UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE STUDENTS' INTEREST IN PROGRAMMING: THE EFFECT OF PROJECT WORK, TUTORIALS, ACCESSIBILITY OF RESOURCES ON THE INTERNET AND STUDENTS' PERCEPTION

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MAY, 2021

DECLARATION

STUDENT DECLARATION

I, **ISAAC AMPOFO ATTA SENIOR,** declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole for another degree elsewhere.

SIGNATURE:……..

DATE:……..……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

DR. FRANCIS OHENE BOATENG

SIGNATURE:……..

DATE:……..……

DEDICATION

This work is dedicated to the Ampofo family, for their prayers and support.

ACKNOWLEDGEMENT

My first gratitude goes to God by whose mercy, grace and glory have enabled me to complete this dissertation. I give thanks and praise to God. I express my gratitude to my supervisor, Dr Francis Ohene Boateng who supervised this dissertation. I will never forget his hardworking, patience, and words of encouragement. I also appreciate his worth comments and suggestions with expert guidance for the entire work. It is my prayer that God's abundant blessings will continue to flow in his life. Also, to my enemies, friends, and extended family for their cooperation, support, and motivation. It is my prayer that God's abundant blessings will continue to flow in their lives.

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ABSTRACT

Robots, artificial intelligence, bitcoins, block chain, IoT (Internet of Things), and Cloud Computing are innovation of technologies that solve problems in the world and are backed by programming. Learning of programing has become relevant in Ghanaian schools where students are expected to develop interest and equip themselves with knowledge and skills in programming. The study sought to determine the effects of project work, tutorials, and accessibility of resources on the internet on the perception of students towards their interest in computer programming. The study used a descriptive survey design. The population for the study was 8,420 with 368 as a sample size. A stratified random sampling technique was used for sampling participants for the study and a purposive sampling technique was used to select three public universities in Ghana. The researcher used a questionnaire to gather the data for studying the issue under investigation. Analysis of the data was done through the use of the SPSS and PROCESS Macro. Data collected from the respondents were analysed using both inferential statistics and descriptive statistics. The study found that students' perception of programming at the university was higher which enhanced their interest in programming. The study revealed that there was a direct significant effect of project work on students' perception of programming. The study revealed that there was a direct significant impact of accessibility of resources from the internet on students' perception of programming. The study revealed that there was a direct significant effect of tutorials on students' perception of programming. The study concluded that there was a direct significant mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Problems in the world are solved by understanding the problem, developing strategies to solve them and implementing the strategies to solve them (Moström, 2011). The implementation of the strategies can be done by man or computer. The process whereby computers are used to perform specific instructions to solve a problem is termed programming. When a problem arises, the programmer will get an understanding of the problem and break it down using problem-solving techniques. The programmer uses available knowledge and tools in solving all the problems that have been broken down. The programmer needs to put the solution into instructions that the computer will understand to solve the problem. The languages that are used to write instructions are C++, PHP, Python, C, and Java. Programming is part of courses that are studied under Computer Science, Mathematics, and Information Technology programmes offered at the university. Students that offer these programmes must be occupied with programming to empower them to have the enthusiasm to learn (Chan, 2018). The capacity to apply and understand a programming language is a significant skill for the students to acquire (Rahmat et al., 2012).

Programming students of today should be engaged in knowledge and skills to have the option to adjust to their regularly evolving condition (Wagner, 2019). Although programming lecturers' best interest is to guide students to acquire knowledge and skills during lectures (Rico, Martínez-muñoz, Alaman, Camacho, & Pulido, 2011), learning of programming cannot be limited to the lecture room only. During a lecture period, there are just little opportunities for collaboration between the instructor and the

student. Programming students who professed to have gone to lectures still battled with what was taught (Chen et al., 2019). So, going to the field for students to have hands-on experience in programming, giving them project work and taking students through a series of tutorials to help them acquire the necessary skills and knowledge in programming should be a priority. This contributes to the learning of programming and thus, knowledge and skills acquired in programming are best learned during lectures, learning resources and tutorials from the internet (Chen, Chang, & Wang, 2008).

In Saudi Arabia, students in middle schools and senior high schools are acquainted with the concept of programming to equip them to have a love for programming. In middle schools in Saudi, a programming language called Scratch is taught to the children (Al-Attas, 2014). And in secondary schools, the students begin to recognize the more significant level of programming languages, for example, Visual Basic, and programming of smart devices (Al-Ghamdi & Musa, 2014; Waziri, Khaddran, & Mustafa, 2014). In Ghana, learning programming at the educational institutions was added to the elective subjects taught at the senior high school. For now, students learn programming languages from senior high school to university. Also, learning computer programming during the first semester at the university assists students to develop critical thinking skills and gives them the understanding of how computers and smart devices' software works (Alhassan, 2014, Shamma, 2014; Yousif, et al, 2015; Ala-Mutka, 2004; Major, 2010; Lee, 2014).

Furthermore, it encourages students to prepare their mind about the field of Computer Science, Information Technology and Mathematics before proceeding onward to the next semester. To help them know exactly the relevance of programming in their course of study at the university. During programming lecture, students are unable to ask

questions regarding every problem faced in their codes but when they have access to the internet they can learn it best from open-source codes and software. Results from earlier studies demonstrate a solid and reliable relationship between students' web use and their learning (Metzger, Flanagin, & Zwarun, 2003). Meanwhile, the percentage of employment-population in Ghana as of 2020 is less than 50% which means that more than half of the population are not working but rather depend on those that are working (Plecher, 2020). This has caused unstabilize financial situation on the part of students at the university. Due to unstabilize financial situation of students, buying data for internet services to access learning resources is a problem.

As a result, all tertiary institutions in Ghana provide Wi-Fi for students to access the internet without a fee. Students' use of campus network to access learning resources has increased over the years. Especially, in Ghanaian universities, students rely mostly on the on-campus network as their learning support (Zheng, Li, & Li, 2017). College students in the various public universities in Ghana rely mostly on open-source codes, tutorials from YouTube and other learning resources on the internet when programming. As a result, the study sought to examine if accessibility of resources on the internet has an effect on college students' interest in programming. Moreover, the use of digital tools is important among individuals from children to adults (Dittmar & Eilks, 2019). That implies a learning emotionally supportive system ought to give efficient transparency concerning classroom interaction, particularly in learning programming (Chen et al., 2008).

Hands-on experiences like tutorials and project work give users a succession of steps. For each progression, the tutorial gives short literary guidelines just as a circling video showing how to play out that progression (Wade et al., 2019). Also, project work giving

to students after every tutorial help students to understand programming. Project work can be in the form of group work and individual work where students are challenged to apply what they know. Earlier research looking at the adequacy of tutorials and riddles was initially founded on tutorials actualized within Scratch (Harms, Balzuweit, Chen, & Kelleher, 2016). Thus, the study sought to determine college students' interest in programming with the effect of tutorials and project work.

Students' interest in programming is falling in the U.S., just as in different nations around the world (Pausch & Kelleher, 2007). The Higher Education Research Institute discovered that from 2000 to 2005 the number of first-year students admitted to study programming as a major, dropped by 70% in the U.S., and the Taulbee Survey discovered that students' enrolment in programming dropped by half (Vegso, 2006). In Ghana, students' interest in programming has affected their perception and that, they perceive it as a complex and difficult course to study. This has hindered their enrollment and zeal to study programming. Meanwhile, programming is a good course that is emerging in the world's economy and as such, students should be equipped with knowledge and skills to prepare them for emerging technologies.

The U.S. Agency of Labor Statistics anticipated in 2005 that 65% of employment opportunities from 2004 to 2014 in science and engineering will be in Information Technology where programming will be a key factor to secure a job (Hecker, 2005). The president of Ghana and his vice, His Excellency Nana Addo Dankwa Akuffo Addo and Dr Mahamudu Bawumia has spearhead digitization of the country's economy since their turn of power in 2016. Some of their initiatives are Zipline technology, paperless port system, digital property addressing system, national identification card, integrating

mobile money interoperability with financial institutions, medical drone system, and online booking for passport registration (Nyavi, 2020).

All these implemented initiatives and new initiatives that they are bringing on board will require a workforce where programmers are not exempted. Therefore, programming students must show improvement in the knowledge and skills obtained to fill accessible occupations that have been created to help in the attainment of the vision of government of Ghana about digitization to transform the economy of Ghana. With such expansive impact, it is basic for Ghana, just as for some national economy, that programming students pull in the most splendid personalities (Pausch & Kelleher, 2007). Therefore, there is a need for the study to analyze factors that can positively influence the perception of students towards their interest in computer programming.

1.2 Statement of the Problem

Programming is significant for figuring out how to innovate, make eco-friendly answers to problems of the world (Rico et al., 2011). Writing a computer program is significant in our day by day life to increase and enhance the intensity of computers and the web (Birnbaum, 2004). Writing a computer program is imperative to mechanize, gather, manage, figure, and analyze the processing of information and data precisely. Writing a computer program is critical to making programming and applications that help computer users in a day by day life function effective and efficient (Harms et al., 2016). It is extremely imperative to figure out how to help students understand programming languages to be able to develop an interest in programming. Today, we are seeing robots, artificial intelligence, bitcoins, block chain, IoT (Internet of Things), and Cloud Computing due to the innovation of technologies. The innovation of new technologies to help solve problems in the world are backed by programming (Sharma, 2018).

Past studies have revealed that college programming students face challenges in trying to understand most of the programming languages (White, Sivitanides, & Marcos, 1997). Where programming students in Ghanaian universities are of no exception. At the beginning of every academic year, the enrolment of students to offer programmes that have programming as a course increases significantly. But after their introduction to programming, they began to perceive it as difficult which affect their academic grades negatively (Abdunabi, Hbaci, & Ku, 2019). Studies over a range of two decades have recorded low degrees of commitment in programming, especially in the classroom (Marks, 2000). The unfamiliarity of programming on the part of the students makes it difficult to convince themselves that it is not as they perceived. Students' perception of programming affects their seriousness towards the course (Koch, 2019). It is by this that the study sought to determine the effects of project work, tutorials, and accessibility of resources on the internet on the perception of students towards their interest in computer programming.

Several studies have been done on the perception of students towards their interest in computer programming (Bilal, 1997; Al-Bassiouni, 2012; Al-Bassiouni, 1991). But little has been done on factors that influence students' interest in programming (Moström, 2011; Byrne & Lyons, 2014). To add to the literature, the study uses project work, tutorials, and accessibility of resources on the internet as factors that can influence students' perception of their interest in programming. Appropriately, there is an earnest need to look at additional factors that can affect the perception of students towards their interest in computer programming. Sub-Saharan Africa is scant as existing literature covers Europe, Asia and America extensively (Afenyadu, 2014). Also, no studies in Ghana have been done using project work, tutorials, and

accessibility of resources on the internet as an effect. To bridge the gap, the study sought to investigate college students' interest in programming: the effect of project work, tutorials, accessibility of resources on the internet and students' perception.

1.3 Purpose of the Study

This study aimed at examining the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the public universities in Ghana.

1.4 Research Objectives

Specifically, the following issues will be addressed:

1. To determine the influence of project work on students' perception of programming at the public universities in Ghana.
2. To determine the effect of accessibility of resources on the internet influence students' perception of programming at the public universities in Ghana.
3. To assess the influence of tutorials on students' perception of programming at the public universities in Ghana.

1.5 Research Questions

The study sought to answer the following specific research questions:

1. What is the influence of project work on students' perception of programming at the public universities in Ghana?
2. How does accessibility of resources on the internet influence students' perception of programming at the public universities in Ghana?
3. Does the influence of tutorials have a positive effect on students' perception of programming at the public universities in Ghana?

1.6 Significance of the Study

In terms of theory, the current study attempt to contribute new knowledge in terms of determining the effects of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming students. The study will be relevant to policymakers in education during decision making on how the teaching of programming should be delivered to students. Studying this effect reduces the knowledge gap and gives programming students and lecturers an in-depth understanding of how tutorials, accessibility of resources on the internet and project work influence students' perception of their interest in programming. This study will also guide future research in this particular area. The findings of this study will at this point help to illuminate Policy Makers on their aim of imparting knowledge and skills to students so that they can be fit in this challenging world (Abdunabi et al., 2019). The findings of this research will additionally uncover the accomplishments chalked concerning students' interest in programming.

1.7 Delimitation of the Study

The study was limited to Computer Science, Mathematics and Information Technology students at the public universities in Kumasi, Ghana. The outcome of the research could not cover all programming students in the public universities in Kumasi, Ghana. That is the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in the Ashanti Region of Ghana.

1.8 Limitation of the Study

During the study, there were some challenges encountered by the researcher. However, the limitations did not have a significant interference with the outcome of the study. Some of these challenges are that;

1. Collection of data posed a big challenge since the time allocated for the survey to be done exceeded. Data collection therefore, took a longer time than anticipated.
2. Due to the worldwide pandemic, availability of participants for the survey was a problem. So the researcher used Google Forms to assist the collection of data. A link to the questionnaire was sent to participants but their commitment was low. Hence more time and patience was exercised until all the questionnaires got filled up.
3. Universities that were used for the study were based in the second capital city of Ghana and so the researcher had to wait for permission from head of departments, which also took a while and so delayed the coding and keying in of the responses into SPSS which in turn delayed the analysis.

1.9 Definition of Terms

1. **A tutorial** is a technique for transferring knowledge by a lecturer or instructor to students and might be used as a piece of a learning procedure. More interactive and explicit than a book or a lecture, a tutorial tries to educate by model and supply the information to finish a specific task. A tutorial can be taken in numerous structures, running from a lot of instructions to finish a task to an intelligent critical thinking session.
2. **The Internet** is the system of interconnected networks that uses the Internet protocol suite (TCP/IP) to interconnected electronic devices globally.

3. **Project Work** is a learning experience that expects to give students the chance to blend knowledge from different territories of learning, and fundamentally and creatively apply it to genuine circumstances. This procedure, which upgrades students' knowledge and empowers them to secure abilities like cooperation, communication and independent learning, sets them up for deep-rooted learning and the difficulties ahead.
4. **A project** is a bit of arranged work or an activity that is done over the timeframe and planned to accomplish a specific reason. A project is an errand that requires a great deal of time and exertion. A project is a step by step study of a subject by a student.
5. **A student** is an individual who is learning at a university or college. A student is fundamentally an individual taken a crack at a school or other instructive organization who goes to classes in a course to accomplish the proper degree of authority of a subject under the direction of an educator and who commits time outside class to do whatever activity the teacher allots that is essential either for class preparation or to submit proof of progress towards that mastery. In the more extensive sense, a student is any individual who puts forth a concentrated effort to the escalated scholarly commitment with some issue important to ace it as a major aspect of some functional undertaking in which such mastery is fundamental or conclusive.
6. **Perception** is the association, distinguishing proof, and translation of sensory information to speak to and comprehend the introduced information, or the environment.

7. **Computer programming** is the way toward designing and building an executable computer program to achieve a particular computing result. Computer programing involves variables, commands and instructions (called code or program) entered by a programmer to a computer using a programing language, according to a specific sequence for a human to help to deliver a high degree of speed, accuracy and proficiency, so that a written program gives the required correct results.
8. **Programming** includes errands, for example, analysis, generating algorithms, profiling algorithms' exactness and resource utilization, and the usage of algorithms in a picked programming language (normally alluded to as coding). The source code of a program is written in at least one dialects that are understandable to developers, instead of machine code, which is legitimately executed by the focal processing unit. The motivation behind writing computer programs is to discover a sequence of instructions that will computerize the exhibition of a task (which can be as mind-boggling as an operating system) on a PC, frequently for solving a given issue. The way toward programming along these lines regularly requires mastery in a few unique subjects, including knowledge of the application area, particular algorithms, and formal logic.
9. **Accessibility of resources** can be seen as the "capacity to access" and advantage from some system or entity.

1.10 Organization of the Study

This dissertation has been divided into five parts. The current chapter which is the first part deals with the background of the study, statement of the problem, the purpose of the study, objectives of the study, research questions, significance of the study, delimitation of the study, definition of terms and organization of the study. The second

part highlights on Introduction, conceptual framework (review literature on the variables), theoretical review, hypotheses development, empirical review (review literature on the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming), and conclusion. The third chapter is concerned with the methodology employed for this study. This contains an introduction, research design, population, sample and sampling technique, research instrument/measurement, pilot study, research approach, descriptive analysis, reliability test, normality test, linearity test, correlation analysis, multiple regression analyses and conclusion. The fourth chapter analyses the data gathered and addresses each of the research questions in turn. It contains the introduction, pilot study, research approach, descriptive analysis, reliability test, correlation analysis, hypotheses result and conclusion. The last chapter which is the fifth present's introduction, overall findings based on the research objectives, limitation of the study, a recommendation for future research and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The study aimed to determine the effects of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the public universities in Ghana. The chapter constitutes the theoretical basis of the study, the conceptual framework of the study and the empirical basis of the study.

2.2 Conceptual Framework of the Study

The following concepts were reviewed; Computer Programming, Project Work, Accessibility of Resources on the Internet, Tutorials, Students' Perception, College Students' Interest in Programming.

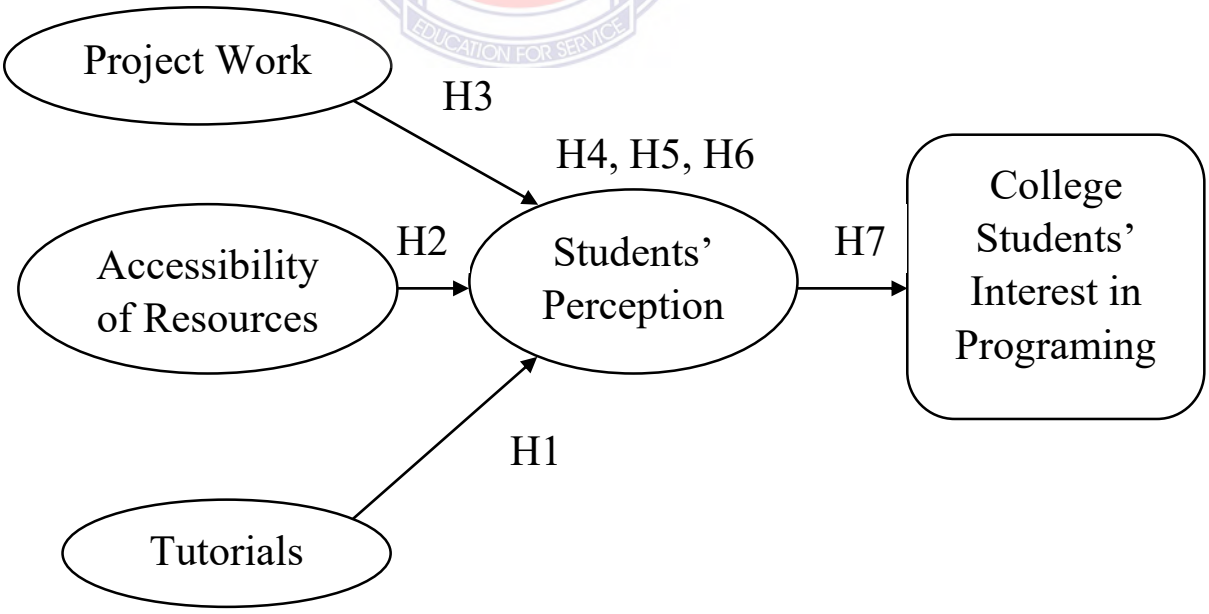


Figure 1: Conceptual Framework

2.2.1 Computer Programming

Computer programming is a course under programmes that students apply to study at the tertiary and secondary level of an educational institution. It included aptitude in making algorithm, program writing, understanding the language structure just as the rationale of the program. Writing computer programs is part of the toughest studying area because of certain reasons (Daly, 1999; Jenkins, 2002). The researcher group these reasons into three classifications; the subject, students and the instructors. The researcher talks about every one of these variables in the accompanying subdivision. Furthermore, programming is a subject that students study at school that equip students in to develop skills and knowledge. Writing a computer program is a progressive "hands-on activity" for learners to secure an essential skill in their programming career. For instance, students need to gain proficiency with the essential punctuation and afterwards the semantic, structure, and style step by step. During lesson delivery, the instructor will not hold up learners to completely understand programming. Writing computer programs is not just a various levelled expertise yet additionally different aptitudes. Writing computer programs is a procedure starts with interpreting an algorithm into program code. The difficult part is to decipher the required specification into an algorithm. Good algorithm delivers the correct program.

Along these lines, students are expected to be talented regarding every procedure; structure the algorithm, interpret the algorithm into program language and compose the programming language with the right punctuation. Programming as a course is offered semester by a semester at the university; mostly the first semester for new students, second and third semester for those who have completed the first semester. Learners who do not perform in the assessment must quit the subject anyway and the individuals

above the expected mark will continue to the subsequent class. Lamentably, certain students even though they breezed through the assessment, however, they develop no confidence in programming. At the point when they take the next course, they will confront an issue where they have to gain proficiency with another thing just as enhancing their coding ability. The programming language used in indicating an introductory programming course likewise is an issue.

Programming class is to show the student the most proficient method to program. Computer programming code is only a medium to accomplish the very idea. In any case, the most programming language used for instructing is not structured for educating but for industrial purpose. Thusly, it is without a doubt, not a fitting language. Students accept that writing computer programs is a challenging thing to learn to have a good grade. That perception is told to new students and consequently gives a terrible impression that programming is not an easy course. Writing computer programs is another course for some students. We can not anticipate that students should be talented in programming just within 14 weeks. Anyway, it can take somebody 10 years to be a gifted software engineer (Rahmat et al., 2012). Moreover, teachers assume a noticeable role in imparting knowledge in programming to students (Gomes and Mendes, 2007). Tutors can teach learners and provide feedback based on the questions they ask during a programming lesson. Learning conditions in classrooms like time of learning, class size and span likewise can influence students' inspiration (Rahmat et al., 2012). These can be an issue to the students if the instructors neglect to deal with students' inspiration other than the different learning styles of the students.

2.2.2 Project Work

Project work is a task given to students to give their hands a try with the thought process to improve their insight, connect with them in learning and stir their enthusiasm for that subject (Mazaya, 2019). In the meantime, in the broadest sense, a project is portrayed as a specific, limited action that makes a perceptible and quantifiable result under certain pre-set requirements. It is an endeavour to execute desired change to a circumstance in a controlled way.

2.2.3 Accessibility of Resources on the Internet

Accessibility of resources on the web alludes to the accessibility of educational resources on the web that student access from the web (Schumacher, 2001). Web accessibility is the far-reaching demonstration of ensuring there are no impediments that envision association with, or access to, sites on the World Wide Web by people with physical handicaps, situational inability, and financial difficulties on information transfer capacity and speed (Birnbaum, 2004). At the point when sites are effectively planned, created and altered, all-around all customers have proportionate access to information and usefulness (Chen et al., 2008).

2.2.4 Tutorials

Tutorial is a form of teaching whereby teachers' impact knowledge by practicing along with students in a step by step approach at the classroom (Harms et al., 2016). During tutorials, students watch and mimic tutors as they take them through a step by step practice. Instructional tutorials help students with adjusting new aptitudes by using a tiny bit at a time procedure that guarantees the client is following and understanding the material (Wade et al., 2019). Some programming tutorials give testing highlights to

guarantee to understand the material, as others might understand software program after watching. Instructional tutorials can be used for so many purposes for educational institutions and businesses and are designed for fundamental, moderate, and propelled clients. Experts in computer programming learn from tutorials and online learning resources.

Almost all software development programs involve a tutorial for creating a "Hello World!" program, which is the most essential program that can be made with the software. Since tutorials offer a slow way to deal with learning, they can be useful to individuals at a wide range of ability levels. If a software programmer can profit from a tutorial, anyone can. Numerous studies have indicated that teaching and learning that is upheld with worked models during the beginning periods of learning brings about a more huge positive effect than discovering that they did not use that sort of models, with the progressively constructive outcome being in logical subjects, for example, Mathematics (Alhassan & Arabia, 2017), natural sciences (Crippen & Earl, 2007; Richey & Nokes-Malach, 2013), engineering (Pollock et al., 2002), and computer programing (Murphy & Wolff, 2009). When contemplating computer programming, which speaks to a high intellectually trouble, the use of worked models may help reduce this over-burden (Alhassan & Arabia, 2017). Normally, worked models in programing are a program code that has itemized perceptions and remarks for each progression advocating the purpose behind learning a particular programming articulation, or a specific algorithm (Crippen & Earl, 2007).

A significant sort of previous studies in using worked models in training indicated that students learn toward adapting legitimately through these models, instead of reading long messages given in instructive books to the motivation behind clarifying complex

ideas. Analysts found that students go straight towards the worked models when considering scientific materials (Mathematics, Science, and Engineering.), and overlook long messages that give the principles on account of the engaging quality of these models and the ease of gaining from them, particularly they have point by point clarifications of each progression of the solution (Alhassan & Arabia, 2017). This marvel outlines the human outrageous want towards the simplest way of learning, which is given by worked models (Alhassan & Arabia, 2017).

2.2.5 Students' Perception

Perception means the affiliation, conspicuous confirmation and translation of tangible information which addresses and appreciates the exhibited statistics or situation. All recognition incorporates indicators that experience the tangible system which in this way leads to physical or compound induction of the sensory system. For example, sight incorporates light which strikes the retina of the eye, the smell is occurred by the aroma of particles, and hearing incorporates pressure waves. Perception is not only the inert acceptance of these signs, however, it is formed by the recipient's learning memory, thought and want (Abdunabi, Hbaci, & Ku, 2019). Perception can be part into two strategies, handling the sensory input, which alters this low-level information to increasingly significant level data; training which is associated with an individual's ideas and desires (or knowledge), restorative and particular components, (for example, attention) that impact perception (Wagner, 2019). Perception depends upon multifaceted components of the sensory system, anyway passionately appears to be generally easy because this getting ready happens outside cognizant mindfulness (Koch, 2019).

2.2.6 College Students' Interest in Programming

The sentiment of an individual whose attention, concern, or interest is especially connected by something: She has an incredible enthusiasm for the verse of Donne. Something that worries, includes, draws the attention of, or excites the interest of an individual. His inclinations are theory and chess (Rico et al., 2011). Students' enthusiasm for the subject is likewise significant. Learning programming will be exhausting and challenging if they are not keen regarding the matter. How programming teachers direct the class likewise can fascinate students of the course. Various students have various sorts of inspiration. A few students spurred to master programming for their advantage whereas others were roused by friends. Students' mode of studying is likewise extraordinary by every student. Some students love learning in groups with colleagues while others concentrate alone. In either way, what is significant is how they think. That is because figure out how to program, included an alternate perspective (Rahmat et al., 2012).

2.3 Hypothesis Development

The current study looked at the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the public universities in Kumasi, Ghana (University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology). All these literature have researched into the variable. The hypothesis that will be tested is that:

H1: *There exists a direct significant effect of project work on students' perception of programming.*

H2: *There exists a direct significant impact of accessibility of resources from the internet on students' perception of programming.*

H3: *There exists a direct significant effect of tutorials on students' perception of programming.*

H4: *There exists a direct significant impact of students' perception of programming on college students' interest in programming.*

H5: *There exists a direct significant mediating role of students' perception of programming on the relationship between project work and college students' interest in programming.*

H6: *There exists a direct significant mediating role of students' perception of programming on the relationship between tutorials and college students' interest in programming.*

H7: *There exists a direct significant mediating role of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming.*

2.4 Theoretical Basis of the Study

The following theories will be reviewed; Technology Acceptance Model, Social learning theory, Student engagement theory and Perception Theory. The researcher used these theories to support the study.

2.4.1 Studying Computer Programming

Benefits during instructional delivery of computers accept that the genuine estimation of computers lies in the capacity of people to instruct computers to perform a specific function that individual will take more time before he/she can execute (Al-Mohammadi, 2015). The best way to guide a computer to do the necessary tasks is by programing it orders like human language, called programing language. Languages in programing is a middle person between a client and a computer. Therefore, there is a need to

incorporate computer programing in the educational programmes of the state-funded education (Alhassan & Arabia, 2017). There are normal qualities and likenesses between most present-day programming languages. The overall aptitudes of programming of the parts of comparability are program preparation, putting down algorithms, drafting flowcharts, managing numbers and factors, managing restrictive sentences, managing loops, and dealing with arrays and functions (Waziri, 2014).

One might say that considering programming skills of any programing language (Visual Basic Studio, Scratch, and Java.) is to become familiar with the skills of programming by and large, yet through explicit language. Along these lines, a student or a developer can master programming aptitudes in a specific language and when the person wants to gain proficiency with a later language, the learning procedure will be simpler than learning full programing skills as a result of the indistinguishable fundamental programming skills in most current languages (Lee, 2014). Concerning the techniques for surveying students getting the hang of programming skills, there are two fundamental strategies for appraisal in the field of programing (Mohammed, Metwally, & Ali, 2015). First, evaluating the intellectual side, the side handles the data and information for learning programming and it is measured by diverse sorts of tests accomplishment. Next is evaluating the specialized side, this side surveys the students' capacity to write programming code within the necessary speed and exactness. This perspective is regularly surveyed by requesting that a student write a product code, to actualize and to check its legitimacy and results.

2.4.2 Technology Acceptance Model

Technology Acceptance Model is the adjustment of the Theory of Reasoned Action (TRA) to an Information System field (Lampouw & Fajar, 2019). TAM posits that obvious handiness and perception gives an individual the objective to use a system. Seen esteem is similarly seen as being straightforwardly affected by perceived ease of use (Peng, 2019). Programming students have come to acknowledge and use technology and has easily adapted to the technological devices that help them surf the internet. With this positive attitude towards the use of their technology devices, accessibility of resources on the internet has become their daily routine (Sohn & Kwon, 2019). The use of technology has shape programming students' behavioral intention, which has to lead them to utilize technology (Shuhidan, Syahida, Abd, Sanusi, & Hamidi, 2019). Programming students are eager to learn more and anytime they get online, they try to find a resource that will add to their knowledge in programming (Solangi, Solangi, Maitlo, Chandio, & Shah, 2019).

2.4.3 Social Learning Theory

Learning theories are used to explain how individuals think and what components determine their actions (Çeliköz, Erişen, & Şahin, 2019). Social Learning Theory (SLT) is a characterization of learning theories which is grounded in the conviction that human conduct is constrained by a three-course association between mental segments, common effects, and conduct (Lampouw & Fajar, 2019). The theory is gotten from Gabriel Tarde (1843-1904) who recommended that social learning happened through four basic stages: close contact, impersonation of supervisors, comprehension of ideas and role model behavior (Carcea & Froemke, 2019). The term 'social' in SLT alludes to the setting within which learning of programming happens.

Two sorts of conduct are distinguished in learning, participant and operant. Participant conduct is discovered through the process of learning programming (Usman & Ogbu, 2019). Conduct of programming students that changes nature, accordingly delivering prizes or disciplines for the students, is named operant. This part structures major observational learning, they are, attention, including demonstrated occasions (where how to program and correct codes are demonstrated to students) and onlooker attributes (material cutoff points, previous fortress, fervour level, perceptual set), Retention which comprises symbolic coding, specialist practice, abstract association, motor practice), Motor Reproduction, involving physical boundaries, self-perspective on increase, the exactness of information, and Motivation, involving outward, vicarious and individual fortification on programming (Andrew & Holmes, 2019).

Since learning wraps thought, memory and motivation, SLT ranges both subjective and social systems. It is related with SLT according to the accompanying points that, the most observational learning is done by first orchestrating and rehearsing how to program and correct error codes (Wang, Qiu, Ding, & Kaluri, 2019). Social learning theory is a learning methodology theory and social conduct which suggests that new practices can be acquired by watching and emulating others (Mayer, 2019). As this theory suggest when programming teachers engage their students through tutorials as they watch and mimic they began to learn more. Most students develop an interest in programming when they are taught with an effective tutorial where they watch and mimic as their tutors teach them through practice.

Teaching programming using effective tutorials as a scholarly methodology that occurs in the classroom happens totally through perception and direct direction, even without engine propagation or direct reinforcement (Jacobs, 2019). Despite the perception of

conduct, adjusting in like manner occurs through the impression of compensations and controls, a strategy known as vicarious help. When particular conduct of students towards programming is compensated regularly, it will no doubt suffer. Also, if particular conduct is consistently repelled, it will most likely stop. The theory develops customary social theories or traditional behavioral theories, in which conduct is controlled only by fortresses, by setting complement on the huge role of various internal methodology in the learning individual (Mulyani, 2019).

2.4.4 Student Engagement Theory

Student engagement theory uses limited cognizance of condition as a great deal of students' conditions affected on students' behaviour towards programming. We envision that such importance of institutional environment confines our comprehension into inward components of student commitment. We cannot clarify why there is a partition in the responsibility of students, who learn in one class and have the same condition, by these theories (Maloshonok, 2014). The theory of student engagement in learning programming accentuates the role of the condition in the learning of students. Schools should bolster student engagement in programming by presenting convincing academic practices throughout the learning technique. The insightful outcomes and improvement of students are influenced by student commitment in learning programming. Engagement theory relies upon making compelling shared groups that work on goal-oriented activities that are imperative to an individual outside the study room.

These three fragments, consolidated by Relate-Create-Donate, gather that learning works out happen in cooperative groups are venture based and have a valid focus (Shneiderman & Kearsley, 2018). Regardless of the way that student engagement with

the academic work of programming is basic to students' accomplishment and their social and scholarly improvement, commitment deduces both full of feeling and conduct support in the learning experience (Marks, 2000). Engagement in programming lesson is characterized as a powerful arrangement of social and mental grows similarly as a synergistic system (Lawson & Lawson, 2013). Moreover, in numerous investigations, engagement and disengagement are seen and evaluated on alone continuum, with lower levels of commitment (Fredricks, 2016). So students' engagement in teaching and learning of programming is crucial as it influence their perception towards the course to know how to program and correct error codes.

2.4.5 Perception Theory

Perception is a type of occurring and intriguing thought. Contending philosophical theories of acknowledgement generally differ in their endeavours to suit perceptual characteristics, for instance, deception, with pre-scientific musings in regards to the exotic character of perception (Matherne, 2015). The proposed variation of direct genuineness that obliges both fantasy and ordinary musings concerning perception. The exotic character of a perceptual thought, we battle, abides in its substance, and its substance is a bit of the physical world. Observation, by then, is quick, unmediated intellectual contact with the world (Maloney, 2016). Perceptual learning includes an expanded capacity to extricate significant data from an upgraded exhibit as a consequence of experience. The standard viewpoint on perception, returning to Bishop Berkeley during 1700s, asserts that animals make sense of how they see; the information at tactile receptors is demolished and garbage and as such an absolute percept requires learning (Adolph & Kretch, 2015).

Students who are learning programming look for data and streamline it as they try to understand it. The learner must plan something to acquiring data examine the act and behave towards it. Realizing what and how to assemble perceptual data shows the significant piece of perceptual learning. Since seeing continues after a while, so will it address itself progressively and progress over advancement (Adolph & Kretch, 2015). Most researchers are convinced that the wellsprings of perception can be isolated into two basic social affairs according to whether the sources exist inside the subject of programming or outside of it. Safeguards of the essential philosophy are called internalist. The internalist is convinced that bits of data or their sources and gauges can be found inside the subject, and cognition is nothing else aside from discovering them or becoming beforehand existing bits of data (Démuth, 2016). Instead of internalism, there is an opposite system; learners who stick to it, are convinced that all our understanding has an outer source experience.

The externalists avow that the cerebrum is essentially an unmistakable piece of paper (fresh start) and all data is being imprinted in us from outer reality (Démuth, 2016). Issue of this procedure is the explanation of how outside the fact of the matter is being seen and engraved in the subject. This issue, in all honesty, is the crucial determinant of an account of something that will be the subject of perception, how and in what course it will acquaint itself with us and how it is possible to get a handle on it. Additionally, this issue of meeting with data which addresses the substrata of information is in truth the key request of the speculations of perception. It is comparatively standard to go over examine our cerebrums picking what programming students see or to find affirmations about how to program and correct error codes for the most part experience what is out there in the mind-autonomous world (Zigman, 2018).

2.5 Empirical Basis of the Study

The empirical basis on which the literature review of this research study hypothesis focuses on is that project work ensures a positive significant effect on students' view on software design. Access to internet resources and tutorial also ensure students' positive significant discernment on programming and students' perception has a mediating effect on the relationship between project work and college students' interest in programming, students' perception has a mediating effect on the relationship between the accessibility of resources on the internet and college students' interest in programming, students' perception has a mediating effect on the relationship between tutorials and college students' interest in programming, students' perception of programming has a significant effect on learner's interest in program design.

H1: *There exists a direct significant effect of project work on students' perception of programming.*

Ciência, Moreira, & Figueiredo (2019) expressed that balancing theory and practise is a repetitive test in Programming Designing training. The educational program rules of the IEEE and Brazilian PC Society underscore the need of furnishing students with adequate and useful information for the improvement of abilities expected for Software Engineering (SE) proficiently. Learning-by-doing and students focus approaches. For example, learning by Project-Based (PBL), have been supported as appropriate for the improvement of skills. These methodologies expect to advance higher inspiration for the student, an increasingly dynamic job in the learning procedure, and better learning in the application level. To accomplish this objective, Ciência, Moreira, & Figueiredo (2019) played out a drawn-out training traversing for around 2 years. This research incorporates a review to gather reactions of 32 college students tried out a basic SE course that utilized PBL.

Ciência, Moreira, & Figueiredo (2019) contrast the outcomes with the reactions of 17 students who took an interest in a SE course with a comparative schedule however with a conventional teacher-centred learning technique (non-PBL). The outcomes show a positive PBL strategy, and an expanded view of the commitment of a useful programming improvement task in learning explicit SE points with regards to the PBL course, in contrast with a non-PBL technique. Ciência, Moreira, & Figueiredo (2019) contrasted the study results with the impression of learners took on a comparable SE course that utilized conventional teacher-cantered learning technique with a product improvement venture task. The study had the support of 49 college students, generally from Bachelor program in an Information System.

The results demonstrated that students concur that it is critical to utilize practical programming improvement extends with regards to SE training, instead of depending just on conventional talks and tests; there is a positive impression of the commitment of the project assignment on learning explicit SE points, (for example, “Programming Prerequisites”, “Programming Design”, and “Agile Methods”), and this recognition was much progressively positive for the students in the PBL course; and students in the PBL course expressed increasingly positive perspectives related about the project in regards to the learning procedure and polished skill, while the students in the course expressed progressively negative angles corresponding to the undertaking as a learning device, to the documentation and to the advancement procedure utilized. Along these lines, the outcomes proposed a superior view of significant worth in the project based learning from students' reaction.

According to Burga, Leblanc, & Rezania (2020) on student view of project work found that students incline toward authority positions, are worried about social qualities, and view project work in as fundamental groundwork for the work environment. Using a social intellectual vocation hypothesis focal point, we find that the objectives, interests, and self-adequacy convictions of students line up with the necessities of project management, yet there is an absence of specialized information on project processes. Encircling the inquiry from the perspective of students who will enter the workforce toward the finish of their projects of study, Burga, Leblanc, & Rezania (2020) see that students grasp the ideas innate in project work. The suggestion for acquiring knowledge and skills in programming is when students accept that they can prevail in project work, yet specialized abilities are expected to assist them with prevailing informal project work.

Study by Adams (2018) on perception of students and teachers of Project-Based Learning. This study analysed the view of educators and students on Project Based Learning by actualizing a four-week project in one classroom. This study further analysed the distinction among females and males on their impression of Project-Based Learning (Adams, 2018). The members included one educator and 18 students matured somewhere in the range of 15 and 16. The blended technique was utilized to infer quantitative and subjective information from studies, a meeting, and observational information (Brooks, 2016). The outcomes reasoned that the instructor had a positive perception of Project Based Learning and students saw Project Based Learning as an affable and a successful method to instruct programming (Rochmahwati, 2015; Simpson, 2011). From the results, an end can be drawn about the affability of Project Based Learning. During the review, the teacher and students were inquired as to

whether they enjoyed utilizing PBL. In the teacher study, the instructor demonstrated that he especially loved utilizing Project Based Learning in the classroom. Likewise, a greater part of students saw Project Based Learning as generally affable which was the most significant level of affability on the Likert scale questions.

A study on multivariate analysis of students' perception on teaching with client-based and non-client based team projects revealed that classroom experience has advanced from PowerPoint presentation, traditional teaching and whiteboards presentation to an increasingly dynamic condition where students and teachers cooperate on hands-on exercises to accomplish the course destinations by Appiah-kubi (2018). Furthermore, the research investigates the perception of students on project-based learning with the customer based and non-customer based projects. As far as the project work is seen as a learning gadget, commitment to learn, commitment to abilities and individual advantages, and their impacts on student assessment and inspiration to learn. From the study, project work types propel students, in any case, the non-client based had a higher measurably critical mean than the client-based projects. The outcomes show that PBL done in groups, regardless of whether non-client or client based is exceptionally respected by students as an incredible method of teaching that enhance their acquisition of knowledge and skills in programming. Moreover, students see that they are highly motivated to learn by either non-client or client based project work (Appiah-kubi, 2018).

Habók & Nagy (2016) examined perceptions of in-service teachers on project-based learning. The study used experimental design gathered in grade schools and professional optional schools. An analysis using 109 questionnaires revealed various contrasts dependent on the level of understanding and kind of school. All in all, PBL

was highly chosen by teachers for teaching programming. Students effectively took an interest in the assessment procedure through oral assessment (Douglas & Stack 2010). PBL has experienced critical advancement in the previous 30 years when contrasted with the thoughts by Dewey and Kilpatrick (1918). Learning theories, for example, social learning and subjective learning theories have considerably affected the advancement of PBL Van-den-Bergh et al. (2006). Also, PBL typifies another practice which models genuine circumstances for children. It gives that students should be given chances to apply their insight and abilities and enhance their insight and improve their aptitudes during the project based learning (Habók & Nagy, 2016).

Mahnic (2014) found that to get students ready for industry, encouraging project work in teaching and learning is turning into a significant piece of the Software engineering and Programming Designing educational programmes. Student studies demonstrated that they were overwhelmingly positive about the course and affirmed the narrative proof of Scrum's advantages announced in the literature. In the spring semester of the Scholarly Year 2008/09, the last Programming Building course at the College of Ljubljana was upgraded to open students to lithe strategies, especially Scrum. Scrum was picked because it is one of the most far-reaching coordinated techniques, however, needs progressively point by point assessment and exact proof about its pertinence. To give students a nearly genuine condition the course was planned as a capstone venture with just a limited quantity of formal talks expected to present lithe ideas and Scrum. Most obviously was committed to extending work during which student groups grew genuine undertakings carefully following the Scrum technique.

By picking applicable undertakings from genuine the course not just furnished students with the information on Scrum, yet also with proficient aptitudes required in an industry domain. One of the activities was characterized in co-activity with a product organization that furnished Item Excess with necessities determinations. Experience after training the course just because has indicated that the course accomplished each of the three goals:

1. Students delighted in learning Scrum in a near certifiable condition.
2. Their recognitions about Scrum were certain, and the observational assessment dependent on reviews led after each Run and toward the finish of the course affirmed the episodic proof about the qualities of Scrum detailed in writing.
3. Information from Run Accumulations gathered during the course empowered the calculation of earned worth calendar and cost execution files as proposed in some of our past works.

H2: Accessibility of Resources on the Internet has a positive significant effect on students' perception of programming.

A study by Birnbaum (2004) found that using the World Wide Web, an individual can proficiently enlist huge, diverse examples rapidly, enlist specific examples, and institutionalize systems, making things about simple to reproduce. Alternative programming techniques are thought about, including customer side instead of server-side programming. Web contemplates have procedural issues; example, greater paces of drop out and rehashed cooperation. Web studies must be altogether dissected and tried before propelling on-line. Numerous lessons analysed information got in Web against the lab. Both strategies for the most part arrive at similar resolutions; nonetheless, there are critical contrasts between students tried in the lab and individuals selected and tried using the Internet.

A study by Chen et al. (2008) on the use of adaptive e-news to enhance undergraduate programming courses with the hybrid format and planned an e-news conveyance framework that transmits customized messages to each students letter drop to make data access and companion cooperation progressively helpful and proficient. Through daily propensity for utilizing email, students can get the most recent data, new directions or friend discourses early. To empower the use of the system, an easy to understand interface was planned. An e-news system exploits site page hyperlinks to enable learners to tap on intriguing subjects whereas perusing e-news; doing such makes other window spring out an itemized content recovered from the electronic learning system. Single-click with the mouse enables students to log in to the online learning system and concentrate on subtleties of the picked subject. To upgrade the proficiency of e-news, students' wants and welfares were thought when framing the e-news content. Students' learning status and perusing inclinations were evaluated to figure out the data or substance to remember for the e-news. The outcomes uncovered that e-news and customized data enormously advance the learning of new data and support in online resources.

Rico et al. (2011) studied high school students on programming experience in a virtual world platform and found that Virtual Worlds (VW) have become a famous sort of programming application that has been used in various fields, from games to re-enactment or instruction. They enable people to communicate with others through their symbols and with objects in the earth. Virtual Worlds give new instructive encounters where coordinated effort and participation among clients can be effectively accomplished. Rico et al. (2011) introduced the outcome of an involvement with which students from a few secondary schools were offered a seminar on programming through

a VW instructive stage to make programming lesson additionally engaging for students. Simultaneously the proposed stage limits the exertion required by the educators to utilize the VW condition. At last, an assessment of the emotional experience of students and instructors when using the VW condition was done. The outcome of this assessment shows that the two educators and students had a palatable educational experience.

Schumacher (2001) studied internet, computer attitudes and gender experiences and revealed that it is generally expected that support by females on the Internet is hampered by their mentalities towards PCs, which thusly is intelligent of their frames of mind towards innovation. Research by and large backings that females have less in general involvement in PCs and are almost certain than guys to have negative frames of mind towards PCs. Albeit restricted, explore on Internet encounters and dispositions have discovered parallel sex contrasts, with females revealing lower levels of understanding and increasingly negative demeanours. This paper investigates regardless of whether Internet and PC encounters, abilities and dispositions are connected, utilizing proof from two investigations of approaching undergrads, in 1989/90 and 1997.

There were critical sex contrasts in numerous PC encounters and frames of mind of approaching students in 1989/90. Males were increasingly knowledgeable about computers, bound to have taken secondary school courses requiring PC use, and announced higher aptitude levels in applications, for example, programming, games and designs than females. By 1997, incoming students were more knowledgeable about utilizing a PC than the prior students. Be that as it may, gender differences in PC experience and expertise levels had lessened in certain territories. The 1997 overview moreover surveyed Internet encounters, aptitudes, ability and solace.

Students had used and use computers than to the Internet. Males were increasingly experienced and detailed higher expertise levels with the Internet than females, except for email. The general competency and solace level for students in 1997 was fundamentally higher for PCs than for the Internet; 19% of the students did not feel able or potentially alright with the computer compared to 36% with the Internet, with females reporting more elevated levels of ineptitude and inconvenience for both. Competence and solace levels with the Internet and PCs were profoundly inter-correlated, and both anticipated Internet aptitudes and experiences.

A study by Dittmar & Eilks (2019) on internet forums for secondary school students a survey of student opinions distinguished with an investigation of internet forum posts. Students nowadays are progressively tied up with the utilization of advanced data and communication technologies. The Internet keeps on developing and an ever-increasing number of young people are using it around the world. Instructive practices, in any case, have been delayed to adjust to the relating improvements. For instance, Internet is commonly overlooked in most instructive works on, including science training, even though they are regularly used to discover new data by ordinary individuals. The inquiry accordingly emerges: Why are the media not used to incite and advance science or science instructing and learning, while all the while creating basic logical media proficiency?

To see how the more youthful age learns through Internet forums, this research takes a gander at an overview of Internet discussion use to conduct lower and higher secondary school students (age run 12–17) in connection to chemistry-specific content. Discoveries from the analysis of client conduct stood out. From the last findings,

students are open and basic when using internet forums, even though such learning is, for the most part, detached formal instruction. The outcomes can advise chemistry and science instructing by concentrating on educating and adapting more on Internet forums to engage them as an educational medium in science class.

H3: There is a statistically significant direct effect of tutorials on students' perception on programming.

A study by Harms et al. (2016) on program learning from tutorials and code puzzles: children's value of perception found that tutorials and code perplex are usually utilized in the present amateur programming situations to acquaint PC programming with kids. While studies have investigated the adequacy of each instructional organization at educating unique sorts of data autonomously, little work has investigated students' impression of significant worth in every key choice client does in figuring out how to program in an instructional format. Harms et al. (2016) presents what students chose among numerous riddles and tutorials from indistinguishable programming content. Their thinking behind decisions and prospective results were investigated for studying bolster accessible for programming in the future.

A study by Abdunabi, Hbaci, & Ku (2019) on how to improve students' self-efficacy perceptions in programming in information systems found that the Information Systems (IS) department in business colleges is moving towards incorporating figuring out how to program in their undergrad core courses. Numerous elements influencing IS student achievement in figuring out how to do programming remain distinguished with students' perception information deficiency all alone skill. Students' attitude about worth as well as challenges to get the hang of programming can influence their

knowledge and skills acquisition. IS instructors need to comprehend the student perception identified with challenges of figuring out how to program to offer progressively viable help during teaching and associations with learners. The investigation in other to curtail the issue inspects two basic components in enhancing educating IS customizing courses: (a) Students' programming Self-Efficacy convictions all alone programming capability, joined by (b) programming aptitudes levels which IS learners at first idea learn for future calling. The study uses quantitative information obtained from college students in a Computer Information Systems classes at Colorado State University in the U.S.A. what's more, bolstered by subjective information.

Quantitative information quantifies the relationship among learners' programming self-adequacy, apparent benefit in programming, personal time for training and recurrence of teaching assistant (TA) discussions. Qualitative data is used to comprehend learners' considerations of programming aptitudes for future calling that can impact the programming self-viability throughout the learning procedure. This research significance relies on abilities of discoveries of the analysis as basic that research the best powerful influences that are probably going to be a medium which instructors will either develop personal viability of students as well as comprehend it all the more completely. Besides, these discoveries may impact academic practices for teaching programming dialects in advanced education settings all the more effectively. For example, executing a relevant learning method help with recognizing the best way to deal with programming courses, and thus, will prompt expanded learning results as experienced and described by IS learners.

This correlation study showed significant positive connection concerning IS students' programming self-adequacy and apparent benefit in getting the hang of programming. Be that as it may, the occurrence and training time of TA conferences required no huge association with program design self-adequacy. What's more, the subjective information uncovered a reasonable position of IS learners' prospect vision of their five coding stages in all program design abilities: beginner, end-client, communicator, the expert than another classification with "equipped" rising. This writing allows IS students to implant intercessions to expand their apparent benefit in getting training time in program design. It’s likewise extremely compelling in connecting real-life projects to class activities. Moreover, suggestions for instructors to use relevant studying method to bolster more elevated significant levels for program design and self-adequacy between IS students.

Additionally, harmonization among teachers and managers help create compelling program design class to improve IS students' activity attractiveness. Researching different components that conceivably add to IS student' customizing self-viability, for example, math introduction and past computer program design, inspiration and monetary position. Understanding the significance of self-viability in program design can aid successful IS instructors and proficient program courses to bring about students getting the hang of program design with great obtaining but few problem. Featuring the significance in connecting market wants with course substance can build learners’ customizing self-adequacy with odds of getting employments. Intelligent program design apparatus is recommended addition for IS teachers that build learner eagerness during training time to bolster learners own chip away to appreciate the class and skilled instructors to precisely follow and survey learners’ involvements.

A study by Wade et al. (2019) on radiology resources and adaptive tutorials: a combined techniques analysis of efficacy and engagement in senior medical students. Radiology training is fit to conveyance through e-learning to cover information gaps to plan an entry-level position for students. There exists constrained viability proof of adaptive tutorials which is a senior medicinal student e-learning accomplice. A randomized blended techniques hybrid preliminary was done to comprehend proper practice and translate essential imaging contemplates and evaluate commitment viability of adaptive tutorials. Eighty-one 5th and 6th years medicinal students in a 6-year program volunteer and were haphazardly dispensed to each in two groups. One group in the main period of preliminary on head CT got admittance to peer-investigated web-based resources and adaptive tutorials. A traverse was done then next period of test tending to chest CT initiated. Assessment appraisal was finished at end of each stage.

An online questionnaire was given to assess learner understandings of commitment and viability of educational materials used at the test conclusion. Controls that were factually noteworthy in primary stage had lower mean scores than adaptive tutorial groups in two stages. Students revealed higher commitment and in the general apparent estimation of the adaptive tutorials than controls. Adaptive tutorials are tremendously bolstered by senior medical students. Questionnaire reactions proposed a connection with how tutorials effectively maintain knowledge and cooperation on a fundamental level bolstered by test results.

A study on analysis of face to face tutorials of distance learners for prospective teachers in Pakistan by Akhter (2016) found that education programmes incorporate a component of up close and personal coaching. Information of this investigation depends

on an overview inquire about, getting information from 2549 separation students of educator instruction course B.Ed. with the assistance of questionnaire. The study found that separating students offer significance to instructional activities. They need arranged training exercises during teaching and learning of programming.

A study on investigating students' perceptions of first-year engineering tutorials by Miqdadi & Harris (2019) gave the results of the study that the accompanying proposals could improve the instructional exercise understanding for first-year students. A step by step instructions to get ready for the instructional exercise and expanding proactivity to help discover answers to students' inquiries. Giving helpful and opportune criticism so students can utilize remarks to improve. Learning the significance of their vitality and demeanour in a classroom and the amount it impacts students' support and learning. While going over class material the class is instructed overall, Later on, separated into groups to additionally examine the material and take part in exercises, Teaching Assistant (TA)'s catch up with students get an opportunity to move toward TA independently if necessary. Increase the measure of in-class conversations and utilization of online applications. Practice more test in the instructional exercise. Increase TA available time or dispense instructional exercise time to pose questions and get criticism from TA's about assignments.

A study on marking and providing feedback face-to-face: staff and student perspectives by Miqdadi & Harris (2019) found that the setting, checking and giving criticism on appraisals structure a significant piece of a mentor's job. Studies into the utilization of criticism and how it is deciphered by students show confound between what students are searching for and what guides think they are giving. Mentors remark that students are more inspired by the imprint than the criticism, but students show that they do not

get enough input or that it is not valuable. A companion of year 1 college students was given the option of receiving either written input or a 15-minute gathering with one of their guides to have their article set apart with them. On the whole, 49 students picked eye to eye checking, and the staying 35 students got composed input. Centre groups were utilized to explore student understanding. Staff individuals were additionally approached to ponder the procedure. Students and staff found the experience of eye to eye checking advantageous and positive. Both felt that the time spent together took into consideration an input discourse about the bit of work and that staff could clarify and legitimize why imprints were given.

According to Garratt-reed, Roberts, Heritage, & Garratt-reed (2016) on Grades, Student Satisfaction and Retention in Online and Face-to-Face Introductory Psychology Units: A Trial of Equivalency Hypothesis. There has been ongoing fast development in the quantity of brain research courses offered online through establishments of advanced education. The American Mental Affiliation has featured the significance of guaranteeing the adequacy of online brain science courses (Halonen et al., 2013). Notwithstanding this, there have been conflicting discoveries concerning student evaluations, fulfilment, and maintenance in online brain research units. Equivalency Hypothesis sets that on the web and classroom-based, students will accomplish equal learning results when comparable learning experience are given (Simonson, 1999; Simonson et al., 1999).

Garratt-reed, Roberts, Heritage, & Garratt-reed (2016) present an investigation of an online early on brain research unit intended to give comparable learning encounters to the prior up close and a personal variant of the unit. Utilizing semi trial techniques, scholarly execution, student criticism, and maintenance information from 866

Australian undergrad brain research students were inspected to evaluate whether the online unit created to give proportional learning encounters delivered practically identical results to the 'conventional' unit conveyed eye to eye. Student grades did not essentially contrast between methods of conveyance, except a gathering work-based evaluation where online students performed all the more inadequately. Student fulfilment was commonly high in the two methods of the unit, with bunch work the key wellspring of disappointment in the online unit. The outcomes offer halfway help for Equivalency Hypothesis. The project work-based appraisal did not give a comparable learning experience to students in the online unit featuring the requirement for additional exploration to decide successful strategies for drawing in students in online exercises. Reliable with past research, standards for dependability were fundamentally lower in the online unit, demonstrating the need to create viable methodologies to increment online degrees of consistency.

A study on Students' perceptions towards self-directed learning in Ethiopian medical schools with new innovative curriculum: a mixed-method study by Kidane, Roebertsen, & Vleuten (2020) found that self-directed learning (SDL) is suitable and favoured to students for long-lasting learning in their callings and make them keep awake-to-date. A blended strategy that examines configuration was utilized. Quantitative information was gathered by utilizing a self-managed poll of 80 questions estimating learners' observations on their SDL ability just as to investigate students' perspectives about the impact of segments of the educational plan on their SDL. Extra two centre group conversations, each containing eight members from year-1 and year-2 students, were directed.

The quantitative information was investigated utilizing SPSS. The group conversations were inspected, coded, and afterwards specifically broke down. The results demonstrated a huge increment in SDL score on contrasting students at year-1 and students at year-2 ($p = 0.002$). Both year-1 and 2 students appraised PBL instructional exercise conversation and coaches had high impact on their learning. Though, other curricular segments, for example, addresses and testicles had a low effect on their SDL capacity. PBL instructional exercise conversation and module targets indicated solid relationship with students' SDL scores, $r = 0.718$ and $r = 0.648$ ($p < 0.01$), separately. Also, PBL instructional exercise conversation was found unequivocally corresponded with coaches ($r = 0.599$ ($p < 0.01$)) and module destinations ($r = 0.574$ ($p < 0.01$)). Appraisal was profoundly corresponded with addresses ($r = 0.595$ ($p < 0.01$)).

Discoveries from subjective information indicated that specific curricular parts assumed the job in advancing students' SDL. Instructional exercises dissecting issues assumed a significant job on students' self-coordinated learning capacities. Even though the study suggested that segments of the crossover educational plan, for the most part, PBL, could energize preclinical students' self-coordinated learning, the educational program is as yet not liberated from educator focused culture as most of the instructors despite everything have high force in choosing the learning procedure.

A study on the perceptions of STEM tutors on the role of tutorials in distance learning by Campbell et al. (2019) revealed that as a feature of a more extensive study into recognitions that diverse college partners have of instructional exercises, we researched the UK Open College model for the educational cost through a procedure of semi-organized meetings with a self-choosing set of STEM coaches. These remember the

impression of the coaching job for bunch educational cost: encouraging scholastic learning and aptitudes; and supporting the structure of certainty, inspiration, social cooperation and shared group work abilities.

Challenges were distinguished in empowering student collaboration in online coordinated educational cost. Also, jumbles got clear between coaches' impression of student desires for educational cost and their own favoured methodologies, with the recommendation. He recommends that institutional techniques ought to be grown with the end goal that students could increase superior energy about how they could profit by playing an increasingly dynamic job in instructional exercises. This may assist students with bettering welcome the job that association with a group (friends and mentor) can play in their turn of events, and lead to a superior acknowledgement of the normal results of gathering educational cost.

H4: There exists a direct significant impact of students' perception of in programming on college students' interest in programming.

A study on an investigation of the effects of programming with Scratch on the preservice IT teachers' self-efficacy perceptions and attitudes towards computer programming by Yukselturk & Altiok (2017). The study test comprised of 151 preservice IT educators who took an elective course remembering a Scratch module for the 2013–14 scholastic year. Three online polls (Individual Data Survey, The PC Programming Self-Adequacy Scale and The PC Programming Learning Disposition Scale) were utilized to assemble the quantitative information and centre gathering interviews were led to gather the subjective information concerning the preservice IT educators' perspectives in more detail. As per the outcomes, there were huge increments

in the mean of the preservice IT instructors' self-viability discernments concerning practically all intricate programming errands after their Scratch programming experience. The outcomes likewise indicated that the preservice IT instructors' negative mentalities towards programming diminished altogether and programming in the Scratch stage had fundamentally beneficial outcomes on the preservice IT educators' perspectives concerning certain things in the scale.

H7: There is a statistically significant direct effect of students' perception of programming on college students' interest in programming.

A study by Koch (2019) on learner understanding of active learning and motives for the lecture revealed that concerning students' perceived confrontation of classroom active learning, teachers become reluctant in realising that strategy in the classroom structure regardless in what manner powerful it is. Such exploration comprehends perceptions of a student identified with the change to a greater predominance of active learning methods. It is our plan for students to know how a perfect classroom is organized, why to talk in active learning segments and potential clarifications to group work between instructional period. The researchers examined sixty-four with undergrad science students at the University of Nebraska-Lincoln, created coding rubrics from regularly discovered subjects in their answers, and investigated among the students how common every code was. The students favoured that the period of 75% used up in class is spent on a lecture in which they ordinarily view as important to take into account the content effectively, and one-fourth of the class time is spent on active learning, which they most now and again observed as significant for their very own response or response for their teacher. Ramifications of this research can assist teachers with structuring their class time and actualize active learning techniques adequately.

A study on pedagogy adapted to generate interest in students taking a programming course by Venugopal-wairagade (2016) revealed that with versatile application improvement getting one of the most looked for after decisions by software engineering students, designers and organizations, a teacher training a seminar on the equivalent to a bunch of fledglings ought to guarantee that the most ideal instructing learning systems are received to create enthusiasm among learners in the study room. The developer utilized a mixed methodology comprising of customary, e-learning and m-learning systems. These thusly, comprised of different instructing and assessment techniques. Through this paper, the creator examines the effect of the strategies embraced as a major aspect of the analysis, on the enthusiasm of the students and their particular execution. The example comprised of 22 postgraduate software engineering students. Their reactions to the instruments managed, their scores and their LMS get to logs were broke down.

The creator had the option to accomplish factually huge outcomes concerning the students' advantage and their presentation, for the most part, two methodologies coordination of LMS, and showing the points by building up an application in different stages all through the length of the course. It was discovered that concerning venture work, persistent association with the teacher was an ideal and acknowledged methodology by the students. The study additionally uncovered the misinterpretations that a teacher may have when teaching a programming language or when utilizing cell phones for instructing. The outcome the study was that students, all in all, comprehend the significance of following coding rules when writing a program, and it has no relationship with their ability in programming.

It was likewise discovered that when utilizing cell phones and tablets in class, the utilization of the gadget by the student may, to a little degree, rely upon the convenience of the gadget, as there exists just a feeble positive connection between the two parameters. The study likewise uncovered that the students' excitement need not demonstrate that he/she is enthused about getting their work assessed consistently (or week after week). In any case, it was seen that the normal reaction to the inquiry in regards to week by week entries and assessments was 1.45, which shows that the majority of the students that shaped the example favour week by week entries instead of presenting the work toward the finish of the semester with no week after week collaboration. One reason for this could be that they need to stay away from the very late problem and this causes them to take a shot at their venture normally in a progressively productive way. It was additionally discovered that when coordinating e-learning into the teaching method, if a student is effectively occupied with the utilization of the LMS, it might prompt his/her insight in specific parts of the course, for this situation, creating Android applications.

Since the connection between the two factors is frail to direct, we can say that the use of LMS may help in producing enthusiasm for the course. A significant perception that was made throughout the study was that there exists a solid positive connection between the students' scores and his/her reaction to stage shrewd realizing when instructing programming. This demonstrates if the educator encourages a programming course utilizing a couple of uses and builds up the application by circulating the advancement of the highlights all through the semester, the students might have the option to take a gander at the ideas from a more extensive view and might have the option to relate the ideas with each other since all the ideas are constituents of one entire framework. This

might be a superior methodology than showing one idea and afterwards showing another idea, with no connection between the two. The consequences of this investigation might be utilized by educators training programming dialects or any product building course.

H5: Students' perception has a mediating effect on the relationship between the accessibility of Resources on the Internet and college students' interest in programming.

A study by Wagner (2019) on students' perceptions of traditional textbooks vs. open educational resources concentrated on the increasing expense of reading material and the accessibility and cost adequacy of current instructional help such as open access textbooks (OAT) and open educational resources (OER). The motivation behind this study was to inspect the idealness of OER and OAT among Wilmington University's program chairs and faculty valuable on to the impression of helpfulness and convenience of the advancement to encourage significant and practical appropriation of OER and OAT at the advanced education establishment. Likewise, to decide the degree of attention to OER and OAT among the college's students and to understand the level of exertion students put resources into to maintain a strategic distance from the expense of traditional textbooks and the decent variety of methodologies used to abstain from making the buy.

The study used Rogers' (1962) dispersion of advancements and Davis' (1989) technology acceptance model as the theoretical frameworks to control the depiction of the development and appropriation procedure of OER and OAT. The findings demonstrated that both program chairs and faculty have a great perspective on OER and OAT, considering them to be valuable, moderately simple to use, and cost-effective

for students. The results likewise showed that a larger part of program chairs had been convinced to embrace OER/OAT development and many have just executed the assets in their educational plans. It's very well-reasoned that Wilmington University faculty members and program chairs are amenable to using non-traditional instructional materials, for example, OER/OAT. Besides, in light of students' actions and practices concerning the customary business print reading material, it shows up they will be responsive to alternatives, for example, OER and OAT innovation, due to cost-viability. Program chairs and faculty members, generally, have revealed positive reactions from students when these innovations in learning underpins have been used in the course educational programmes.

Self-explanation strategy on obtaining computer programing skills and its effect with worked examples by Alhassan & Arabia (2017). The reason for this research was to inspect the impact of using self-clarification learning procedure bolstered with examples that are worked on gaining computer programing abilities among rookie's secondary school students. This research embraced a semi trial technique, where an experimental group (n = 33) utilized the self-clarification procedure upheld with worked models in getting the hang of programming, and a control group (n = 31) figured out how to do programming using the learning strategy characterized in the National Guidelines for teaching computer curriculum. The consequences of the research demonstrated that students in the exploratory group accomplished fundamentally better in programing knowledge and abilities contrasted with the control group. This research prescribed to remember the self-explanation methodology for computer programing courses in secondary school computer education reading material.

Numerous past studies have discovered a constructive outcome of the use of the self-explanation technique on the students' learning in various topics (Lee, 2014; Kwon and Jonassen, 2011; Yuasa, 1994; Bielaczyc, 1995). The discoveries of the present studies are by these discoveries in the field of computer programing learning, both the information and abilities. The consequences of the present study are reliable with the outcome of various old studies led by Pirolli and Recker, (1994), as the outcomes demonstrated a beneficial outcome for the use of self-explanation procedure upheld with worked models when learning subjects identified with programming. This beneficial outcome was evident using the students' capacity to compose the right programming code and articulations, and the capacity to discover mistakes in given programming. Similarly significant, the present study demonstrated a positive effect of supporting the self-explanation methodology by using worked models that make it simpler for students to learn new programming ideas, which might be seen as a confusing issue by various new students.

This positive effect for the combination of these two procedures could be ascribed to their role in decreasing the psychological exertion of the student and deliberately directing that person to the most ideal approach to tackle the programming issues. The self-explanation methodology adds to the students' learning by testing the constraints of their thoroughly considering posing many inquiries about what is being instructed (Lee, 2014). Further conceivable support for these positive discoveries in accomplishment in programming information and abilities maybe because of the use of self-clarification technique when learning programing as this system assists with understanding complex ideas all the more profoundly. Various studies demonstrated that controlling students to use self-explanation technique encourages them to see a new

topic with a more noteworthy profundity of learning than that on account of a traditional technique for instructing, particularly when the system is bolstered with worked models (Roy and Chi, 2005; McNamara, 2009).

The self-clarification methodology may likewise assist students with arriving at positive outcomes as far as data recovery and the use of the past skills in new teaching settings, and make students progressively independent in the development of significance through their studies of the slip-ups and rectifying them, which may prompt the maintenance of gained ideas and aptitudes for a more extended time (Lee, 2014; Kalyuga, 2009; Vav Merrienboer & Sluijsmans, 2009). Furnishing students with worked models causes them, beat the normal missteps submitted by new students in computer programing. Such models offer the right use of the programming orders in numerous specific circumstances, which empowers them to compose new programming code with insignificant mistakes (Kwon & Jonassen, 2011). Furthermore, when learning computer programing, specifically, which includes a psychological weight (Cognitive Load), the use of worked models may help soothe this psychological over-burden (Garner, 2002).

2.6 Conclusion

The similarities among the related literature were that most of them were quantitative research study and their approach were similar (Kidane et al., 2020). The difference among them is that the study was done at a different research site, different participants and different concept used. In all, there was no contradiction among the studies. The concepts in this paper were clearly defined to cover any ambiguity. Many researchers have researched in all the variables used but they linked each to a different variable which was not used in this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study was designed to examine the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in the Ashanti Region of Ghana. This chapter covers the introduction, research design, profile of study area, population, sample and sampling technique, data collection instrument, data collection procedure, validity and reliability, pilot study, the procedure for the analysis of the data and ethical consideration.

3.2 Research Design

A research design is a design that shows how a problem under investigation can be solved (Lewis, Colombo, Lawrence, & Chandler, 2019). The study used a descriptive survey design. The study used a survey strategy because not much is known about the study and the research questions of the study use 'what'. Also, the study intends to describe the characteristics of all students used as a population in the study. A quantitative research study was used by the researcher (Walton, Homan, Naimi, & Tomovic, 2008). The design enabled the researcher to select a sample which constituted respondents from the different working environment to reflect those of the larger population. The descriptive research enabled the researcher to carefully construct standardized questionnaires that provided data in the same form from all respondents (Grace-martin, Gay, & Ph, 2014). The research design was appropriate since the researcher described some aspects of a population by selecting unbiased samples of

programming students at the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in the Ashanti Region of Ghana who was asked to complete the questionnaire.

3.3 Profile of the Study Area

Kwame Nkrumah University of Science and Technology (KNUST) is a university in Kumasi, Ashanti, Ghana. The Kwame Nkrumah University of Science and Technology is the public university built up in the nation, just as the biggest university in the Ashanti Region. KNUST has its foundations in the plans of the King Asantehene Agyeman Prempeh I to build up a university in Kumasi as a feature of his drive towards modernization of his Ashanti realm. This plan never worked out as intended because of the conflict between the British realm extension and the craving for King Prempeh I to safeguard his Ashanti realm's independence (Effah, 2018). In any case, his younger sibling and successor, King Asantehene Agyeman Prempeh II, after climbing to the Golden Stool in 1935, proceeded with this vision. Occasions in the Gold Coast during the 1940s paved the way for whatever he might have had planned.

First, there was the establishment of the University College of the Gold Coast. Second, there were the 1948 riots and the subsequent Watson Commission report which suggested that a university of sciences be built up in Kumasi. Therefore, in 1949, the fantasy of the Prempehs' turned into a reality when the building began on what was to be known as the Kumasi College of Technology (Daniel, 1998). The Kumasi College of Technology offered admission to its first students to the engineering faculty in 1951 (they entered in 1952), and an Act of Parliament gave the university its legal basis as the Kumasi College of Technology in 1952. The core of the school was shaped from

200 teacher training students moved from Achimota College in the Greater Accra Region. The school was a subsidiary of the University of London. In 1961, the school was allowed full college status. The University of Science and Technology succeeded the Kumasi College of Technology which was built up by a Government Ordinance on sixth October 1951.

It was in any case, opened formally on 22nd January 1952 with 200 Teacher Training students moved from Achimota, to shape the core of the new College. The Kumasi College of Technology was in this manner changed into an undeniable University and renamed Kwame Nkrumah University of Science and Technology by an Act of Parliament on 22nd August 1961. The University's name was changed to University of Science and Technology after the Revolution of 24th February 1966. The University of Science and Technology was formally initiated on Wednesday, twentieth November 1961. Nonetheless, by another demonstration of Parliament, Act 559 of 1998, the University has been renamed Kwame Nkrumah University of Science and Technology, Kumasi (KNUST, 2019).

Kumasi Technical University was built up in 1954 as Kumasi Technical Institute (K. T. I.) to offer speciality courses. In 1963, the Institute was changed over to a non-tertiary Polytechnic status under the Ghana Education Service to begin offering, furthermore, technician diploma and sub-proficient courses. The Polytechnic Law, 1992 (PNDC L.321) raised the Polytechnic to a tertiary establishment to furnish high calibre skilled manpower concerning producing, trade, science and technology to go about as an impetus for technological improvement. As a Polytechnic it was one of the well-known, rich and lively Polytechnics in Ghana (University, 2018). The Technical University Act

2016, (Act 922) changed over Kumasi Polytechnic to the current Kumasi Technical University with the point of giving advanced education in engineering, applied arts, science technology-based disciplines, technical and vocational training.

It is a marvellously delightful institution, which is situated at the core of the Garden city of West Africa, the capital city of the Ashanti Region of Ghana (Kumasi). It has within the time of its reality become a significant community for the training for Ghana as well as for other African nations. As built up in 1954, Kumasi Technical University is a non-profit public higher education institution situated in the enormous city of Kumasi (populace scope of 1,000,000-5,000,000 occupants), Ashanti. Formally certify as well as perceived by the National Accreditation Board, Ghana (National Accreditation Board, Ghana), Kumasi Technical University (KTU) is a coeducational advanced education institution. Kumasi Technical University (KTU) offers courses and projects prompting authoritatively perceived advanced education degrees, for example, four-year certifications in a few zones of study (Unirank, 2020).

The University of Education, Winneba (UEW) is a University in Winneba, Central Region of Ghana. It was built up in 1992 by a government ordinance (PNDC Law 322) and with a relationship with the University of Cape Coast (Brooks, 2009). Its fundamental point is to train educators for the education system of Ghana. The University of Education, Winneba is accused of the obligation of teacher education and producing proficient teachers to lead another national vision of education planned for diverting Ghana's endeavours along the way of fast economic and social advancement (Wan, 2008). The University of Education, Winneba is required to assume the main job in Ghana's drive to produce scholars whose knowledge would be completely receptive

to the real factors and exigencies of contemporary Ghana (Wikipedia, 2020). The University of Education Winneba has four branches in Ghana, one is at Winneba in the central region of Ghana, Ajumako in the central region of Ghana, Mampong in the Ashanti Region of Ghana, and Kumasi in the Ashanti Region of Ghana. Kumasi grounds have the College of Technology Education and is found 320 Kilometers from Winneba and 280 Kilometers north of Accra. The grounds have the accompanying resources; Faculty of Business Education, Faculty of Vocational, Faculty of Technical Education, and Faculty of Education and Communication Science (Kumasi, 2020).

3.4 Population

Population refers to the group or individuals to whom the survey applies. It is the population to which a researcher wants to generalize the results of a study (Muianga, Barbutiu, & Hansson, 2019; Fischer, Karl, & Fischer, 2019). The study was conducted at the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in the Ashanti Region of Ghana because the researcher wanted the study to be done in the three public universities in the Ashanti Region of Ghana. Ashanti Region is one of the sixteen regions in Ghana. The population of the study was Computer Science, Mathematics and Information Technology students in the Kumasi Technical University, University of Education Winneba – Kumasi, and Kwame Nkrumah University of Science and Technology. The target population for the study included all Computer Science, Mathematics and Information Technology students in the Kumasi Technical University, University of Education Winneba – Kumasi, and Kwame Nkrumah University of Science and Technology.

The population for the study was eight thousand four hundred and twenty (8,420). There were nine hundred and thirty-five (935) students of Mathematics and two thousand six hundred and thirty (2,630) students of Information Technology at the University of Education Winneba – Kumasi. Also, at the Kwame Nkrumah University of Science and Technology, two thousand and thirty-five (2,035) were Mathematics students and two thousand three hundred and twenty (2,320) were Computer Science students. Finally, five hundred (500) of the remaining population were Computer Science students from Kumasi Technical University. One hundred and forty-three (143) level 300 students, three hundred and two (302) level 200 students and four hundred and ninety (490) level 100 students of Mathematics at the University of Education Winneba – Kumasi. Eight hundred and fifty (850) were level 100 students, six hundred and eighty (680) were level 200 students, five hundred and seventy (570) were level 300 students, and five hundred and thirty (530) were level 400 students of Information Technology students at the University of Education Winneba – Kumasi.

Four hundred and thirty (430) level 400 students, five hundred and fifty-five (555) level 300 students, five hundred and twenty (520) level 200 students and five hundred and thirty (530) level 100 students of Mathematics at the Kwame Nkrumah University of Science and Technology. Five hundred and fifty (550) were level 400 students, five hundred and eighty (580) students were level 300 students, five hundred and seventy-two (572) students were level 200 students, and six hundred and thirty-eight (638) were level 400 students of Computer Science students at the Kwame Nkrumah University of Science and Technology. One hundred and ten (110) were level 400 students, one hundred and twenty (120) students were level 300 students, one hundred and thirty-two (132) students were level 200 students, and one hundred and thirty-eight (138) were level 400 students of Computer Science students at the Kumasi Technical University.

3.5 Sample and Sampling Technique

The technique of purposive sampling was used in selecting the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in Ghana for the study. These three universities were chosen based on the fact that they are found in one capital city called, Kumasi where the researcher lives. The selected university for the study is among the best universities in Ghana. In purposive sampling, the cases to be used in the sample are handpicked based on their judgment of their typicality or particular knowledge about the issues under study (Trek, 2020). The researcher used an online sample size calculator from survey monkey with a population of eight thousand four hundred and twenty (8,420) with a confidence level of 95% and a margin error of 5%. A confidence level of 95% means the researcher is 95% sure that the findings for the sample will be the same as the findings for the population. The sample size was three hundred and sixty-eight (368). For the sample size to be representative, the researcher used a stratified random sampling technique to select participants for the study (Celestine & Nonyelum, 2018).

Stratified random sampling precisely mirrors the population being examined because the researcher is delineating the whole population (Murphy, 2020). The total population for males were two thousand eight hundred and twenty-four (2,824) whiles one thousand five hundred and ninety-six (1,596) were females. Since there are plenty of males in the population, the majority of males were selected over females for the study. The researcher selected the sample size by calculating a fraction of males over the population (2,840/4,420) of the sample for men which was two hundred and thirty-six (236) and another fraction of females over the population (1,596/4,420) of the sample for females which was one hundred and thirty-two (132). The researcher used stratified sampling in selecting the participants.

The researcher used stratified random sampling because it guarantees every subgroup inside the population gets an appropriate portrayal within the sample (Murphy, 2020). As a result, stratified random sampling gives better inclusion of the population since the researcher has authority over the subgroups to guarantee every one of them are represented in the sampling (Mohamed, 2019). A stratified sample can give more prominent accuracy so it frequently requires a smaller sample, which saves money (Trek, 2020). A stratified sample can make preparations for an unrepresentative sample like an all-male sample from a mixed-gender population (Trek, 2020). A stratified sample was guaranteed that the researcher got adequate sample focuses to help a separate analysis of the population.

3.6 Research Instrument and Measurement

The researcher used a questionnaire to gather the data for studying the issue under investigation (Asih, 2019; Lin et al., 2019). The questionnaire for respondents was close-ended (Ngitoria, 2014; Kataria, Krishna, Tyagi, & Vashishat, 2019). Simple sentences were used for the wording such that respondents could understand the instructions. Five-point Likert-type scale was given ranging from '1' to '5'- from 'strongly disagree' to 'strongly agree' (see Appendix A) (Yukselturk & Altiok, 2017; Mohamed, 2019). The questionnaire consists of three main sections, that is section A, section B and section C. Section 'A' consists of the background of respondents (see Appendix A). It focused on the gender and age of the participants (see Appendix A). Section B consist of information about their educational institution, a program of study and their school level, and section C was based on areas according to the research questions and the variables (see Appendix A).

In section C the questionnaire consist of five sub-sections: PW as project work, IRA as internet resource accessibility, T as tutorials, SP as students' perception, and CSIIP as college students' interest in programming (see Appendix A) (Ma, Gam, & Banning, 2017). Although the sample size for the study was three hundred and sixty-eight (368) but the researcher will share three hundred and fifty questionnaires to avoid any inconveniences. Four items were adapted from a study by Chen et al. (2018) to design the questionnaire and measure students' perception, another four items were adapted from a study by Chen et al. (2018) to measure students' interest in programming. Another four items were adapted from a study by White et al. (1997) to measure students' interest in programming.

3.7 Data Collection Procedure

Data were collected within one week. A letter of permission was sent to the head of the department at the University of Education Winneba – Kumasi, Kumasi Technical University, and Kwame Nkrumah University of Science and Technology in the Ashanti Region of Ghana to permit the researcher to use the place for the research site (see Appendix C). Respondents were briefed about the study but the researcher could not go there to administer the questionnaires because of the worldwide pandemic (Glass & Song, 2019). Due to the issue of the worldwide pandemic, the researcher created the questionnaire with Google forms and sent the link to the participants WhatsApp group with instructions on how to answer the questionnaire. Prior notice was given to them as to when the researcher needed their response. The researcher gave them a telephone number to call for further explanation if needed. The first question in the research questions asked whether they learn programming as part of their course or not. Priorities were given as to whether participants want to take part or not, if 'Yes' then the participants proceeded on to answer the items in the questionnaire. The research

questionnaire was created to take 15 minutes for the respondents to answer the items in it (Liao, Robert, Gurung, & Shi, 2015).

3.8 Validity

The validity of an instrument is the degree to which an instrument measures what it is intended to measure (Kimberlin & Winterstein, 2008). As it were the researcher must get the truth of reactions of those individuals who are under the study as participants through looking at their reactions (Lanlan, Ahmi, Muse, & Popoola, 2019). The importance of the various kinds of validity (criterion, content, and construct) cannot be overlooked in any study. The instruments for data collection were consequently exposed to content analysis. The validity of the questionnaire was acquired by introducing it to the head of the department of Computer Science, Mathematics and Information Technology at University of Education Winneba – Kumasi and Kwame Nkrumah University of Science and Technology (Sommestad et al., 2017). The instruments for data collection were vetted by the researcher's supervisor. This was to determine the face and content validity of the instruments.

However, all corrections and modifications made by my supervisor were effected and research statements or items reconstructed based on the satisfactory comments from the supervisor. This enabled the researcher to develop instruments that yielded valid information (Ciência et al., 2019). The information in the questionnaire was given to ten colleagues to explain how they understand and how they will respond to the questions. Their responses were analysed using SPSS to check the level at which the information in the questionnaire measures the objectives and the extent at which it is related to the outcome of the study (students' interest in programming). The purpose of

this was to check whether the information in the questionnaire meets the objectives of the study. Also, to know if the information in the questionnaire is fairly representative.

3.9 Reliability

The reliability of a measure demonstrates the degree to which it is without inclination and guarantees reliable estimation across time and different things (Heale & Twycross, 2015). It is a proportion of security and consistency with which instrument measures the concept (Sekaran & Bougre, 2011). The Cronbach alpha was used to measure the internal consistency and to determine the reliability of the questionnaire. This statistic gives a thought of the average correlation among the entirety of the things that make up the scale of the instrument. To measure the reliability variables in the research questionnaire, an assessment of the consistency of the responses from the respondents on the pilot questionnaire was made using the Cronbach alpha (Abd, Zaidi, Razak, Abu, & Salihin, 2016). The Cronbach alpha is most regularly used when there are different Likert items in a questionnaire that structure a scale and you wish to decide whether the scale is reliable. The reliability test for Computer programming was .76, Project Work was .70, Accessibility of Resources on the Internet was .81, Tutorials was .73, Students' Perception was .75, and College Students' Interest in Programming was .723.

3.10 Pilot Study

A pilot study is an urgent part before requesting the respondents to fill out the questionnaires, and there are various advantages for doing pilot tests (Riemenschneider, Leonard, & Manly, 2019). Aside from guaranteeing the validity and the reliability of the questionnaire, it can likewise guarantee the questions are worded, and that the respondents correctly understand the questionnaire. Thus, Computer Science,

Mathematics and Information Technology students at Christian Service University was used for the pilot study. The reason for selecting the university was that it is found in the same geographical neighbourhood, therefore shares similar characteristics with the sampled schools.

The researcher sent the questionnaire in Google forms for the participants to answer. Forty (40) answered questionnaire were selected for the pilot study. The researcher used SPSS (Degagne & Degagne, 2007) to analyse the pilot test and the Cronbach Alpha coefficient was 0.745. In light of this test, if the CR for a particular item was 0.70 or less, it was excluded from the final analysis (Ju, Xu, Qin, & Spector, 2019). Notwithstanding, if the base standards could be accomplished by dropping at least one item with low factor loadings while keeping up in any event two items, just the things regarded as unreliable were excluded, not the whole construct (Mcbride, Carter, & Phillips, 2020).

3.11 Data Analysis Procedure

Data collected was edited by carefully inspecting it to identify the mistakes and questions wrongly answered and responded to items. Analysis of the data was done through the use of the Statistical Package for Social Sciences (SPSS) version 22 and PROCESS Macro (Baran, Bilici, Sari, & Tondeur, 2019). This software was selected because of its reliability, accuracy, user-friendly interface and the most employed package for analysing data. Data collected from the respondents were analysed using both inferential statistics and descriptive statistics (Guerin et al., 2019; Adams, 2018). Data for research question one, two and three were analysed using the mean, standard deviation and regression analysis and Pearson zero-order correlation (Huang, 2016). The Pearson zero-order correlation is used when you want to investigate the strength of

the relationship between two continuous variables. This provides a sign of the guidance whether positive or negative as well as the strength of the relationship (weak, moderate or strong).

Again, the hypothesis of the study was tested using multiple regression procedures. The choice of this statistical tool is that all the variables were measured on a Likert scale (Fleming & Fleming, 2019). The multiple regression method is a multivariate technique used to test the predictive power of a lot of predictor variables and to assess the general commitment of every individual variable on the criterion variable. In the multiple regressions, the dependent variable was regressed on the independent and the intervening variables. The researcher, therefore, employed this technique over the others because the predictor variables in the study were more than two. Also, the contribution of individual predictor variables was needed. Additional tests that was used for the analysis were reliability test and correlation analysis.

3.12 Ethical Consideration

In conducting the study, participation in the study was voluntary and respondents were informed about their rights to decline participation at any time. To obtain respondents' informed consent, an explanation about the reasons and purpose of the study was communicated to them (Jacques, St, Tribble, & Pierre, 2019). The anonymity of the respondents was ensured and the data that they provide was treated with the utmost confidentially (Gajjar, 2013). Appropriate citations and references were done in the study.

3.13 Conclusion (Summary)

This chapter discussed the research methods. They included research design, population, sample and sampling procedures, instruments, validity and reliability, data collection procedure, data analysis as well as ethical considerations.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This purpose of the study was designed to examine the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the public universities in Kumasi, Ghana. This chapter deals with the presentation of data, data analysis and discussion. The current chapter is grouped into five sections which are respondents' demographics, measurement issues (reliability test and correlation table), descriptive results, hypotheses testing and conclusion.

4.2 Data Analysis of Administered Questionnaire

A study of the response obtained from the administered questionnaire is as follows: A total of three hundred and eighty-six (386) responses to the questionnaire were downloaded from Google forms. Only three hundred and sixty-eight (368) were accepted (which represents 95.3% of the response); thereby indicating that eighteen (18) questionnaires were rejected because the respective respondents failed to answer all the questions (Saani, 2012).

Table 1: Respondents reaction to the questionnaire on Google forms

Respondents (Students at)	Responses Received	Responses Accepted
KNUST	52	48
UEW - Kumasi	273	263
KTU	61	57
Total	386	368

Source: Researcher's fieldwork, (2020)

Table 1 shows respondents' response to a questionnaire on Google forms, where fifty-two (52) responses were from students at Kwame Nkrumah University of Science and Technology (KNUST). Two hundred and seventy-three (273) responses were from students at the University of Education Winneba, Kumasi (UEW-K) and sixty-one (61) responses were from students at Kumasi Technical University (KTU). Out of the responses received forty-eight (48) responses were accepted from students at KNUST, two hundred and sixty-three (263) responses were accepted from students at UEW-K and sixty-one (61) responses were accepted from students at KTU. The accepted responses were coded in SPSS based on the variables. Questions in the questionnaire meant to measure project work consisted of 16 questions and were coded as PW (PW1, PW2, PW3, PW4, PW5, PW6, PW7, PW8, PW9, PW10, PW11, PW12, PW13, PW14, PW15, and PW16) (see Appendix A).

Furthermore, questions in the questionnaire meant to measure internet resources accessibility consisted of 11 questions and were coded as IRA (IRA1, IRA2, IRA3, IRA4, IRA5, IRA6, IRA7, IRA8, IRA9, IRA10, and IRA11) (see Appendix A). Moreover, questions in the questionnaire meant to measure tutorials consisted of 8 questions and were coded as T (T1, T2, T3, T4, T5, T6, T7, and T8) (see Appendix A). Also, questions in the questionnaire meant to measure students' perception consisted of 12 questions and were coded as SP (SP1, SP2, SP3, SP4, SP5, SP6, SP7. SP8, SP9, SP10, SP11, and SP12) (see Appendix A). Lastly, questions in the questionnaire meant to measure college student's interest in programming consisted of 9 questions and were coded as CSIIP (CSIIP1, CSIIP2, CSIIP3, CSIIP4, CSIIP5, CSIIP6, CSIIP7, CSIIP8, and CSIIP9) (see Appendix A).

4.3 Respondents' Demographics

The current study discusses demographics concerning respondents' age, respondents' gender, respondents' institution, respondents' program of study and respondents' level in the institution. Table 2 demonstrated that three hundred and sixty-eight (368) of the respondents representing 100% were 22 years of age or 42 years of age or between. Also, three hundred and fifty-two (352) of the respondents were males representing 95.7%. Sixteen (16) respondents were females representing 4.3%. Again, table 2 shows the university where respondents school and demonstrated that forty-eight (48) respondents were attending Kwame Nkrumah University of Science and Technology (KNUST) representing 13%. Two hundred and sixty-three (263) respondents were attending the University of Education Winneba, Kumasi (UEW-K) representing 71.5%. Fifty-seven (57) respondents were attending Kumasi Technical University (KTU) representing 15.5%.

Again, table 2 shows the course of study of respondents and demonstrated that forty-eight (48) respondents were computer science students representing 13%. One hundred and five (105) respondents were Mathematics students representing 28.5%. Two hundred and fifteen (215) respondents were Information Technology students representing 58.5%. Again, table 2 shows the level at which respondents are, at their respective university. It demonstrated that one hundred and seventy-seven (177) respondents were level 200 students representing 48.1%. Ninety-three (93) respondents were level 300 students representing 25.3%. Ninety-eight (98) respondents were level 400 students representing 26.6%.

Table 2: Respondents' Demographic Characteristics

Variables	Frequency (f)	Percentage (%)
Age		
22-42 years	368	100.0
Total	**368**	**100.0**
Gender of Respondents		
Male	352	95.7
Female	16	4.3
Total	**368**	**100.0**
Course of Study		
Computer Science	48	13
Mathematics	105	28.5
Information Technology	215	58.5
Total	**368**	**100.0**
Level of Study		
Level 200	177	48.1
Level 300	93	25.3
Level 400	98	26.6
Total	**368**	**100.0**
Name of University		
KNUST	48	13%
UEW-K	263	71.5%
KTU	57	15.5%
Total	**368**	**100.0**

Source: Researcher's fieldwork, (2020)

4.4 Reliability Test

Table 3 shows that fifty-six (56) items with a Cronbach's Alpha of 0.769 (76.9% consistent good result) for project work, internet resources accessibility, tutorials, students' perception and college students' interest in programming. This means that the variables were reliable.

Table 3: Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.769	56

Source: Researcher's fieldwork, (2020)

4.5 The Influence of Project Work on Students' Perception of Programming at the Public Universities in Ghana

The descriptive results for the current study emphasized on the influence of project work on students' perception of programming at the public universities in Ghana. It shows the mean, standard deviation, skewness, Kurtosis, minimum and maximum Likert choice chosen by respondents, and the total number of respondents (Al-adwan, Box, & Arabia, 2016). The results also show the hypothesis that test the effect and relationship between the variables. Table 4 shows the descriptive statistics of responses to project work on the kind of project work been given to students. Also, Table 5 shows the descriptive statistics of responses to project work on their level of agreement. The results show that standalone systems (PW1) had the highest mean of 2.4266 which means that, standalone systems was the highest factor to the project work given to students. The average distance a score was from the mean was 0.84495, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Entertainment system (PW8) had the second-highest mean of 2.3234 which means that entertainment system was the second highest factor to project work given to students. The average distance a score was from the mean was 0.98285, representing the measure of dispersion (standard deviation) which widely spread the distribution. The batch processing system (PW4) had the third-highest mean of 2.2853 which means that batch

processing system was the third-highest factor of project work given to students. The average distance a score was from the mean was 0.72900, representing the measure of dispersion (standard deviation) which widely spread the distribution. System for modelling and simulation (PW5) had the fourth highest mean of 2.1223 which means that a system for modelling and simulation was the fourth-highest factor of project work given to students. The average distance a score was from the mean was 0.95040, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Embedded system (PW3) had the fifth-highest mean of 2.0734 which means that the embedded system was the fifth-highest factor of project work given to students. The average distance a score was from the mean was 0.84657, representing the measure of dispersion (standard deviation) which widely spread the distribution. Interactive transaction-based software (PW2) had the sixth-highest mean of 2.0707 which means that interactive transaction-based software was the sixth-highest factor of project work given to students. The average distance a score was from the mean was 0.61799, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Data collection system (PW7) had the seventh-highest mean of 1.7989 which means that data collection system was the seventh-highest factor of project work given to students. The average distance a score was from the mean was 0.71405, representing the measure of dispersion (standard deviation) which widely spread the distribution. Information system (PW6) had the last mean of 1.7255 which means that an information system was the last factor of project work given to students. The average distance a score was from the mean was 0.59352, representing the measure of

dispersion (standard deviation) which widely spread the distribution. The skewness was from -0.177 to 2.047 which means, the variable was sufficiently normal. The kurtosis of two items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of four items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean. Again, the kurtosis of two items was greater than 3 which means that it had no relatively few outliers.

Table 4: Descriptive Statistics for Project Work on the kind of project work been Given to students

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PW1	368	1.00	4.00	2.4266	.84495	-.177	.127	-.671	.254
PW2	368	1.00	4.00	2.0707	.61799	.931	.127	2.352	.254
PW3	368	1.00	5.00	2.0734	.84657	1.865	.127	4.435	.254
PW4	368	1.00	5.00	2.2853	.72900	2.047	.127	5.574	.254
PW5	368	1.00	5.00	2.1223	.95040	1.170	.127	1.646	.254
PW6	368	1.00	3.00	1.7255	.59352	.171	.127	-.551	.254
PW7	368	1.00	4.00	1.7989	.71405	.676	.127	.430	.254
PW8	368	1.00	5.00	2.3234	.98285	.891	.127	.452	.254

Source: Researcher's fieldwork, (2020)

Also, on participants' level of agreement to questions under project work, the study shows that Project work can make students find interest in programming (PW12) had the highest mean of 2.8668 which means that, project work can make students find interest in programming. The average distance a score was from the mean was 1.56117, representing the measure of dispersion (standard deviation) which widely spread the distribution. Project work helps to disclose positive information about programming

(PW13) had the second-highest mean of 2.4810 which means that, project work helps to disclose positive information about programming. The average distance a score was from the mean was 1.16706, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Project work exposes students in the designing algorithm (PW9) had the third-highest mean of 2.2418 which means that project work exposes students in designing an algorithm. The average distance a score was from the mean was 0.74460, representing the measure of dispersion (standard deviation) which widely spread the distribution. How project work directs the students can lead to enthusiasm (PW14) had the fourth highest mean of 2.0870 which means that, how project work directs the students can lead to enthusiasm. The average distance a score was from the mean was 0.96987, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Project work makes students learn (PW16) had the fifth-highest mean of 2.0000 which means that project work makes students learn. The average distance a score was from the mean was 0.93377, representing the measure of dispersion (standard deviation) which widely spread the distribution. Project work gives information to students (PW11) had the sixth-highest mean of 1.8832 which means that project work gives information to students. The average distance a score was from the mean was 0.92199, representing the measure of dispersion (standard deviation) which widely spread the distribution. Project work influences students' perception (PW15) had the seventh-highest mean of 1.8723 which means that project work influences students' perception.

The average distance a score was from the mean was 0.62421, representing the measure of dispersion (standard deviation) which widely spread the distribution. Project work helps in understanding the linguistic structure just as the rationale of the program (PW10) had the last mean of 1.8261 which means that, project work helps in understanding the linguistic structure just as the rationale of the program. The average distance a score was from the mean was 0.61514, representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from -0.344 to 1.639 which means, the variable was sufficiently normal. The kurtosis of five items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of two items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean. Again, the kurtosis of one item was greater than 3 which means that it had no relatively few outliers.

Table 5: Descriptive Statistics for Project Work on their level of agreement

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PW9	368	1.00	4.00	2.2418	.74460	-.344	.127	-.984	.254
PW10	368	1.00	3.00	1.8261	.61514	.122	.127	-.477	.254
PW11	368	1.00	5.00	1.8832	.92199	1.639	.127	3.394	.254
PW12	368	1.00	5.00	2.8668	1.56117	.400	.127	-1.476	.254
PW13	368	1.00	5.00	2.4810	1.16706	.904	.127	.024	.254
PW14	368	1.00	4.00	2.0870	.96987	.798	.127	-.245	.254
PW15	368	1.00	3.00	1.8723	.62421	.096	.127	-.484	.254
PW16	368	1.00	5.00	2.0000	.93377	1.534	.127	2.863	.254

Source: Researcher's fieldwork, (2020)

Table 6 demonstrated that I see programming as unfamiliar (SP5) had the highest mean of 3.2283 which means that, students see programming as unfamiliar was the highest perception of programming to students. The average distance a score was from the mean was 1.07337, representing the measure of dispersion (standard deviation) which widely spread the distribution. I see programming as lovely when resources are easily accessible (SP2) had the second-highest mean of 3.2255 which means that students see programming as lovely when resources are easily accessible was the second-highest perception on programming to students. The average distance a score was from the mean was 1.48405, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I see programming as difficult (SP6) had the third-highest mean of 3.1223 which means that students see programming as difficult was the third-highest perception of programming to students. The average distance a score was from the mean was 1.04855, representing the measure of dispersion (standard deviation) which widely spread the distribution. I see programming language to be difficult to understand (SP8) had the fourth highest mean of 2.9293 which means that, students see programming language to be difficult to understand was the fourth-highest perception on programming to students. The average distance a score was from the mean was 0.88918, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I see the difficulty in learning visual/script programming (SP12) had the fifth-highest mean of 2.8451 which means that students see the difficulty in learning visual/script programming was the fifth-highest perception on programming to students. The average distance a score was from the mean was 1.10507, representing the measure of

dispersion (standard deviation) which widely spread the distribution. I see the difficulty in learning procedural programming (SP11) had the sixth-highest mean of 2.6957 which means that students see the difficulty in learning procedural programming was the sixth-highest perception of programming to students. The average distance a score was from the mean was 1.07221, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I see programming as time-consuming (SP3) had the seventh-highest mean of 2.5299 which means that students see programming as time-consuming was the seventh-highest perception of programming to students. The average distance a score was from the mean was 1.12885, representing the measure of dispersion (standard deviation) which widely spread the distribution. I see the difficulty with concepts involving mathematical logic (SP10) had the eighth highest mean of 2.4212 which means that students see the difficulty with concepts involving mathematical logic was the eighth highest perception on programming to students. The average distance a score was from the mean was 1.08207, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I see programming as entrepreneurial (SP4) had the ninth highest mean of 2.0082 which means that students see programming as entrepreneurial was the ninth highest perception of programming to students. The average distance a score was from the mean was 0.76890, representing the measure of dispersion (standard deviation) which widely spread the distribution. I see graphical programming languages to be helpful to young learners (SP9) had the tenth highest mean of 2.0082 which means that students see graphical programming languages to be helpful to young learners was the tenth

highest perception on programming to students. The average distance a score was from the mean was 0.82034, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I see programming as easy with dedication (SP7) had the eleventh highest mean of 1.8342 which means that students see programming as easy with dedication was the eleventh highest perception of programming to students. The average distance a score was from the mean was 0.83664, representing the measure of dispersion (standard deviation) which widely spread the distribution. I see programming as easy with the help of tutorials (SP1) had the twelfth highest mean of 1.8071 which means that students see programming as easy with the help of tutorials was the twelfth highest perception on programming to students. The average distance a score was from the mean was 0.83405, representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from -0.518 to 0.857 which means, the variable was sufficiently normal. The kurtosis of eleven items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of one item was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean.

Table 6: Descriptive Statistics for Students' Perception

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SP1	368	1.00	5.00	1.8071	.83405	.857	.127	.292	.254
SP2	368	1.00	5.00	3.2255	1.48405	.075	.127	-1.623	.254
SP3	368	1.00	5.00	2.5299	1.12885	.360	.127	-1.138	.254
SP4	368	1.00	4.00	2.0082	.76890	.167	.127	-.838	.254
SP5	368	1.00	5.00	3.2283	1.07337	-.518	.127	-.783	.254
SP6	368	1.00	5.00	3.1223	1.04855	-.446	.127	-.750	.254
SP7	368	1.00	5.00	1.8342	.83664	.629	.127	-.371	.254
SP8	368	1.00	5.00	2.9293	.88918	-.376	.127	-.295	.254
SP9	368	1.00	4.00	2.0082	.82034	.551	.127	-.142	.254
SP10	368	1.00	5.00	2.4212	1.08207	.321	.127	-1.005	.254
SP11	368	1.00	5.00	2.6957	1.07221	-.063	.127	-1.131	.254
SP12	368	1.00	5.00	2.8451	1.10507	.225	.127	-.809	.254

Source: Researcher's fieldwork, (2020)

H1: *There exists a direct significant effect of project work on students' perception of programming.*

Table 7 illustrate the direct significant effects of project work on students' perception of programming. The R Square of the model summary illustration is .0304 which means the significant effects of project work account for only 3.04% of the contribution of factors that influence students' perception of programming. The significant value is .0008 which is below .01 and .05 with a coefficient value of .2776 and a standardized coefficient of .1744 (see Appendix B). This indicates that there was a direct significant effect of project work on students' perception of programming.

Table 7: Independent Variable – Project Work

Model Summary						
R	R-sq	MSE	F	df1	df2	P
.1744	.0304	.2135	11.4870	1.0000	366.0000	.0008

Source: Researcher's fieldwork, (2020)

H5: *There exists a direct significant mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming.*

Table 8 illustrate the direct significant mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming. The R Square of the model summary illustration is .0034 which means the mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming account for only 0.34% of the contribution of factors that influence college students' interest in programming (see Appendix B). From the model in table 8, the significant value (p) for the mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming is .2750 which is above .05 with a coefficient value of .0819 and a standardized coefficient of .0580. This indicates that there was no direct significant mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming.

H4: *There exists a direct significant impact of students' perception of programming on college students' interest in programming.*

Also, from table 8, the significant value (p) for students' perception of programming on college students' interest in programming is .9806 which is above .05 with a coefficient value of .0011 and a standardized coefficient of .0013 (see Appendix B). This indicates that there is no statistically significant effect of students' perception of programming on college students' interest in programming.

Table 8: Mediating Role of Students' Perception

Model						
	coeff	se	t	p	LLCI	ULCI
Constant	2.3643	.1836	12.8789	.0000	2.0033	2.7253
Student Perception	.0819	.0749	1.0932	. 2750	-.0654	.2292
Project Work	.0011	.0471	.0243	. 9806	-.0914	.0937

Source: Researcher's fieldwork, (2020)

H8: *There exists a direct significant effect of project work on college students' interest in programming.*

Table 9 illustrate the direct significant effects of project work on college students' interest in programming. The R Square of the model summary illustration is .0034 which means the significant effects of project work account for only 0.34% of the contribution of factors that influence college students' interest in programming. The significant value is .2651 which is above .05 with a coefficient value of .0822 and a standardized coefficient of .0582 (see Appendix B). This indicates that there is no direct significant effect of project work on college students' interest in programming.

Table 9: Project Work on college students' interest in programming

Model Summary						
R	R-sq	MSE	F	df1	df2	P
.0582	.0034	.1727	1.2455	1.0000	366.0000	.2651

Source: Researcher's fieldwork, (2020)

4.6 The Effect of Accessibility of Resources on the Internet on Students' Perception of Programming at the Public Universities in Ghana

The descriptive results for the current study emphasized on the effect of accessibility of resources on the internet on students' perception of programming at the public universities in Ghana. It shows the mean, standard deviation, skewness, Kurtosis,

minimum and maximum Likert choice chosen by respondents, and the total number of respondents (Al-adwan, Box, & Arabia, 2016). The results also show the hypothesis that test the effect and relationship between the variables. Table 10 shows the descriptive statistics of responses to internet resource accessibility (IRA) about resources used. Table 11 shows the descriptive statistics of responses to internet resource accessibility (IRA) based on the level of agreement. Programming books (IRA1) had the highest mean of 2.6495 which means that, programming books were the highest resource that could be accessible on the internet. The average distance a score was from the mean was 1.50184, representing the measure of dispersion (standard deviation) which widely spread the distribution. Online tutorials (IRA4) had the second-highest mean of 2.2092 which means that online tutorials were the second-highest resource that could be accessible on the internet. The average distance a score was from the mean was 1.04775, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Programs to download and update (IRA6) had the third-highest mean of 2.0870 which means that programs to download and update were the third-highest resource that could be accessible on the internet. The average distance a score was from the mean was 0.86911, representing the measure of dispersion (standard deviation) which widely spread the distribution. Sites that share uncompleted programs (IRA3) had the fourth highest mean of 1.8641 which means that sites that share uncompleted programs were the fourth-highest resource that could be accessible on the internet. The average distance a score was from the mean was 0.84687, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Sites that provide free source code (IRA2) had the fifth-highest mean of 1.7935 which means that sites that provide free source code were the fifth-highest resource that could be accessible on the internet. The average distance a score was from the mean was 0.84541, representing the measure of dispersion (standard deviation) which widely spread the distribution. The online classroom (IRA5) had the last mean of 1.5353 which means that online classroom was the last resource that could be accessible on the internet. The average distance a score was from the mean was 0.72994, representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from 0.457 to 1.145 which means, the variable was sufficiently normal. The kurtosis of three items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of three items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean.

Table 10: Descriptive Statistics for Internet Resources Accessibility on the resources assessed on the internet

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
IRA1	368	1.00	5.00	2.6495	1.50184	.462	.127	-1.292	.254
IRA2	368	1.00	4.00	1.7935	.84541	.761	.127	-.288	.254
IRA3	368	1.00	4.00	1.8641	.84687	.966	.127	.579	.254
IRA4	368	1.00	5.00	2.2092	1.04775	.802	.127	.079	.254
IRA5	368	1.00	4.00	1.5353	.72994	1.145	.127	.435	.254
IRA6	368	1.00	4.00	2.0870	.86911	.457	.127	-.455	.254

Source: Researcher's fieldwork, (2020)

Also, with the level of agreement on resource accessibility, the results show that accessibility of programming resources from the internet make students have a positive perception about programming (IRA8) had the highest mean of 2.5598 which means

that, accessibility of programming resources from the internet make students have a positive perception about programming. The average distance a score was from the mean was 1.09580, representing the measure of dispersion (standard deviation) which widely spread the distribution. Accessibility of programming resources from the internet make students feel happy to engage in programming (IRA9) had the second-highest mean of 2.5380 which means that accessibility of programming resources from the internet make students feel happy to engage in programming.

The average distance a score was from the mean was 1.02219, representing the measure of dispersion (standard deviation) which widely spread the distribution. Accessibility of programming resources from the internet gives a reason for students to engage in programming (IRA11) had the third-highest mean of 2.3207 which means that accessibility of programming resources from the internet gives a reason for students to engage in programming. The average distance a score was from the mean was 1.11243, representing the measure of dispersion (standard deviation) which widely spread the distribution. Accessibility of programming resources from the internet makes students find it simple to learn programming (IRA10) had the fourth highest mean of 1.9946 which means that, accessibility of programming resources from the internet make students find it simple to learn how to program.

The average distance a score was from the mean was 1.00948, representing the measure of dispersion (standard deviation) which widely spread the distribution. Accessibility of programming resources from the internet help improve students' interest in programming (IRA7) had the last mean of 1.8668 which means that accessibility of programming resources from the internet help improve students' interest in programming. The average distance a score was from the mean was 0.86481,

representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from 0.619 to 1.128 which means, the variable was sufficiently normal. The kurtosis of one item was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of four items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean.

Table 11: Descriptive Statistics for Internet Resources Accessibility on the level of agreement

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
IRA7	368	1.00	4.00	1.8668	.86481	.921	.127	.340	.254
IRA8	368	1.00	5.00	2.5598	1.09580	1.040	.127	.343	.254
IRA9	368	1.00	5.00	2.5380	1.02219	1.128	.127	.412	.254
IRA10	368	1.00	5.00	1.9946	1.00948	1.002	.127	.747	.254
IRA11	368	1.00	5.00	2.3207	1.11243	.619	.127	-.701	.254

Source: Researcher's fieldwork, (2020)

Table 12 demonstrated that I feel I belong in programming (CSIIP 6) had the highest mean of 3.0571 which means that, students feel that they belong in programming was the highest interest in programming to students. The average distance a score was from the mean was 1.02795, representing the measure of dispersion (standard deviation) which widely spread the distribution. I feel no tiredness when programming (CSIIP 5) had the second-highest mean of 2.8342 which means that, students feel no tiredness when programming was the second-highest interest in programming to students. The average distance a score was from the mean was 1.13753, representing the measure of dispersion (standard deviation) which widely spread the distribution. Programming is interesting to me (CSIIP 8) had the third-highest mean of 2.8207 which means that programming is interesting to me was the third-highest interest in programming to students. The average distance a score was from the mean was 1.17902, representing

the measure of dispersion (standard deviation) which widely spread the distribution. I like programming (CSIIP 1) had the fourth highest mean of 2.7283 which means that students like programming was the fourth-highest interest in programming to students. The average distance a score was from the mean was 1.19356, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I want to program every day (CSIIP 3) had the fifth-highest mean of 2.4973 which means that, students desire to program every day was the fifth-highest interest in programming to students. The average distance a score was from the mean was 0.92202, representing the measure of dispersion (standard deviation) which widely spread the distribution. I do not get discouraged from setbacks in programming (CSIIP 9) had the sixth-highest mean of 2.4484 which means that students do not get discouraged from setbacks in programming was the sixth-highest interest in programming to students. The average distance a score was from the mean was 0.98077, representing the measure of dispersion (standard deviation) which widely spread the distribution. I become comfortable when programming (CSIIP 4) had the seventh-highest mean of 2.3804 which means that, students become comfortable when programming was the seventh-highest interest in programming to students. The average distance a score was from the mean was 0.81662, representing the measure of dispersion (standard deviation) which widely spread the distribution.

I look forward to taking programming (CSIIP 7) had the eighth-highest mean of 2.0924 which means that students look forward to taking programming was the eighth-highest interest in programming to students. The average distance a score was from the mean was 0.76514, representing the measure of dispersion (standard deviation) which widely

spread the distribution. I am happy when programming (CSIIP 2) had the last mean of 2.0163 which means that, students are happy when programming was the last interest in programming to students. The average distance a score was from the mean was 0.75986, representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from 0.050 to 0.828 which means, the variable was sufficiently normal. The kurtosis of six items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of three items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean.

Table 12: College Students' Interest in Programming

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CSIIP1	368	1.00	5.00	2.7283	1.19356	.828	.127	-.357	.254
CSIIP2	368	1.00	5.00	2.0163	.75986	.722	.127	1.662	.254
CSIIP3	368	1.00	5.00	2.4973	.92202	.050	.127	-.460	.254
CSIIP4	368	1.00	5.00	2.3804	.81662	.314	.127	-.068	.254
CSIIP5	368	1.00	5.00	2.8342	1.13753	.117	.127	-.834	.254
CSIIP6	368	1.00	5.00	3.0571	1.02795	.385	.127	-.825	.254
CSIIP7	368	1.00	5.00	2.0924	.76514	.576	.127	.694	.254
CSIIP8	368	1.00	5.00	2.8207	1.17902	.573	.127	-.690	.254
CSIIP9	368	1.00	5.00	2.4484	.98077	.642	.127	.059	.254

Source: Researcher's fieldwork, (2020)

H2: *There exists a direct significant impact of accessibility of resources from the internet on students' perception of programming.*

Table 13 illustrate the direct significant impact of accessibility of resources from the internet on students' perception of programming. The R Square of the model summary illustration is .0241 which means the significant impact of accessibility of resources

from the internet account for only 2.41% of the contribution of factors that influence students' perception of programming. The significant value is .0028 which is below .01 and .05 with a coefficient value of .1768 and a standardized coefficient of .1551 (see Appendix B). This indicates that there is a direct significant impact of accessibility of resources from the internet on students' perception of programming.

Table 13: Independent Variable – Internet Resource Accessibility

Model Summary						
R	R-sq	MSE	F	df1	df2	P
.1551	.0241	.2149	9.0228	1.0000	366.0000	.0028

Source: Researcher's fieldwork, (2020)

H7: *There exists the direct significant mediating role of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming.*

Table 14 illustrate the direct significant mediating role of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming. The R Square of the model summary illustration is .1301 which means the mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming account for only 13.01% of the contribution of factors that influence college students' interest in programming (see Appendix B). From the model in table 14, the significant value (p) for the mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming is .0000 which is below .01 and .05 with a coefficient value of .3689 and a standardized coefficient of .3649. This indicates that there is a direct significant mediating effect of students' perception of programming on the relationship between

the accessibility of resources from the internet and college students' interest in programming.

H4: *There exists a direct significant impact of students' perception of programming on college students' interest in programming.*

Also, from table 14 the significant value (p) for students' perception of programming on college students' interest in programming is .3611 which is above .05 with a coefficient value of -.0401 and a standardized coefficient of -.0452 (see Appendix B). This indicates that there is no statistically significant effect of students' perception of programming on college students' interest in programming.

Table 14: Mediating variable – students' perception of programming

	Model					
	coeff	se	t	p	LLCI	ULCI
Constant	1.8586	.1434	12.9590	.0000	1.5766	2.1407
Student Perception	-.0401	.0438	-.9145	.3611	-.1263	.0461
Internet Resource Accessibility	.3689	.0500	7.3845	.0000	.2707	.4672

Source: Researcher's fieldwork, (2020)

H9: *There exists a direct significant effect of accessibility of resources from the internet on college students' interest in programming.*

Table 15 illustrate the direct significant effects of accessibility of resources from the internet on college students' interest in programming. The R Square of the model summary illustration is .1281 which means the significant effects of accessibility of resources from the internet account for only 12.81% of the contribution of factors that influence college students' interest in programming. The significant value is .0000 which is below .01 and .05 with a coefficient value of .3618 and a standardized coefficient of .3579 (see Appendix B). This indicates that there is no direct significant

effect of accessibility of resources from the internet on college students' interest in programming.

Table 15: Accessibility of resources from the internet on college students' interest in programming

Model Summary						
R	R-sq	MSE	F	df1	df2	P
.3579	.1281	.1511	53.7726	1.0000	366.0000	.0000

Source: Researcher's fieldwork, (2020)

4.7 The Influence of Tutorials on Students' Perception of Programming at the Public Universities in Ghana

The descriptive results for the current study emphasized on the influence of tutorials on students' perception of programming at the public universities in Ghana. It shows the mean, standard deviation, skewness, Kurtosis, minimum and maximum Likert choice chosen by respondents, and the total number of respondents (Al-adwan, Box, & Arabia, 2016). The results also show the hypothesis that test the effect and relationship between the variables. Table 16 demonstrated that using step by step approach, lecturers design and entertainment system together with students (T8) had the highest mean of 2.7310. This means that using step by step approach, lecturers design entertainment system together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was 1.14169, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using step by step approach, Lecturers design Batch processing system together with students (T4) had the second-highest mean of 2.5707. This means that using step by step approach, Lecturers design Batch processing system together with students was a form of tutorial applied in the institution.

The average distance a score was from the mean was 1.07506, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using step by step approach, Lecturers design System for modelling and simulation together with students (T5) had the third-highest mean of 2.5598. This means that using step by step approach, Lecturers design System for modelling and simulation together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was 1.06298, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using a step by step approach, Lecturers design Data collection system together with students (T7) had the fourth highest mean of 2.5163.

This means that using step by step approach, Lecturers design Data collection system together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was 0.93071, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using step by step approach, Lecturers design Interactive transaction-based software together with students (T2) had the fifth-highest mean of 2.4973. This means that using step by step approach, Lecturers design Interactive transaction-based software together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was 1.03086, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Using step by step approach, Lecturers design Embedded systems together with students (T3) had the sixth-highest mean of 2.4755. This means that using step by step approach, Lecturers design Embedded systems together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was

1.02261, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using step by step approach, Lecturers design Information system together with students (T6) had the seventh-highest mean of 2.4293. This means that using step by step approach, Lecturers design Information system together with students was a form of tutorial applied in the institution.

The average distance a score was from the mean was 0.87994, representing the measure of dispersion (standard deviation) which widely spread the distribution. Using step by step approach, Lecturers design Standalone systems together with students (T1) had the last mean of 2.2255. This means that using step by step approach, Lecturers design Standalone systems together with students was a form of tutorial applied in the institution. The average distance a score was from the mean was 0.91055, representing the measure of dispersion (standard deviation) which widely spread the distribution. The skewness was from 0.719 to 1.121 which means, the variable was sufficiently normal. The kurtosis of two items was less than 0 which means that it had fewer outliers relative to normal distribution. Also, the kurtosis of six items was greater than 0 and less than 3 which means that it had relatively few outliers and scores were more clustered around the mean.

Table 16: Descriptive Statistics of Tutorials

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
T1	368	1.00	5.00	2.2255	.91055	.976	.127	1.370	.254
T2	368	1.00	5.00	2.4973	1.03086	1.050	.127	.459	.254
T3	368	1.00	5.00	2.4755	1.02261	.973	.127	.614	.254
T4	368	1.00	5.00	2.5707	1.07506	.841	.127	-.152	.254
T5	368	1.00	5.00	2.5598	1.06298	.719	.127	.005	.254
T6	368	1.00	5.00	2.4293	.87994	1.121	.127	1.088	.254
T7	368	1.00	5.00	2.5163	.93071	.962	.127	.316	.254
T8	368	1.00	5.00	2.7310	1.14169	.840	.127	-.315	.254

Source: Researcher's fieldwork, (2020)

H3: *There exists a direct significant effect of tutorials on students' perception of programming.*

Table 17 illustrate the direct significant effect of tutorials on students' perception of programming. The R Square of the model summary illustration is .0245 which means the significant effect of tutorials accounts for only 2.45% of the contribution of factors that influence students' perception of programming. The significant value is .0026 which is below .01 and .05 with a coefficient value of .0968 and a standardized coefficient of .1564 (see Appendix B). This indicates that there is a direct significant effect of tutorials on students' perception of programming.

Table 17: Independent Variable - Tutorials

Model Summary

R	R-sq	MSE	F	df1	df2	P
.1564	.0245	.2148	9.1739	1.0000	366.0000	.0026

Source: Researcher's fieldwork, (2020)

H6: *There exists a direct significant mediating role of students' perception of programming on the relationship between tutorials and college students' interest in programming.*

Table 18 illustrate the direct significant mediating role of students' perception of programming on the relationship between tutorials and college students' interest in programming. The R Square of the model summary illustration is .0023 which means the mediating effect of students' perception of programming on the relationship between tutorials and college students' interest in programming account for only 0.23% of the contribution of factors that influence college students' interest in programming (see Appendix B). From the model in table 18, the significant value (p) for the mediating effect of students' perception of programming on the relationship between tutorials and college students' interest in programming is .3726 which is above .05 with a coefficient value of .0260 and a standardized coefficient of .0473. This indicates that there is no direct significant mediating effect of students' perception of programming on the relationship between tutorials and college students' interest in programming.

H4: *There exists a direct significant impact of students' perception of programming on college students' interest in programming.*

Also, from table 18 the significant value (p) for students' perception of programming on college students' interest in programming is .9395 which is above .05 with a coefficient value of .0036 and a standardized coefficient of .0040 (see Appendix B). This indicates that there is no statistically significant effect of students' perception of programming on college students' interest in programming.

Table 18: Mediating effect of students' perception of programming

	Model					
	coeff	se	t	p	LLCI	ULCI
Constant	2.4677	.1320	18.6976	.0000	2.2081	2.7272
Student Perception	.0036	.0470	.0760	.9395	-.0888	.0959
Tutorials	.0260	.0291	.8927	.3726	-.0312	.0831

Source: Researcher's fieldwork, (2020)

H10: *There exists a direct significant effect of tutorials on college students' interest in programming.*

Table 19 illustrate the direct significant effects of tutorials on college students' interest in programming. The R Square of the model summary illustration is .0023 which means the significant effects of tutorials account for only 0.23% of the contribution of factors that influence college students' interest in programming. The significant value is .3597 which is above .05 with a coefficient value of .0263 and a standardized coefficient of .0479 (see Appendix B). This indicates that there is no direct significant effect of tutorials on college students' interest in programming.

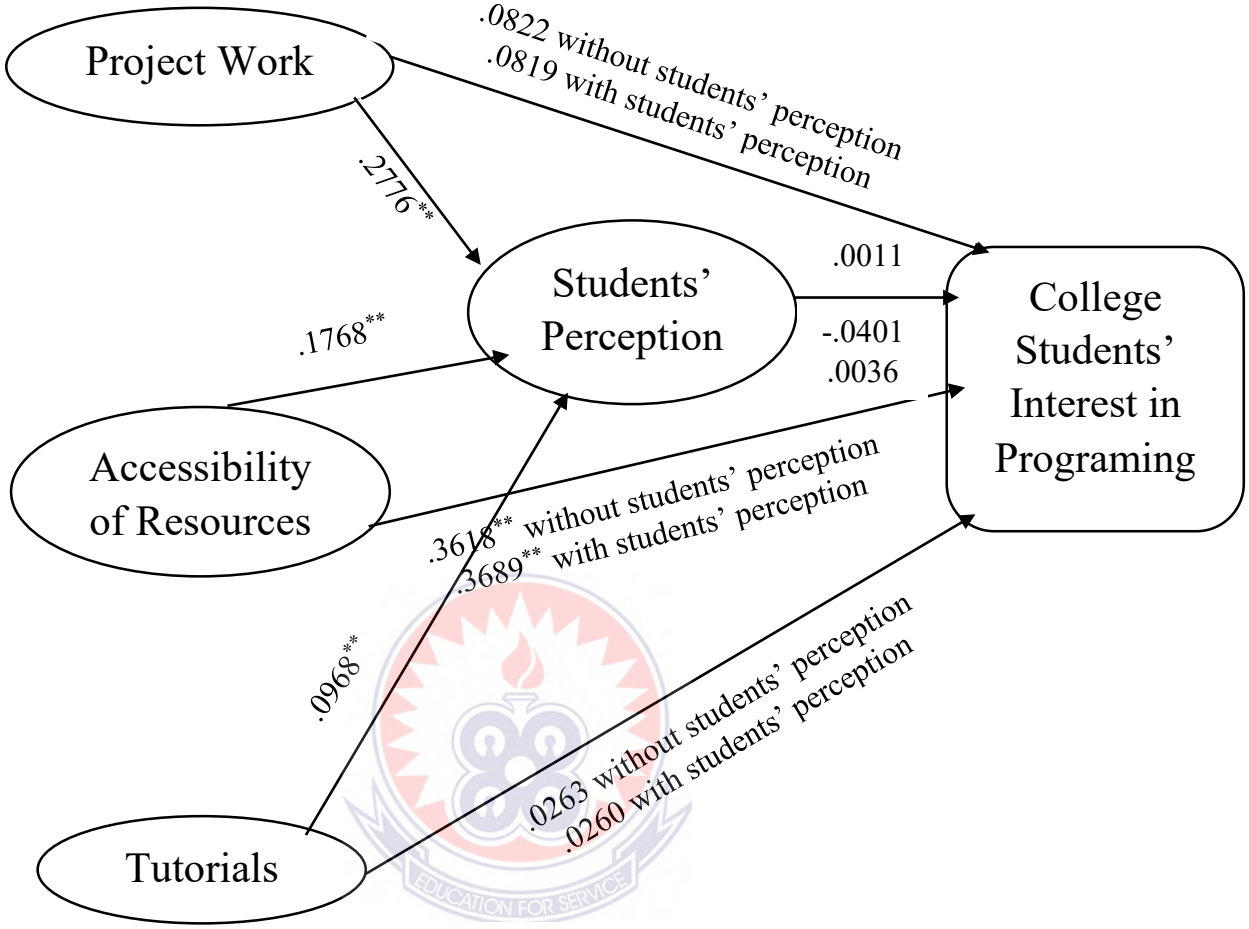
Table 19: Tutorials on college students' interest in programming.

		Model Summary				
R	R-sq	MSE	F	df1	df2	P
.3579	.1281	.1511	53.7726	1.0000	366.0000	.0000

Source: Researcher's fieldwork, (2020)

4.8 Summary of Hypothesis Testing

Figure 2 summarized the hypothesis that was tested in the study



-.0023 CI (-.0226, .0191), .2059 CI (.1374, .2818)

Figure 2: Summary of Hypothesis results

4.9 The Effect of the Relationship between Project Work, Tutorials, and Accessibility of Resources on the Internet on Students' Perception of Programming at the Public Universities in Ghana.

The descriptive results for the current study emphasized on the effect of the relationship between project work, tutorials, and accessibility of resources on the internet on students' perception of programming at the public universities in Ghana. It shows the mean and standard deviation of the results. The results also show the hypothesis that test the effect and relationship between the variables. Table 20 showed the strength and

direction of the relationship between project work (project) and internet resources accessibility (resource), the relationship between project work (project) and tutorials (tutorial), the relationship between project work (project) and students' perception (percept), the relationship between project work (project) and college students' interest in programming (interest), the relationship between internet resources accessibility (resource) and tutorials (tutorial), the relationship between internet resources accessibility (resource) and students' perception (percept), the relationship between internet resources accessibility (resource) and college students' interest in programming (interest), the relationship between tutorials (tutorial) and students' perception (percept), the relationship between tutorials (tutorial) and college students' interest in programming (interest) and the relationship between students' perception (percept) and college students' interest in programming (interest).

The current study employed a Pearson correlation. The correlation between project work and internet resources accessibility was positively medium ($r = .376^{**}$, $n = 368$, $p < 0.05$) and significant. This explained a 14.14% variation of project work in internet resources accessibility ($r^2 = .376 * .376 * 100$). This means that a positive correlation means that there is an increase in project work and as project work increases the more student access resources from the internet. The correlation between project work and tutorials was positively small ($r = .257^{**}$, $n = 368$, $p < 0.05$) and significant. This explained a 6.61% variation of project work in tutorials ($r^2 = .257 * .257 * 100$). This means that a positive correlation means that as project work increases the more students demand tutorials to guide them throughout their project work. The correlation between project work and students' perception was positively small ($r = .174^{**}$, $n = 368$, $p < 0.05$) and significant. This explained a 3.03% variation of project work in students'

perception (r^2 = .174 * .174 * 100). This means that a positive correlation means that as project work increases, students' perception of programming increases at a small rate.

The correlation between project work and college students' interest in programming was positively weak (r = .058, n = 368, p > 0.05) but not significant. This explained a 0.34% variation of project work in college students' interest in programming (r^2 = .058 * .058 * 100). This means that, as there is an increase in project work, college students' interest in programming increases at a weaker rate. The correlation between internet resources accessibility and tutorials was positively medium (r = .359**, n = 368, p < 0.05) and significant. This explained a 12.89% variation of internet resources accessibility in tutorials (r^2 = .359 * .359 * 100). This means that, as there is an increase in internet resources accessibility, tutorials are given to students also increases in a medium rate.

The correlation between internet resources accessibility and students' perception was positively small (r = .155**, n = 368, p < 0.05) and significant. This explained a 0.04% variation of internet resources accessibility in students' perception (r^2 = .155 * .155 * 100). This means that, as there is an increase in internet resources accessibility, students' perception of programming also increases at a small rate. The correlation between internet resources accessibility and college students' interest in programming was positively medium (r = .358**, n = 368, p < 0.05) and significant. This explained a 0.49% variation of internet resources accessibility in college students' interest in programming (r^2 = .358 * .358 * 100). This means that, as there is an increase in internet resources accessibility, college students' interest in programming increases at a medium rate.

The correlation between tutorials and students' perception was positively small (r = .156**, n = 368, p < 0.05) and significant. This explained a 0.01% variation of tutorials in students' perception (r^2 = .156 * .156 * 100). This means that, as there is an increase in tutorials given to students, students' perception of programming increases at a small rate. The correlation between tutorials and college students' interest in programming was positively weak (r = .048, n = 368, p > 0.05) but not significant. This explained a 1.69% variation of tutorials in college students' interest in programming (r^2 = .048 * .048 * 100). This means that, as there is an increase in tutorials given to students, college students' interest in programming increases at a weaker rate. The correlation between students' perception on programming and college students' interest in programming was positively weak (r = .011, n = 368, p > 0.05) but not significant. This explained a 1% variation of students' perception in college students' interest in programming (r^2 = .011 * .011 * 100). This means that, as there is an increase in students' perception of programming, college students' interest in programming increases at a weaker rate.

Also, table 20 shows that students' perception of programming had the highest factor of 2.55. This implies that students' perception of programming at the university is higher. The average distance a score was from the mean is 0.46, representing the measure of dispersion (standard deviation) which widely spread the distribution. The second highest is college students' interest in programming with a factor of 2.54. This implies that college students have an interest in programming as a second highest activity at the university. The average distance a score was from the mean is 0.41, representing the measure of dispersion (standard deviation) which widely spread the distribution. The third highest is tutorials given to students with a factor of 2.50. This implies that tutorials given to students had a high influence on students' academics. The

average distance a score was from the mean is 0.75, representing the measure of dispersion (standard deviation) which widely spread the distribution.

The fourth highest is project work with a factor of 2.13. This implies that project work given to students influences students' academics. The average distance a score was from the mean is 0.29, representing the measure of dispersion (standard deviation) which widely spread the distribution. The last is internet resources accessibility with a factor of 2.12. This implies that internet resources accessibility has an influence on students' academics. The average distance a score was from the mean is 0.41, representing the measure of dispersion (standard deviation) which widely spread the distribution.

Table 20: Correlation, means and standard deviations

	Project	Resource	Tutorial	Percept	Interest	M	SD
Project	1					2.13	.29
Resource	.376**	1				2.12	.41
Tutorial	.257**	.359**	1			2.50	.75
Percept	.174**	.155**	.156**	1		2.55	.46
Interest	.058	.358**	.048	.011	1	2.54	.41

Note. N = 237. The internal reliability (alpha) coefficients are shown on the diagonal.
**p < .05; **p < .01*

Source: Researcher's fieldwork, (2020)

4.10 Discussion of Results

There was a positive correlation which meant that when there is an increase in project work the more student access resources from the internet. The result is similar to that of Koch (2019), (Appiah-kubi, 2018) and White et al. (1997). Furthermore, as project work increases the more students demand tutorials to guide them throughout their

project work. The result is similar to that of Alhassan & Arabia (2017), Pausch & Kelleher (2007), and Miqdadi & Harris (2019). Moreover, as project work increases, students' perception of programming increases at a small rate. The result is similar to that of (Adams, 2018), Rahmat et al. (2012), and Moström (2011). Furthermore, as there was an increase in project work, college students' interest in programming increases at a weaker rate. The result is similar to that of Mahnic (2014), (Habók & Nagy, 2016), and Chen et al. (2018). As there was an increase in internet resources accessibility, tutorials are given to students also increases in a medium rate. The result is similar to that of Venugopal-wairagade (2016), Lee (2014), and Zink, Suh, Gu, & Kurose (2009). As there was an increase in internet resources accessibility, students' perception of programming also increases at a small rate. The result is similar to that of Garratt-reed, Roberts, Heritage, & Garratt-reed (2016), Wagner (2019), and Yukselturk & Altiok (2017). As there was an increase in internet resources accessibility, college students' interest in programming increases at a medium rate. The result is similar to that of Dittmar & Eilks (2019), Rico et al. (2011), and Birnbaum (2004). As there was an increase in tutorials given to students, students' perception of programming increases at a small rate. The result is similar to that of Blanchard & Anthony (2019), Campbell et al. (2019), and Miqdadi & Harris (2019). As there was an increase in tutorials given to students, college students' interest in programming increases at a weaker rate. The result is similar to that of Akhter (2016), Wade et al. (2019), and Schumacher (2001). As there was an increase in students' perception of programming, college students' interest in programming increases at a weaker rate. The result is similar to that of Abdunabi, Hbaci, & Ku (2019), Venugopal-wairagade (2016), and Yukselturk & Altiok (2017).

The results of the study implied that students' perception on programming at the university was higher. The result is similar to that of Yukselturk & Altiok (2017), Abdunabi, Hbaci, & Ku (2019), Moström (2011), and Rahmat et al. (2012). Furthermore, college students had an interest in programming as a second highest activity at the university. The result is similar to that of Venugopal-wairagade (2016), Chen et al. (2018), Schumacher (2001), and (Rico et al., 2011). Moreover, tutorials given to students had a high influence on students' academics. The result is similar to that of (Alhassan & Arabia, 2017), (Rochmahwati, 2015), Ciência, Moreira, & Figueiredo (2019), Wade et al. (2019), and Campbell et al. (2019). Also, project work given to students influenced students' academics. The result is similar to that of (Mazaya, 2019), Appiah-kubi (2018), Burga, Leblanc, & Rezania (2020), (Adams, 2018), and Mahnic (2014). Lastly, internet resources accessibility influences students' academics. The result is similar to that of Birnbaum (2004), Dittmar & Eilks (2019), Garratt-reed, Roberts, Heritage, & Garratt-reed (2016), and Kidane, Roebertsen, & Vleuten (2020).

The results of the study on the kind of project work been given to students revealed that standalone systems were the highest kind of project work given to students, entertainment system was the second-highest kind of project work given to students, batch processing system was the third-highest kind of project work given to students, a system for modelling and simulation was the fourth-highest kind of project work given to students, the embedded system was the fifth-highest kind of project work given to students, interactive transaction-based software was the sixth-highest kind of project work given to students, data collection system was the seventh-highest kind of project work given to students, and information system was the least kind of project work given

to students. The result is similar to that of Pausch & Kelleher (2007), Appiah-kubi (2018), Miqdadi & Harris (2019), Mahnic (2014), Burga, Leblanc, & Rezania (2020), Habók & Nagy (2016), Adams (2018), and (Mazaya, 2019).

The results of the study on the influence of project work on students' perception of programming revealed that project work can make students find interest in programming. The result is similar to that of Appiah-kubi (2018). Project work helps to disclose positive information about programming. The result is similar to that of (Adams, 2018). Project work exposes students in designing an algorithm. The result is similar to that of Burga, Leblanc, & Rezania (2020). How project work directs the students can lead to enthusiasm. The result is similar to that of (Mazaya, 2019). Project work makes students learn which is similar to a study by Adams (2018) who found the project to improve student participation in class. Appiah-kubi (2018) also found that students see that they are roused to learn by either customer-based or non-customer based project. Project work gives information to students. Project work influences students' perception which is similar to that of Ciência, Moreira, & Figueiredo (2019) who found that students in the project-based learning course expressed increasingly positive perspectives related about the project in regards to the learning procedure and polished. Project work helps in understanding the linguistic structure just as the rationale of the program. The result is similar to that of Miqdadi & Harris (2019).

The results of the study on the influence of accessibility of resources on the internet on students' perception of programming revealed that programming books were the highest resource that could be accessible on the internet. The result is similar to that of Garratt-reed, Roberts, Heritage, & Garratt-reed (2016). Online tutorials were the second-highest resource that could be accessible on the internet. Programs to download

and update were the third-highest resource that could be accessible on the internet. Sites that share uncompleted programs were the fourth-highest resource that could be accessible on the internet. Sites that provide free source code were the fifth-highest resource that could be accessible on the internet. The online classroom was the last resource that could be accessible on the internet. Accessibility of programming resources from the internet makes students have a positive perception about programming. The result is similar to that of Dittmar & Eilks (2019). Accessibility of programming resources from the internet makes students feel happy to engage in programming (Schumacher, 2001). Accessibility of programming resources from the internet gives a reason for students to engage in programming. The result is similar to that of Kidane, Roebertsen, & Vleuten (2020). Accessibility of programming resources from the internet makes students find it simple to learn how to program (Chen et al., 2008). Accessibility of programming resources from the internet help improve students' interest in programming. The result is similar to that of Birnbaum (2004).

The results of the study on the influence of tutorials on students' perception on programming revealed that using step by step approach, lecturers design entertainment system together with students was a form of tutorial applied in the institution. The result is similar to that of Ciência, Moreira, & Figueiredo (2019). Using step by step approach, Lecturers design Batch processing system together with students was a form of tutorial applied in the institution. The result is similar to that of Alhassan & Arabia (2017). Using step by step approach, Lecturers design System for modelling and simulation together with students was a form of tutorial applied in the institution. The result is similar to that of Lee (2014). Using step by step approach, Lecturers design Data collection system together with students was a form of tutorial applied in the institution.

The result is similar to that of Zink, Suh, Gu, & Kurose (2009). Using step by step approach, Lecturers design Interactive transaction-based software together with students was a form of tutorial applied in the institution. Using step by step approach, Lecturers design Embedded systems together with students was a form of tutorial applied in the institution (Wade et al., 2019). Using step by step approach, Lecturers design Information system together with students was a form of tutorial applied in the institution (Alhassan & Arabia, 2017). Using step by step approach, Lecturers design Standalone systems together with students was a form of tutorial applied in the institution (Harms et al., 2016).

The results of the study on students' perception of programming revealed that students see programming as unfamiliar was the highest perception of programming to students. The result is similar to that of Wagner (2019). Students see programming as lovely when resources are easily accessible was the second-highest perception of programming to students. Students see programming as difficult was the third-highest perception of programming to students. Students see programming language to be difficult to understand was the fourth-highest perception of programming to students. Students see the difficulty in learning visual/script programming was the fifth-highest perception of programming to students. Students see the difficulty in learning procedural programming was the sixth-highest perception of programming to students. Students see programming as time-consuming was the seventh-highest perception of programming to students. Students see the difficulty with concepts involving mathematical logic was the eighth highest perception of programming to students. Students see programming as entrepreneurial was the ninth highest perception of programming to students. Students see graphical programming languages to be helpful

to young learners was the tenth highest perception of programming to students. Students see programming as easy with dedication was the eleventh highest perception of programming to students (Abdunabi, Hbaci, & Ku, 2019). Students see programming as easy with the help of tutorials was the last perception of programming to students (Wagner, 2019).

The results of the study on college students' interest in programming revealed that student feels that they belong in programming was the highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) who used the same item and found that it has the third-highest factor loading of 0.80. Students feel no tiredness when programming was the second-highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) who found that students do not get disheartened from setbacks which had a factor loading of 0.62. Programming is interesting to me was the third-highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) who used the same item and found that it has a higher factor loading of 0.84. Students like programming were the fourth-highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) found that students appreciate programming and that they learn with their peers which had a higher factor loading of 0.43. Students' desire to program every day was the fifth-highest interest in programming to students. Students do not get discouraged from setbacks in programming was the sixth-highest interest in programming to students.

The study is similar to that of Chen *et al.* (2018) who found that students do not get disheartened from setbacks which had a factor loading of 0.62. Students become comfortable when programming was the seventh-highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) found that students feel calm

with computer science which had a higher factor loading of 0.72. Students look forward to taking programming was the eighth highest interest in programming to students. The study is similar to that of Chen *et al.* (2018) who used the same item and found that the item had the second-highest factor loading of 0.83. Students feel happy when programming was the last interest in programming to students (Mazaya, 2019). The study is similar to that of Chen *et al.* (2018) found that students enjoy learning it which had a higher factor loading of 0.73.

Also, the significant effects of project work account for only 3.04% of the contribution of factors that influence students' perception of programming. The result is similar to that of Mazaya (2019). The mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming account for only 0.34% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Wagner (2019) and Yukselturk & Altiok (2017). The significant effects of project work account for only 0.34% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Miqdadi & Harris (2019).

The significant impact of accessibility of resources from the internet accounts for only 2.41% of the contribution of factors that influence students' perception of programming. The result is similar to that of Kidane, Roebertsen, & Vleuten (2020). The mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming account for only 13.01% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Abdunabi,

Hbaci, & Ku (2019) and Miqdadi & Harris (2019). The significant effects of accessibility of resources from the internet account for only 12.81% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Dittmar & Eilks (2019).

The significant effect of tutorials accounts for only 2.45% of the contribution of factors that influence students' perception of programming. The result is similar to that of Akhter (2016), Wade et al. (2019) and Harms et al. (2016). The mediating effect of students' perception of programming on the relationship between tutorials and college students' interest in programming account for only 0.23% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Rahmat et al. (2012) and Moström (2011). The significant effects of tutorials account for only 0.23% of the contribution of factors that influence college students' interest in programming. The result is similar to that of Rico et al. (2011) and Ciência, Moreira, & Figueiredo (2019).

CHAPTER FIVE

CONCLUSION, SUMMARY AND RECOMMENDATION

5.1 Introduction

This purpose of the study is designed to examine the influence of tutorials, accessibility of resources on the internet and project work on students' perception towards their interest in programming of students at the public universities in Kumasi, Ghana. This chapter consists of conclusion, summary and recommendation.

5.2 Summary

Computer Programing has been viewed as a complex and challenging procedure that requires an attitude of high students' vigour to learn programing. Information Technology, Mathematics and Computer Science students should be engaged in knowledge and skills to have the option to adjust to their regularly evolving condition. Although programming lecturers' best interest is to impart knowledge and skills to students and wish programming becomes attractive to students, learning of programming cannot be limited to the lecture room only. Knowledge and skills in programming are best learned during lectures, learning resources and tutorials from the internet. Literature has revealed that it is vital to help amateur students of Computer Science, Mathematics, and Information Technology to get the hang of programming languages. Students' perception of programming affects their seriousness towards the course.

The study sought to investigate college students' interest in programming: the effect of project work, tutorials, accessibility of resources on the internet and students' perception. The results of study implied that students' perception on programming at

the university is higher, college students have interest in programming as a second highest activity at the university, tutorials given to students had a third high influence on students' academics, and project work given to students have an influence on students' academics. The results of the study were that the correlation between project work and internet resources accessibility was positively medium and significant which explained a 14.14% contribution of project work in internet resources accessibility. The correlation between project work and tutorials was positively small and significant. This explained a 6.61% contribution of project work in tutorials.

The correlation between project work and students' perception was positively small and significant. This explained a 3.03% contribution of project work in students' perception. The correlation between project work and college students' interest in programming was positively weak but not significant. This explained a 0.34% contribution of project work in college students' interest in programming. The correlation between internet resources accessibility and tutorials was positively medium and significant. This explained a 12.89% contribution to internet resources accessibility in tutorials. The correlation between internet resources accessibility and students' perception was positively small and significant. This explained a 0.04% contribution to internet resources accessibility in students' perception.

The correlation between internet resources accessibility and college students' interest in programming was positively medium and significant. This explained a 0.49% contribution to internet resources accessibility in college students' interest in programming. The correlation between tutorials and students' perception was positively small and significant. This explained a 0.01% contribution of tutorials in

students' perception. The correlation between tutorials and college students' interest in programming was positively weak but not significant. This explained a 1.69% contribution of tutorials in college students' interest in programming. The correlation between students' perception of programming and college students' interest in programming was positively weak but not significant. This explained a 1% contribution to students' perception in college students' interest in programming.

5.3 Conclusion

The results of the study found that there was a positive correlation which means that there was an increase in project work and as project work increases the more student access resources from the internet. There was a positive correlation which means that as project work increases the more students demand tutorials to guide them throughout their project work. There was a positive correlation which means that as project work increases, students' perception of programming increases at a small rate. Also, as there was an increase in project work, college students' interest in programming increased at a weaker rate. As there was an increase in internet resources accessibility, tutorials are given to students also increased at a medium rate. As there was an increase in internet resources accessibility, students' perception of programming also increased at a small rate. As there was an increase in internet resources accessibility, college students' interest in programming increased at a medium rate.

As there was an increase in tutorials given to students, students' perception of programming increases at a small rate. Also, as there was an increase in tutorials given to students, college students' interest in programming increased at a weaker rate. Lastly, as there was an increase in students' perception of programming, college students'

interest in programming increased at a weaker rate. Furthermore, the results of the study indicated that there was a direct significant effect of project work on students' perception of programming. It indicated that there was no direct significant mediating effect of students' perception of programming on the relationship between project work and college students' interest in programming. It indicated that there was no statistically significant effect of students' perception of programming on college students' interest in programming. It indicated that there was no direct significant effect of project work on college students' interest in programming. It indicated that there was a direct significant impact of accessibility of resources from the internet on students' perception of programming.

It indicated that there was a direct significant mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet and college students' interest in programming. It indicated that there was no direct significant effect of accessibility of resources from the internet on college students' interest in programming. It indicated that there was a direct significant effect of tutorials on students' perception of programming. It indicated that there was no direct significant mediating effect of students' perception of programming on the relationship between tutorials and college students' interest in programming. Lastly, the results of the study indicated that there was no direct significant effect of tutorials on college students' interest in programming.

5.4 Recommendation

The study recommends that the ministry of education, policymakers, principal, lecturers and other stakeholders should put measures in place to strengthen the use of project work in teaching and learning of programming to enhance college students' interest in programming. Furthermore, there should be provisions for students' accessibility of resources from the internet to be effective, reliable and efficient to enhance students' learning and interest in programming at school. Moreover, the study recommends that a well-structured and advanced way of teaching programming through tutorials should be encouraged in all educational institutions that teach programming as a course to enhance students' interest in programming. Also, intelligent program design tools should be provided to senior high schools and universities offering programming to help equip students skills and knowledge in programming.

5.5 Suggestions for Future Studies

The results of the study revealed that there was a 0.34% contribution of project work on college students' interest in programming, 12.81% contribution of accessibility of resources from the internet on college students' interest in programming, 0.23% contribution of tutorials on college students' interest in programming. Therefore, further studies should focus on other factors that influence college students' interest in programming. Also, the results of the study revealed that there was a 2.45% contribution of tutorials on students' perception of programming, 2.41% contribution of accessibility of resources from the internet on students' perception of programming, and 3.04% contribution of project work on students' perception of programming. As a result, further studies should focus on other factors that influence students' perception

of programming. Lastly, the results of the study revealed that there was 13.01% contribution of the mediating effect of students' perception of programming on the relationship between the accessibility of resources from the internet, tutorials, and project work, and college students' interest in programming. Therefore, further studies should focus on other factors that mediate effectively between independent variables and college students' interest in programming.

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APPENDIX A

QUESTIONNAIRE

Dear respondent, this questionnaire is designed to gather data about College students' interest in programming: The effect of project work, tutorials, internet resources accessibility and students' perception. This research project is conducted by a UEW-K Masters' student and your kind cooperation in this research is very much appreciated. Your anonymity and confidentiality are assured.

SECTION A: YOUR PERSONAL DATA

Please indicate your response to statements by ticking [√] the appropriate box.

1. Age: Below 22 years [ ] 22-42 years [ ] 43-60 years [ ] 60 years and above [ ]
2. Gender: Male [ ] Female [ ]

SECTION B: YOUR INSTITUTION

3. Your institution: KNUST [ ] UEW-K [ ] KTU [ ]
4. Your program: Computer Science [ ] Computer Engineering [ ] Mathematics [ ] Information Technology
5. Your level: 100 [ ] 200 [ ] 300 [ ] 400

SECTION C: PROJECT WORK

This category contains statements about the kind of project work been given to students. Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= strongly agree 2= agree 3= slightly agree 4= Disagree

5= Strongly disagree

S/N	Statement	1	2	3	4	5
PW 1	Standalone systems					
PW 2	Interactive transaction based software					
PW 3	Embedded system					
PW 4	Batch processing system					
PW 5	System for modelling and simulation					
PW 6	Information system					
PW 7	Data collection system					
PW 8	Entertainment system					

Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

	CIRCLE ONLY ONE OPTION IN 1-5	1	2	3	4	5
PW 9	Project work expose students in designing algorithm.					
PW 10	Project work helps in understanding the linguistic structure just as the rationale of the program.					
PW 11	Project work gives information to students.					
PW 12	Project work can make students find interest in programming.					
PW 13	Project work helps to disclose positive information about programming.					

PW 14	The manner in which project work directs the students can lead to enthusiasm.					
PW 15	Project work influences students' perception.					
PW 16	Project work makes students learn					

INTERNET RESOURCES ACCESSIBILITY

This category contains statements about resources that can be accessible on the internet. Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

S/N	Statement	1	2	3	4	5
IRA 1	Programming books					
IRA 2	Sites that provide free source code					
IRA 3	Sites that share uncompleted programs					
IRA 4	Online tutorials					
IRA 5	Online classroom					
IRA 6	Programs to download and update					

Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

S/N	Statement	1	2	3	4	5
IRA 7	Availability of programming resources on the internet help improve students' interest in programming.					
IRA 8	Accessibility of programming resources from the internet make students have positive perception about programming.					

IRA 9	Accessibility of programming resources from the internet make students' feel happy to engage in programming.					
IRA 10	Accessibility of programming resources from the internet make students find it simple to learn programming.					
IRA 11	Accessibility of programming resources from the internet give a reason for students to engage in programming.					

TUTORIALS

This category contains statements about the tutorials given to students. Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

S/N	Statement	1	2	3	4	5
T 1	Using step by step approach, Lecturers design Standalone systems together with students.					
T 2	Using step by step approach, Lecturers design Interactive transaction based software together with students.					
T 3	Using step by step approach, Lecturers design Embedded systems together with students.					
T 4	Using step by step approach, Lecturers design Batch processing system together with students.					
T 5	Using step by step approach, Lecturers design System for modelling and simulation together with students.					
T 6	Using step by step approach, Lecturers design Information system together with students.					
T 7	Using step by step approach, Lecturers design Data collection system together with students.					
T 8	Using step by step approach, Lecturers design Entertainment system together with students.					

STUDENTS' PERCEPTION

This category contains statements about your perception on programming. Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

S/N	Statement	1	2	3	4	5
SP 1	I see programming as easy with the help of tutorials					
SP 2	I see programming as lovely when resources are easily accessible					
SP 3	I see programming as time consuming					
SP 4	I see programming as entrepreneurial					
SP 5	I see programming as unfamiliar					
SP 6	I see programming as difficult					
SP 7	I see programming as easy with dedication					
SP 8	I see programming language to be difficult to understand					
SP 9	I see graphical programming languages to be helpful to young learners					
SP 10	I see difficulty with concepts involving mathematical logic					
SP 11	I see difficulty in learning procedural programming					
SP 12	I see difficulty in learning visual/script programming					

COLLEGE STUDENTS' INTEREST IN PROGRAMMING

This category contains statements about your interest in programming. Please indicate your level of agreement to the statements using the 5 point Likert scale below by ticking [√] the appropriate box:

1= Strongly Agree 2= Agree 3= Slightly Agree 4= Disagree

5= Strongly Disagree

S/N	**Statement**	**1**	**2**	**3**	**4**	**5**
CSIIP 1	I like programming					
CSIIP 2	I am happy when programming					
CSIIP 3	I want to program everyday					
CSIIP 4	I become comfortable when programming					
CSIIP 5	I feel no tiredness when programming					
CSIIP 6	I feel I belong in programming					
CSIIP 7	I look forward to taking programming					
CSIIP 8	Programming is interesting to me					
CSIIP 9	I do not get discouraged from setbacks in programming					

APPENDIX B

Run MATRIX procedure:

**** PROCESS Procedure for SPSS Version 3.5 ****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

Documentation available in Hayes (2018). www.guilford.com/p/hayes3

****

Model : 4

Y : CollegeI

X : ProjectW

M : StudentP

Sample Size: 368

****

OUTCOME VARIABLE: StudentP

Model Summary

R	R-sq	MSE	F	df1	df2	p
.1744	.0304	.2135	11.4870	1.0000	366.0000	.0008

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.9633	.1761	11.1478	.0000	1.6170	2.3096
ProjectW	.2776	.0819	3.3892	.0008	.1165	.4386

Standardized coefficients

	coeff
ProjectW	.1744

****

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.0583	.0034	.1732	.6214	2.0000	365.0000	.5378

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.3643	.1836	12.8789	.0000	2.0033	2.7253
ProjectW	.0819	.0749	1.0932	.2750	-.0654	.2292

StudentP	.0011	.0471	.0243	.9806	-.0914	.0937

Standardized coefficients

	coeff
ProjectW	.0580
StudentP	.0013

********** TOTAL EFFECT MODEL **********

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.0582	.0034	.1727	1.2455	1.0000	366.0000	.2651

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.3665	.1584	14.9404	.0000	2.0551	2.6780
ProjectW	.0822	.0737	1.1160	.2651	-.0626	.2270

Standardized coefficients

	coeff
ProjectW	.0582

********* TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
.0822	.0737	1.1160	.2651	-.0626	.2270	.1977	.0582

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps	c'_cs
.0819	.0749	1.0932	.2750	-.0654	.2292	.1970	.0580

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0003	.0119	-.0247	.0234

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0008	.0287	-.0567	.0578

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0002	.0085	-.0168	.0171

********** ANALYSIS NOTES AND ERRORS **********

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

WARNING: Variables names longer than eight characters can produce incorrect output when some variables in the data file have the same first eight characters. Shorter variable names are recommended. By using this output, you are accepting all risk and consequences of interpreting or reporting results that may be incorrect.

------ END MATRIX -----

Run MATRIX procedure:

********** PROCESS Procedure for SPSS Version 3.5 **********

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

Documentation available in Hayes (2018). www.guilford.com/p/hayes3

****

Model : 4

Y : CollegeI

X : Internet

M : StudentP

Sample Size: 368

****

OUTCOME VARIABLE: StudentP

Model Summary

R	R-sq	MSE	F	df1	df2	p
.1551	.0241	.2149	9.0228	1.0000	366.0000	.0028

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.1782	.1276	17.0713	.0000	1.9273	2.4292
Internet	.1768	.0588	3.0038	.0028	.0610	.2925

Standardized coefficients

	coeff
Internet	.1551

****

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.3607	.1301	.1512	27.2924	2.0000	365.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.8586	.1434	12.9590	.0000	1.5766	2.1407
Internet	.3689	.0500	7.3845	.0000	.2707	.4672
StudentP	-.0401	.0438	-.9145	.3611	-.1263	.0461

Standardized coefficients

	coeff
Internet	.3649
StudentP	-.0452

********** TOTAL EFFECT MODEL **********

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.3579	.1281	.1511	53.7726	1.0000	366.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.7713	.1070	16.5559	.0000	1.5609	1.9817
Internet	.3618	.0493	7.3330	.0000	.2648	.4589

Standardized coefficients

	coeff
Internet	.3579

********* TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
.3618	.0493	7.3330	.0000	.2648	.4589	.8703	.3579

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps	c'_cs
.3689	.0500	7.3845	.0000	.2707	.4672	.8874	.3649

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	-.0071	.0082	-.0260	.0061

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	-.0170	.0194	-.0614	.0150

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	-.0070	.0080	-.0252	.0061

********** ANALYSIS NOTES AND ERRORS **********

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

WARNING: Variables names longer than eight characters can produce incorrect output when some variables in the data file have the same first eight characters. Shorter variable names are recommended. By using this output, you are accepting all risk and consequences of interpreting or reporting results that may be incorrect.

------ END MATRIX -----

Run MATRIX procedure:

********** PROCESS Procedure for SPSS Version 3.5 **********

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

Documentation available in Hayes (2018). www.guilford.com/p/hayes3

****

Model : 4

Y : CollegeI

X : Tutorial

M : StudentP

Sample Size: 368

****

OUTCOME VARIABLE: StudentP

Model Summary

R	R-sq	MSE	F	df1	df2	p

.1564	.0245	.2148	9.1739	1.0000	366.0000	.0026

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.3125	.0835	27.6969	.0000	2.1483	2.4767
Tutorial	.0968	.0320	3.0288	.0026	.0340	.1596

Standardized coefficients

	coeff
Tutorial	.1564

****

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.0480	.0023	.1734	.4223	2.0000	365.0000	.6559

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.4677	.1320	18.6976	.0000	2.2081	2.7272
Tutorial	.0260	.0291	.8927	.3726	-.0312	.0831
StudentP	.0036	.0470	.0760	.9395	-.0888	.0959

Standardized coefficients

	coeff
Tutorial	.0473
StudentP	.0040

********** TOTAL EFFECT MODEL **********

OUTCOME VARIABLE: CollegeI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.0479	.0023	.1729	.8411	1.0000	366.0000	.3597

Model

	coeff	se	t	p	LLCI	ULCI
constant	2.4759	.0749	33.0539	.0000	2.3286	2.6232
Tutorial	.0263	.0287	.9171	.3597	-.0301	.0827

Standardized coefficients

	coeff
Tutorial	.0479

******** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
.0263	.0287	.9171	.3597	-.0301	.0827	.0633	.0479

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps	c'_cs
.0260	.0291	.8927	.3726	-.0312	.0831	.0624	.0473

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0003	.0042	-.0074	.0097

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0008	.0103	-.0176	.0238

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
StudentP	.0006	.0077	-.0132	.0178

********** ANALYSIS NOTES AND ERRORS **********

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

WARNING: Variables names longer than eight characters can produce incorrect output when some variables in the data file have the same first eight characters. Shorter variable names are recommended. By using this output, you are accepting all risk and consequences of interpreting or reporting results that may be incorrect.

------ END MATRIX -----

APPENDIX C

UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI
FACULTY OF TECHNICAL EDUCATION
DEPARTMENT OF INFORMATION TECHNOLOGY EDUCATION

200030545

May 27, 2020

TO WHOM IT MAY CONCERN

INTRODUCTORY LETTER

We write to introduce to you Mr. Isaac Ampofo Atta Snr, a postgraduate student of the University of Education, Winneba. He is currently offering MSc Information Technology Education at the Department of Information Technology Education Kumasi Campus.

As part of the programme the student is undertaking a project on the topic "College students' interest in Programming: The effects of Project work, Tutorials, Accessibility of resources on the internet and student's perception" using your institution as a case study.

He is therefore, seeking your consent to use the students as participants for his study.

We wish to kindly request that you grant him audience for administration of questionnaire through Google forms. We also wish to assure you that this data is for academic purposes and all information made available to him will be kept confidential.

We count very much on your anticipated co-operation.

Thank you.

Kwame Ansong-Gyimah (PhD)
Ag. Head, ITE

Head, Information Technology Educ.
College of Technology Education, Kumasi
of Education, Winneba