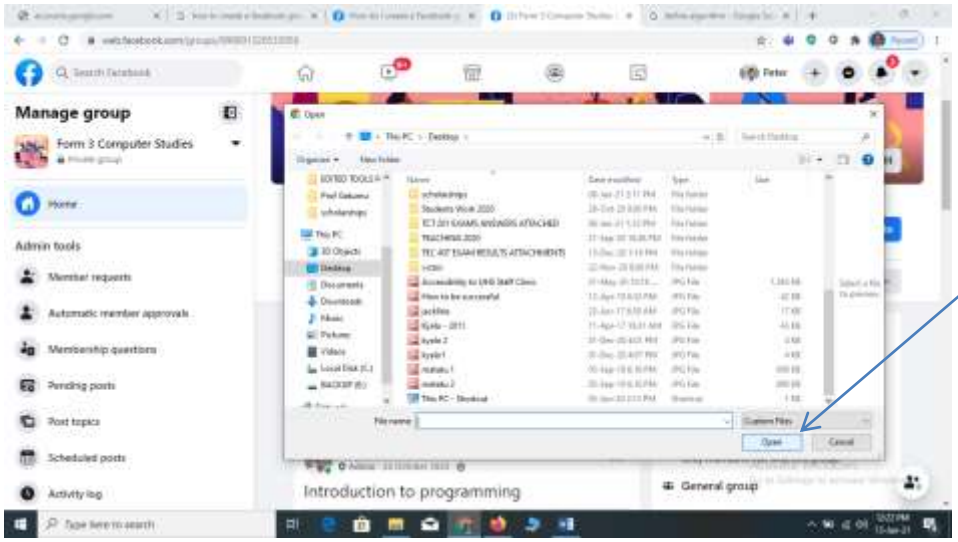


*Click on **Publish** to complete the process*

Keep in mind anyone in the group can delete a file and that links to Dropbox files can be shared outside of the group.

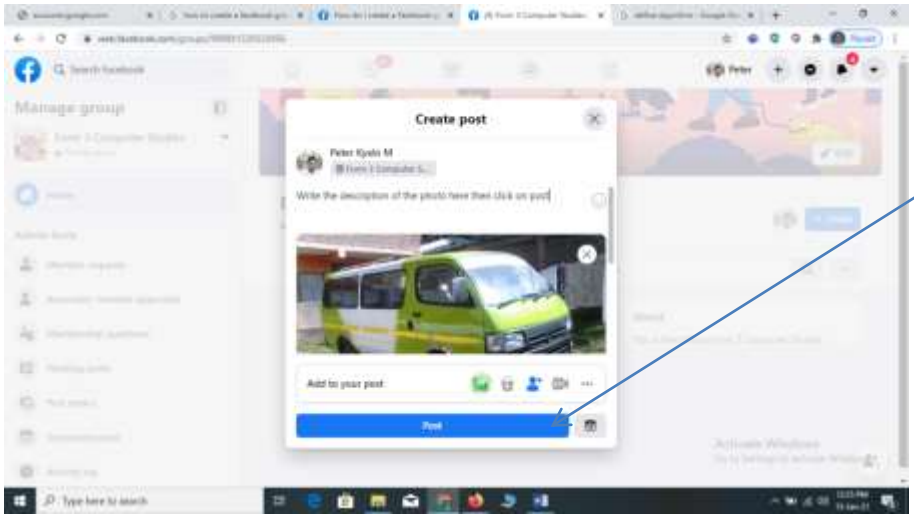
Section H: How to Share Photos and Videos with a Group

1. Click on Discussion tab/menu under the group profile photo
2. Click **Photo/Video** at the top of the group.
3. Browse to select the phot/video to add then click on Open as shown below;



Browse to locate the file of the phot/video to add then click Open

4. Type the description of the photo then click on **Post** and shown below;



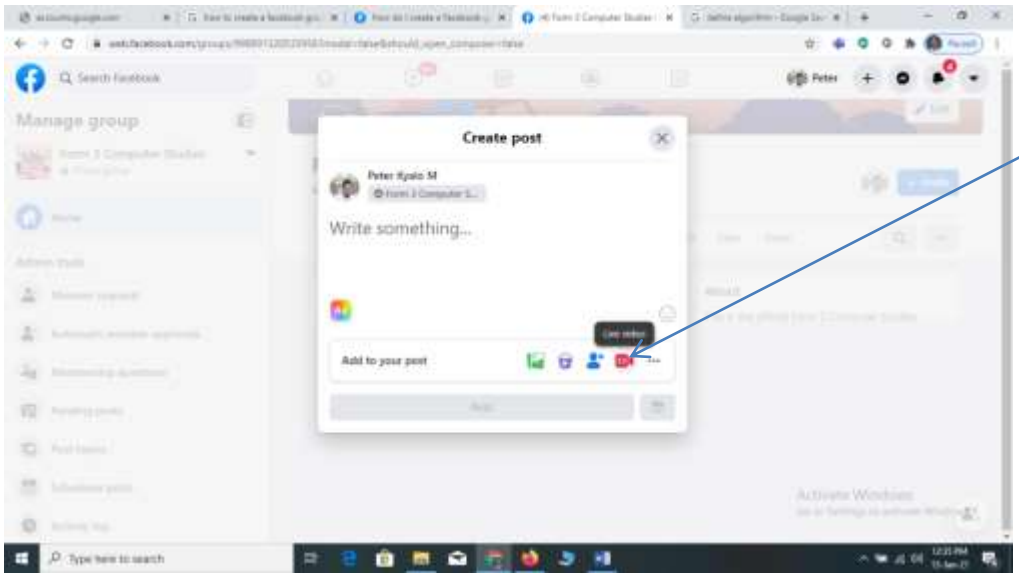
Type the description of the photo then click on Post

NB: Any member of the group can add photos to a group album. Group photos are only visible to other members, and only group members can be tagged in group photos.

Section I: How to Go Live or Schedule a Live Video

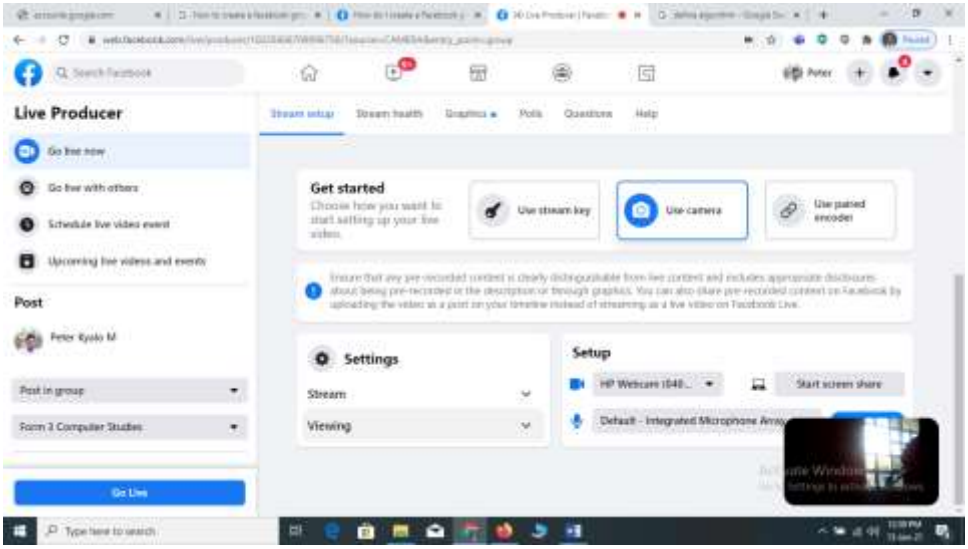
To go live in a Facebook group for a lesson broadcast:

1. Click **What's on your mind?** Type the post to introduce the document.
2. Click on **Live Video** icon from the pop up dialog box that appears

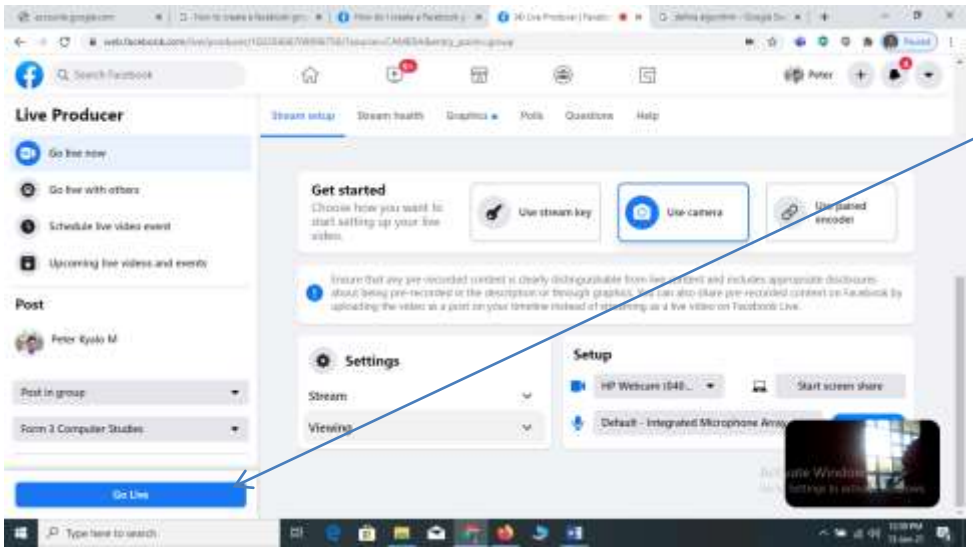


Click on the Live Video icon from the pop up dialog box

3. In the left menu, select whether you'd like to **Go Live Now**



4. Add a title and description to your post. Here you can also tag friends, check in to a location, or add a feeling or activity.
5. Click **Go Live** in the bottom left.

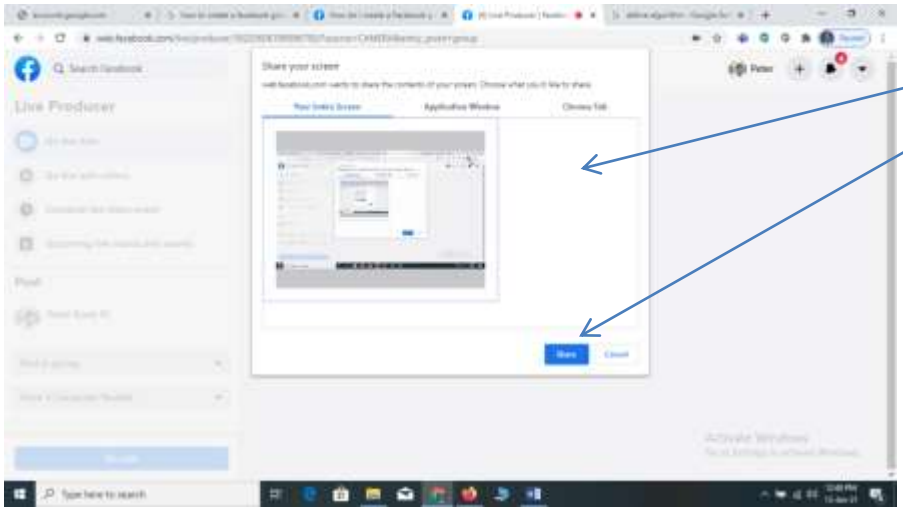


Click on Go Live on the bottom left corner of the screen as shown below

Section J: How to Share Your Screen or Window on Facebook for Presentation

To begin screen-sharing after adding the Google Chrome extension:

1. While in a video call, click **Start Screen Share** on the right middle of the screen.
2. Select which screen option you want to share:



*Click on the screen share option to use, click at the snap shot at the middle then click on **Share***

- **Your Entire Screen**: This may share any window that's open on your computer, including your desktop.
- **Application Window**: This will only share the specific window that you select.
- **Chrome Tab**: This will only share the specific chrome tab you select.

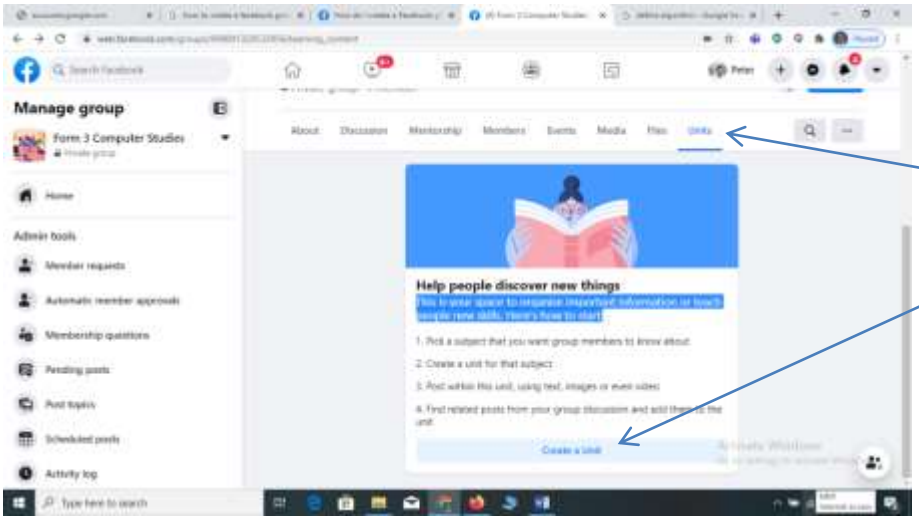
3. You can Open the PowerPoint Presentation to present

NB: When you're done, click **Stop sharing** at the bottom of the screen or hang up the call.

Section K: How to Create a Unit

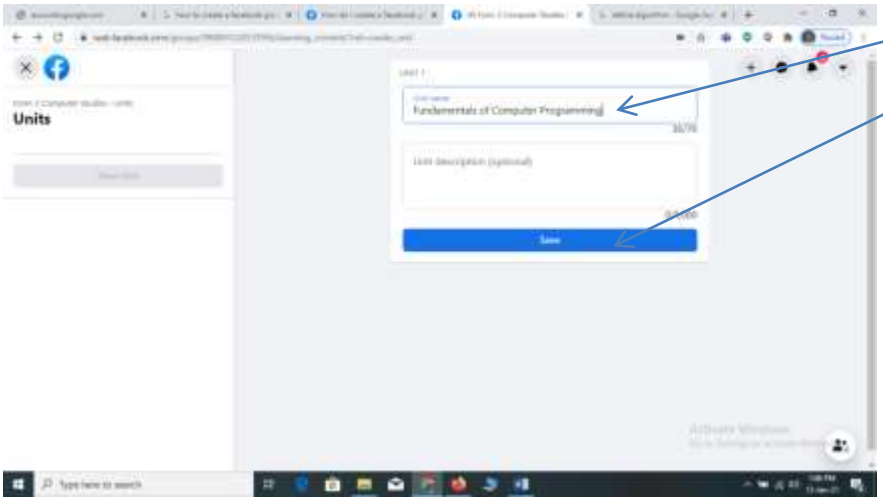
This is your space to organize important information or teach people new skills. A unit will help you as a teacher to organize subject content into topics/sub-topics to present to the learners. Here's how to start:

1. Click on the **Units** tab/menu below the group profile photo then click on **Create Unit** at the bottom



*Click on Units the on **Create a Unit***

2. Type the unit name and description then click on **Save**. The description is optional as shown below;

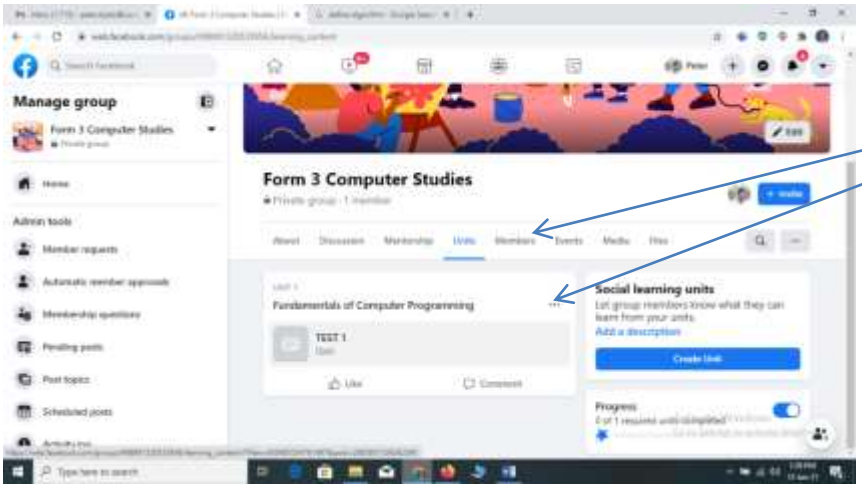


Type the Unit Name and description

NB: You can Create a post or a quiz under a unit

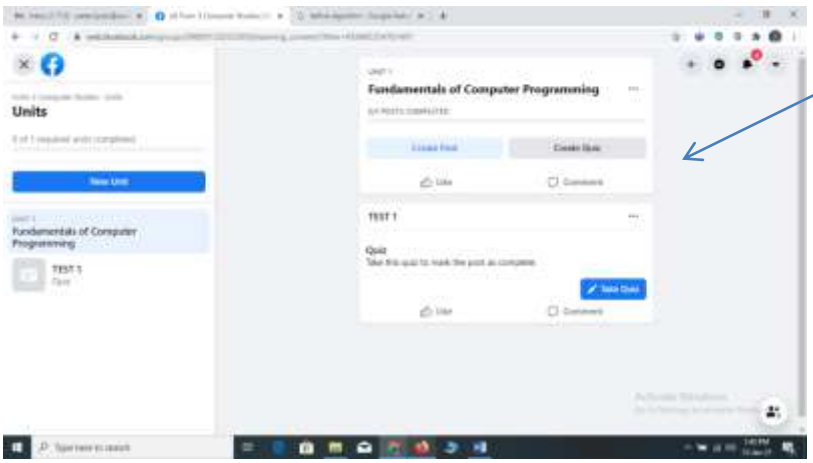
Section L: How to Create a Quiz

1. Click on the Units below the group profile then click on the Unit Name under which to Create a Quiz



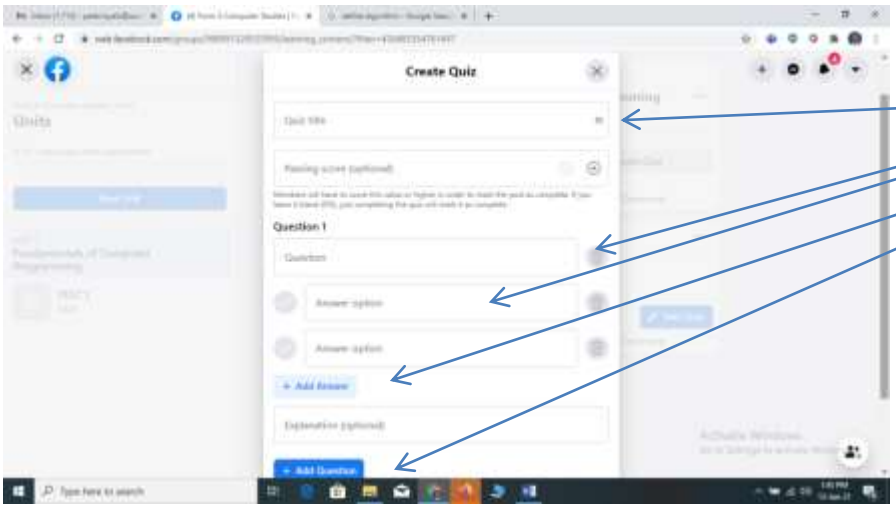
*Type the **Units** tab/menu then the unit name under which to create a quiz*

2. Click on Create Quiz



*Click on **Create Quiz***

3. Key in the Quiz Title, Questions and answers. Click on Add Answer and Add Question to add additional answer options or additional questions respectively. Indicate the correct answer by clicking on the tick (✓) before the correct answer.



Edit the Quiz by:

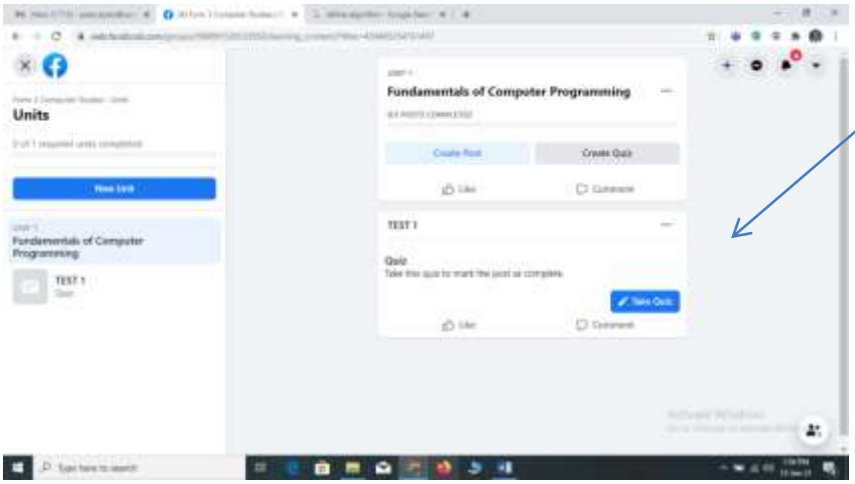
1. *Keying the quiz title*
2. *Keying answer option*
3. *Clicking Add Answer to add answer option*
4. *Clicking on Add Question to add a question*

4. Click Done once you finish editing the quiz

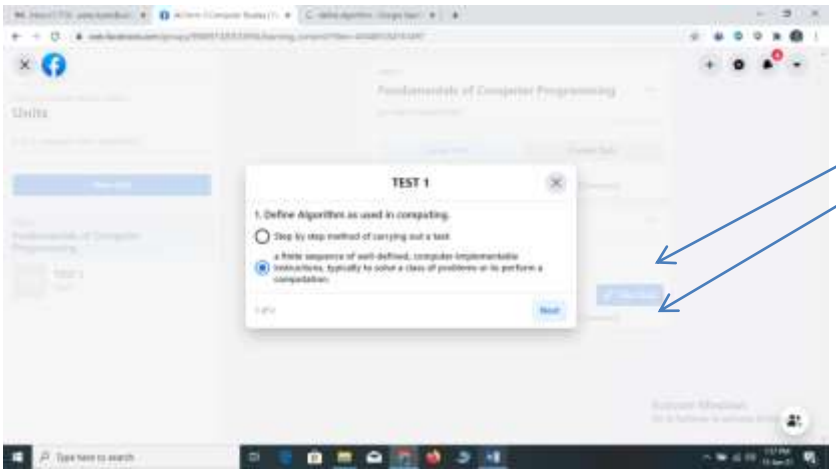
Section M: Taking a Quiz

To start taking the Quiz, click on ***Take Quiz*** *as shown below;*

1. Click on Take Quiz below the quiz

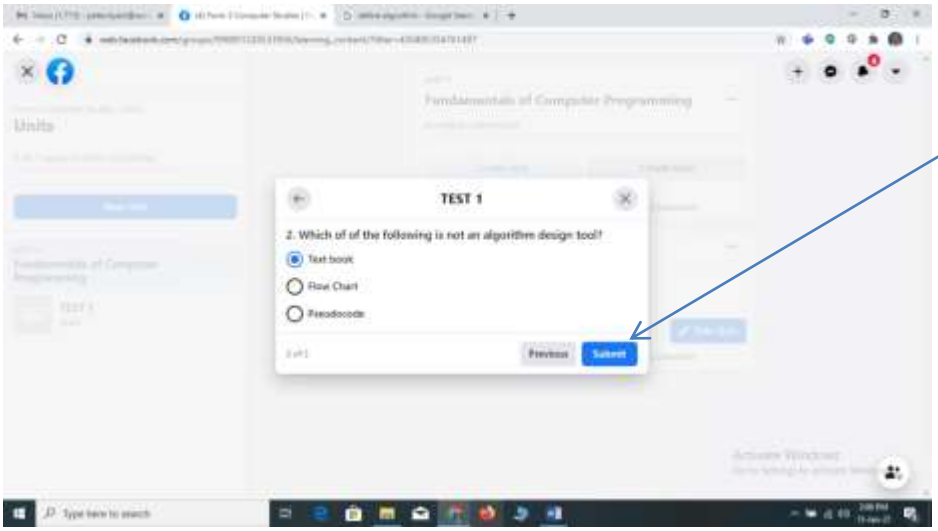


2. Click on your answer from the options given as shown in question 1 below;



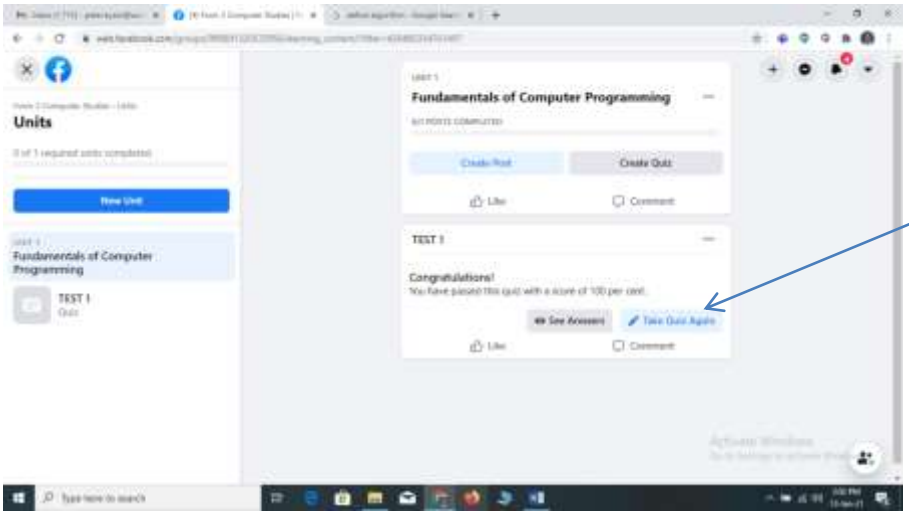
Click on your answer and click Next to move to the next question

3. Click on Submit after answering the last question



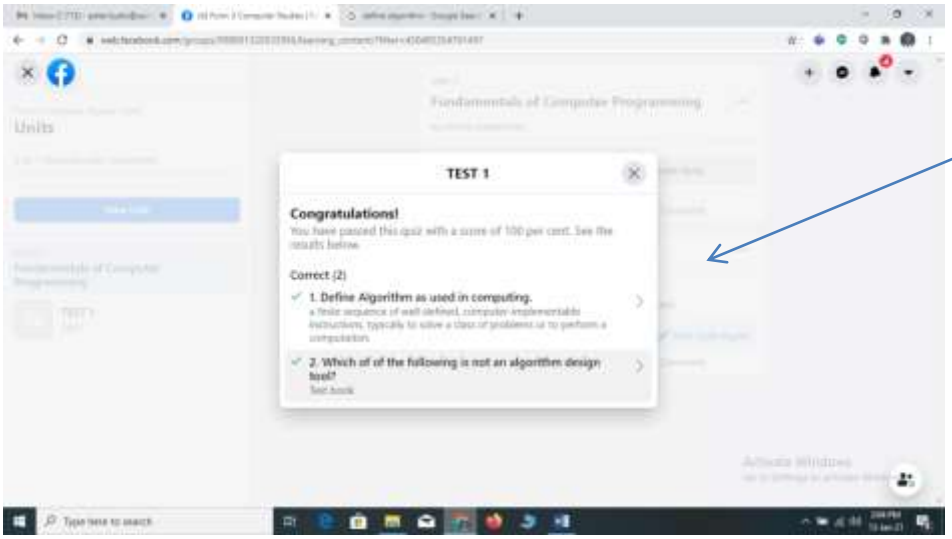
Click on Submit after answering the last question

4. Click on See Answers to view the correct answers and score



Click on See Answers to view the correct answers

5. The correct answer will be shown as below;

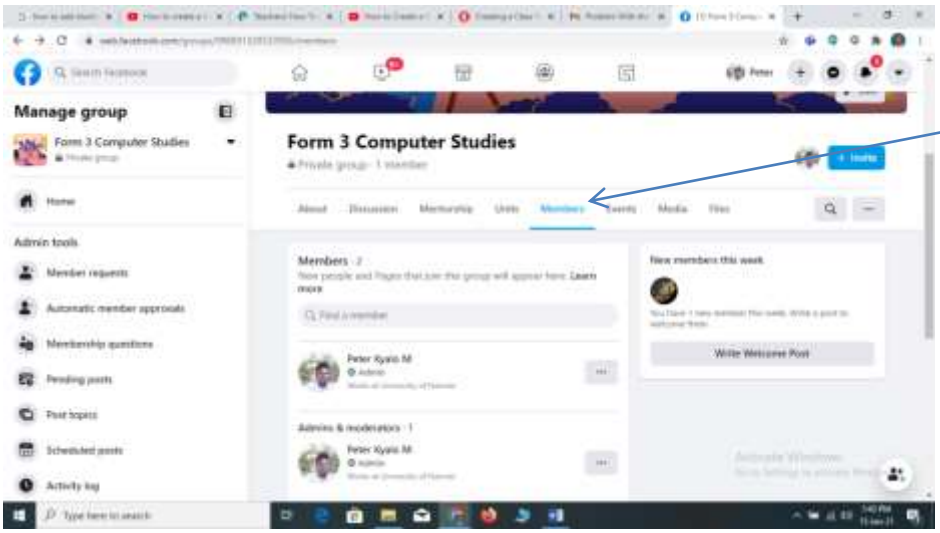


Correct answers for the text.

Section N: How to Chat with Members/Students

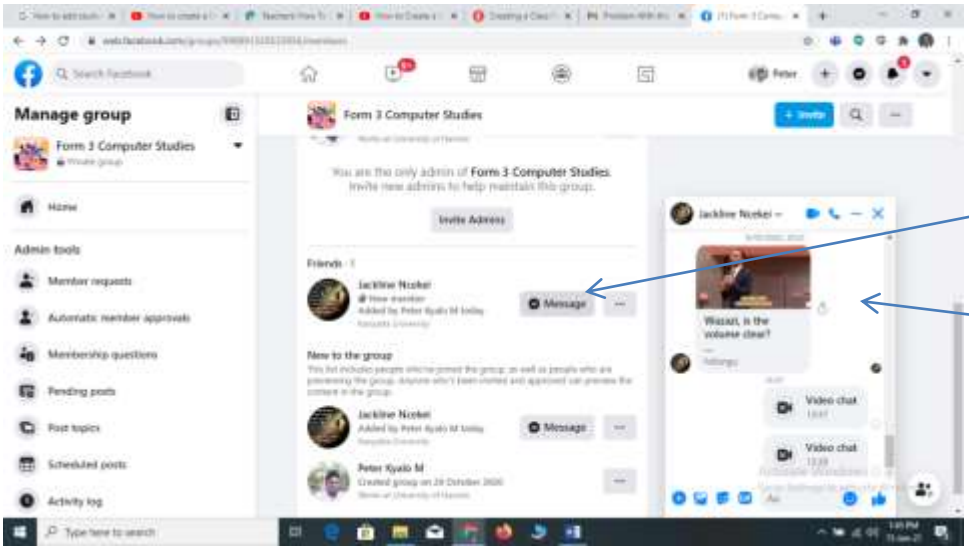
You can create a text chat or a video chat room using the Messenger app to engage individual student or group of students in a group using the steps below;

1. Click on the Members tab/menu below the group profile photo



Click on the Members tab/menu to view members and scroll up to view the member you would want to chat with

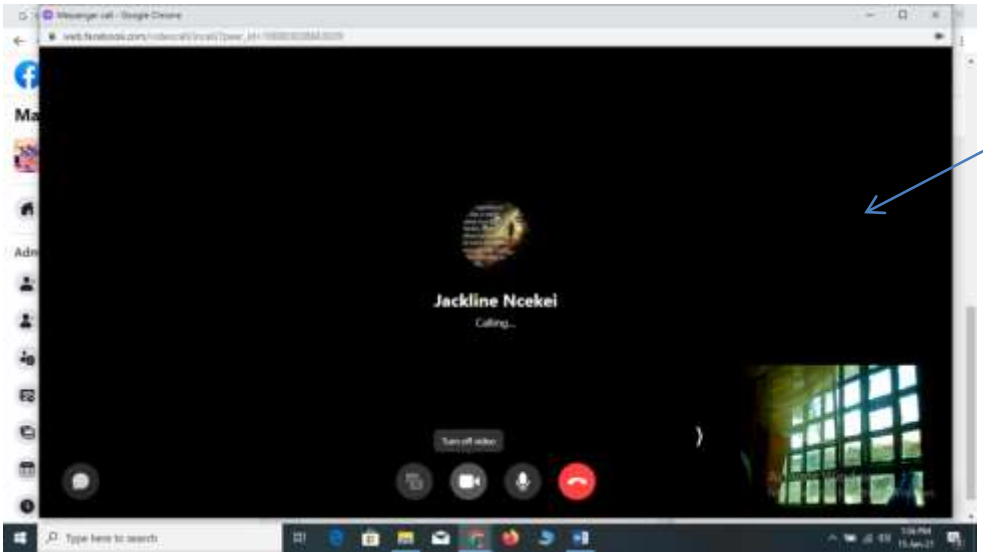
2. Scroll up or down to view the member/student you would wish to chat with then click on the Message tab on the right of the member's profile photo



Click on the Message tab to display the messenger app pane/window shown on the right.

Messenger app pane/window from where you can initiate conversation with an individual member/student by keying the message

3. To start a video/audio chat, click on the video or audio icon next to the name of the member/student on top of the messenger app pane/window. Wait until the connection is done.



Video call connection on progress

4. Once the connection is established, you can share your screen and documents with whom you are chatting with.

Section O: Preparing Lesson Plan for FSNP Teaching

Preparation for a lesson delivered via Facebook Social Networking Platform is not different from a face to face one. As it is the norm, the Computer Studies teacher should prepare a lesson plan using the standard layout used in the school. However, the teacher should clearly indicate the learning activities that would be carried out through the platform and estimate enough time for each activity.

…. End ….

APPENDIX VIII INTRODUCTION LETTER TO NACOSTI

UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION & EXTERNAL STUDIES
SCHOOL OF EDUCATION

Telephone: 0724692079 P.O. BOX 30197, 00100 NAIROBI

P.O. BOX 92, 00902 KIKUYU

25 January 2021

National Commission for Science, Technology and Innovation (NACOSTI)
P. O. Box 30623, 00100
Nairobi, KENYA

Dear Sir/Madam,

RE: APPLICATION FOR AUTHORITY TO CONDUCT RESEARCH IN KENYA: PETER KYALO MULWA

This is to certify that **PETER KYALO MULWA Reg. Number E87/52217/2017** is a student at the University of Nairobi, Department of Educational Communication, Technology and Pedagogical Studies pursuing PhD in Educational Communication and Technology. He is seeking authorization to conduct research titled **"Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Studies in Public Secondary Schools, Nairobi County, Kenya."**

Kindly assist him to acquire a research permit to enable him continue towards completion of his work.

Yours faithfully,

JCNGatumu

PROF. JANE C. GATUMU
CHAIRMAN,
DEPARTMENT OF EDUCATIONAL COMMUNICATION AND TECHNOLOGY

APPENDIX IX: RESEARCH LICENSE FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **467922**

Date of Issue: **04/February/2021**

RESEARCH LICENSE

This is to Certify that Mr. Peter Kyalo Mulwa of University of Nairobi, has been licensed to conduct research in Nairobi on thetopic: Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Studies in Public Secondary Schools, Nairobi County, Kenya for the period ending: 04/February/2022.

License No: **NACOSTI/P/21/8894**

467922

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY
&INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document,
Scan the QR Code using QR scanner application.

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing)

Regulations, 2014CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor beforecommencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies
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6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of theresearch
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and
Innovationoff Waiyaki Way, Upper
Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke /
registry@nacosti.go.keWebsite:
www.nacosti.go.ke

APPENDIX X: SELF INTRODUCTION LETTER

Peter K. Mulwa,
Department of Educational Communication, Technology & Pedagogical Studies,
School of Education,
University of Nairobi,
P.o Box 30197 – 00100,
Nairobi.
Email: peter.kyalo@uonbi.ac.ke
Mobile: +254 712 422 824
Date:…….

…….
……..
……..
……..

Dear Sir/madam,

Re: Research Introduction Letter

I am Peter Kyalo Mulwa an academic staff and also a student at the University of Nairobi, Reg. Number E87/52217/2017 in the Department of Educational Communication, Technology and Pedagogical Studies pursuing PhD in Educational Communication and Technology. I have sampled your school as one of the schools where I will conduct research titled "Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Studies in Public Secondary Schools, Nairobi County, Kenya". The study targets to collect data from form 3 Computer studies students and their teachers through a quasi-experiment, student achievement tests, questionnaires, observations schedule and Interview schedule.

I am therefore seeking authority to engage the form three Computer Studies students and their teachers in your school. Attached please find other approvals granted for the study.

Your faithfully,

Peter K. Mulwa.
E87/52217/2017

APPENDIX XI: RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

(To be administered in English or any other appropriate language e.g. Kiswahili translation)

Title of Study: "Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Programming Among Learners in Public Secondary Schools, Nairobi City County, Kenya."

Principal Investigator\and institutional affiliation: Mr. Peter K. Mulwa, School of Education, University of Nairobi.

Introduction:

I would like to inform you about this study. The purpose of this consent form is to give you the information you will need to help you decide whether or not to allow form 3 Computer Studies students in your school to be participants in the study. Feel free to ask any questions about the purpose of the research, what happens if your students participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction you may decide to allow your students to be in the study or not. This process is called 'informed consent'. We will give you a copy of this form for your records. May I continue? YES / NO This study has an approval from the National Commission for Science, Technology and Innovation (NACOSTI) and the Nairobi County Commissioner of Education.

What Is This Study About?

The purpose of this study is to establish the "Effect of Facebook Social Networking Platform on Learner Academic Achievement in Computer Studies in Public Secondary Schools, Nairobi County, Kenya". Data collection for the study is a partial requirement for the award of the PhD degree of the University of Nairobi. I am therefore asking for your consent on behalf of the form 3 Computer Studies students in your school to participate in this study.

What Will Happen If You Decide to Be in This Research Study?

If you agree to participate in this study, the following things will happen: The students will be involved in a quasi-experimental study on the use of Facebook Social Networking Platform (FSNP) as a learning resource. They will be taught the topic "Elementary Principles of Programming" by their Computer Studies teacher and allowed to collaborate through the platform. They will sit for a Pre-test before the teaching of the topic begins and a Post-test after the topic is covered. They will later be given questionnaires to establish their attitude towards the use of FSNP as a learning resources. The data collected will be confidential and used only for this study.

Are There Any Risks, Discomforts Associated with This Study?

One potential risk of being in the study is loss of privacy. However, temporary Facebook accounts will be created for the students by their Computer Studies teachers and deleted immediately after the study. We will keep everything you tell us as confidential as possible.

Are There Any Benefits Being in This Study?

The students stand to benefit from collaboration through the study in acquiring the relevant skills they can use to utilize FSNP for academic purposes other than only for entertainment. There will no monetary gains for participating in this study.

Will Being in This Study Cost You Anything?

Other than meeting Internet connectivity costs where applicable and printing of the student achievement tests, there are no other anticipated costs to be incurred by the school for participating in this study.

Will You Get Refund for Any Money Spent as Part of This Study?

The principal investigator will not refund any money spent as part of this study.

What If You Have Questions in Future?

If you have further questions or concerns about participating, please call or send a send a text message to the study staff at the number provided at the bottom of this page.

What Are Your Other Choices?

Your decision to participate in research is voluntary. You are free to decline your school's participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

Consent Form Participant's statement

I have read this consent form. I have had the chance to discuss this research study with a study counselor the Principle investigator. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that participation of my school in this study is voluntary and that I may choose to withdraw any time. I freely agree to have my school participate in this research study. I understand that all efforts will be made to keep information regarding personal identity confidential. By signing this consent form, I have not given up any of the legal rights that my school may have as a participant in this study.

I agree to allow my school to participate in this research study: **Yes** **No**

I agree to provide contact information for follow-up: **Yes** **No**

Participant signature / Thumb stamp _____Date _____

Participant printed name: _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant/s named above and believe that the participant has understood and has freely given his/her consent.

Researcher 's Name: _____ Date: _____ Signature _____

For more information, contact---------- at _____from ---------- ------ to----------

NB: *Consent form was adopted from KNH-UoN Ethics and Research Committee Website and edited to fit this study. See more information from https://erc.uonbi.ac.ke/basic-page/e-resources*